Development of a lifestyle intervention for adults with bipolar disorder

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Abstract

Background

Weight management is a significant issue for people with bipolar disorder. Approximately 68% of people who are receiving treatment for bipolar disorder are overweight or obese. There are few trials testing lifestyle interventions for weight management in this population. Trials including people with bipolar disorder completed to date, have methodological limitations and few aim to impact on longer term maintenance of behaviour change. There are also few qualitative studies exploring weight related issues and challenges for this group in order to inform interventions.

Aims

- To gain an understanding of the evidence base for weight management interventions for people with bipolar disorder.

- To explore the experiences of people with bipolar disorder and those who support them including family and friends (close social support) and health professionals.

- To draw together this evidence to inform the design of weight management interventions for people with bipolar disorder.

Methods

This research consisted of two phases. The first phase was a systematic review of trials of lifestyle interventions for adults diagnosed with a serious mental illness (SMI) (including bipolar disorder and schizophrenia). The behaviour change techniques included in the trials were identified. A systematic review of qualitative studies was also conducted to explore the barriers and facilitators of lifestyle behaviour change for adults with SMI. The qualitative and quantitative data were summarised in tables and the data were combined in a narrative summary.

The second phase consisted of 26 semi-structured interviews with: people with bipolar disorder (n=16); their families (n=5); and health professionals (n=5) involved in their care. These interviews explored issues around lifestyle, weight management, diet and physical activity; as well as barriers and facilitators to change. Data were analysed using a thematic approach and just over ten percent were double coded. Social network data were also collected from people diagnosed with bipolar disorder via sociograms. The sociograms explored the nature of social networks in this group and the potential for intervening via social networks. The sociograms were drawn by participants and questions were asked about the people in the diagrams. These were then coded into the social network software, UCINET. Due to the small number of participants included in this study the analyses were exploratory in nature.

Results

The systematic review did not identify many trials of lifestyle interventions for adults with bipolar disorder and there were few qualitative studies. Through the systematic review 19 articles were identified. A total of ten trials of lifestyle interventions and nine qualitative studies.

The identified trials from the review included one physical activity only, and nine combined physical activity and diet. No trials were found for diet only. Of the nine trials included in the systematic review, eight were randomised controlled trials and one was a comparison study. Study quality was generally poor for the trials with small sample sizes and lack of follow-up of interventions. The ten qualitative studies were: four one to one interviews; three focus groups; two ethnographic; and one combination of interviews, observations and focus groups. The overall quality of the qualitative studies was reasonable. There was a lack of detail about the participant demographics and participant recruitment.

Trials that included both physical activity and diet were more likely to result in weight loss than trials that included physical activity only. Across the four trials that lost weight, eleven behaviour change techniques were identified in the trials. These were: provide information about behaviour health link; provide information on consequences; prompt intention formation; provide instructions; model or demonstrate the behaviour; prompt specific goal setting; prompt

review of behaviour goals; prompt self-monitoring of behaviour; provide feedback on performance; prompt practice; and use follow-up prompts. Two theories, social cognitive theory and control theory were most strongly represented in the BCTs present in the four successful trials.

The qualitative studies showed that in order to achieve weight loss for people with bipolar disorder it is important to improve: physical health, mental health, contextual factors (such as access to exercise space and facilities), and social support. These factors are important for supporting behaviour change for weight management interventions.

Thematic analysis of participant interview data revealed a number of key themes related to weight management in this group including: the challenges of living with bipolar disorder; lifestyle related issues; and social support and social influences. Living with bipolar disorder was a key theme and it demonstrated how the disorder influences all aspects of the participant's life. The lifestyle theme covers topics that are linked to managing their bipolar disorder, for example how physical activity, diet, alcohol and coping strategies both influence and are influenced by their bipolar disorder. Social support and social influence were mostly discussed by people who provide support, however people diagnosed with bipolar disorder also identified the importance of social support for weight management. Finally, intervention ideas were discussed with participants. Most participants reported needing and wanting a lifestyle intervention. Using technology was highlighted by participants as being both positive and negative.

A number of barriers and facilitators were identified by participants regarding weight management. The barriers and facilitators were grouped into intrapersonal, interpersonal and other. The intrapersonal factors consisted of internal personal factors that contributed to weight management, including motivation to make lifestyle changes and mood impacts on food choices. Interpersonal factors reflected how other people who provide support contribute to the success or otherwise of weight management in patients with bipolar disorder. Other factors that were discussed included medication and hospitalisation and their negative impact on weight. Finally, people identified mood as having a major impact on attempts to manage weight.

Although the social network data analysis gave only a preliminary exploration of the structure of the participants' social networks and social support, there were some interesting findings. Most participants felt that they had the necessary support to make behaviour changes to facilitate weight management. Everyone had a mixture of healthy and unhealthy people providing social support (as identified by bipolar participants). There did not appear to be a difference in the structure or function of social networks between healthy weight participants and participants with overweight/obesity. Due to the small numbers of participants this may have been difficult to assume that this is prevalent across the wider population.

Conclusions

The systematic review identified that there are gaps in the evidence base related to weight management interventions, including effective behaviour change techniques. Previous studies have a number of methodological problems and few interventions have been shown to be effective. Qualitative studies, including this one, have shown that people with bipolar disorder face similar barriers in relation to weight management as the general population, but they also have additional issues to manage associated with their bipolar disorder. The systematic review and the qualitative evidence indicate that people with bipolar disorder want interventions and that they have the potential to assist with weight management. From the evidence to date, these interventions should consist of both physical activity and dietary components and also include an element of social support, as that has been identified as important. They should also take into consideration the complex nature of bipolar disorder and how this impacts on weight management.

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Author Declaration

I declare that, except where explicit reference is made to the contribution of others, that this dissertation is the result of my own work and has not been submitted for any other degree at the University of Glasgow or any other institution.

Printer name: Natalie Chalmers

Signature:

Abbreviations

SMI	Serious Mental Illness
BCT	Behaviour Change Techniques
RCT	Randomised Controlled Trials
CASP	Critical Appraisal Skills Programme
BMI	Body Mass Index

1 Introduction

The aim of this introductory chapter is to provide an overview of the literature, to outline the rationale for my thesis and to define the research questions. Previous research will be explored and interventions described to provide a background to the thesis.

1.1 Bipolar disorder

Bipolar disorder, previously known as manic depression, is a condition that affects an individual's mood. Bipolar disorder is classified as a SMI (SMI) along with schizophrenia, schizoaffective disorder and major depression. These disorders manifest differently from each other. People with bipolar disorder have mood swings or episodes that vary from one extreme to another. Individuals experience episodes of both: depression – feeling very low and lethargic; and mania – feeling very high and overactive. Bipolar disorder is a complex disorder as the symptoms depend on which mood the individuals diagnosed are experiencing. These mood swings or episodes of bipolar disorder can last for several weeks (or longer), and some individuals may never experience a "normal" mood. People with bipolar disorder are reported as being the most sedentary compared to the general population.(1)

According to Bipolar UK between 1% and 2% of the population experience a lifetime prevalence for bipolar disorder.(2) Bipolar disorder tends to affect both males and females equally. According to the Royal College of Physicians (3) bipolar disorder usually starts during adolescence (15-19 years of age.) It also reports that bipolar disorder rarely starts after the age of 40.

There are two types of disorder: Bipolar I and Bipolar II. Bipolar I is diagnosed when an individual has had at least one high or manic episode lasting for longer than one week. Individuals with Bipolar I may only have manic episodes, although most people with Bipolar I also have periods of depression. The manic episodes of an untreated individual will generally last 3 to 6 months while untreated episodes of depression last longer at between 6 and 12 months. In comparison, individuals with Bipolar II will have had more than one episode of severe depression but only mild manic episodes- these are called 'hypomania'.

Within both Bipolar I and Bipolar II a further condition exists - that of rapid cycling bipolar disorder. This is where an individual has more than four mood swings in a 12 month period. This affects around one in ten people with bipolar disorder.(3)

The aetiology of bipolar disorder is unclear, but there is a strong genetic link. It is also possible that mood episodes may be brought on by stressful experiences or physical illnesses. Bipolar disorder is not curable, instead it must be managed. There are a number of strategies individuals can employ to help themselves control their mood swings so that they do not progress into full blown episodes of mania or depression. These include: self-monitoring; knowledge of the disorder; stress management; support from close relationships; keeping active; and regular exercise.

According to the Royal College of Physicians (3) medication is still often needed to stabilise the mood of those diagnosed and to treat a manic or depressive episode. There are several mood stabilisers such as Lithium; anticonvulsant medications /anticonvulsants; Carbamazepine; Lamotrigine; antipsychotic medications such as Olanzapine and Quetiapine. Each of these medications has associated benefits and side effects. Medication is not used in isolation from other treatments such as psychological treatment. The Royal College of Physicians states that treatment usually involves around 16 one hour sessions over a period of 6 to 9 months.(3) The treatment includes: psycho-education; mood monitoring; help to develop coping skills; cognitive behavioural therapy.

Bipolar disorder is a complex and debilitating disorder which manifests itself in varying degrees and can affect people from all backgrounds. Consequently while treatment, support, and interventions are necessary, it is difficult to address the wide range of symptoms that can be experienced.

1.1.1 Risk factors associated with bipolar disorder

A key issue with mental health illnesses is that, traditionally, clinical services have tended to view mental health and physical health as separate. There is, however, a growing belief within both research and clinical practice that physical health and mental health are strongly inter-related.(4) Studies are now

assessing the complex relationship between mental health and physical health conditions across a range of settings and patient groups.

Research shows high rates of substance abuse among those with bipolar disorder.(5) In fact substance-related disorders have been found to occur in 40–60% of patients.(6) According to Hulvershorn et al tobacco is the most common drug of abuse among individuals with BD being used 1.5-3 times more often than in the general population.(7) Furthermore, Hulvershorn et al stated that alcohol, cannabis and cocaine are the next most commonly misused substances among individuals with BD.(7) Since people with bipolar disorder more frequently participate in substance abuse they are ultimately more likely to experience a negative impact on their physical health.

Individuals with bipolar disorder are more likely to present with cardiometabolic disease, including obesity, hypertension, diabetes, high cholesterol, and heart disease. (8) The number of deaths due to Cardiovascular Disease (CVD) in individuals with bipolar disorder is twice as high as those within the general population.(8)

1.1.1.1 Life-expectancy

Life-expectancy is much shorter for people with bipolar disorder(9). A European study by Laursen et al reported that increased mortality, due to physical diseases and medical conditions, has a greater influence on reducing life-expectancy, compared to the impact of death by external causes.(9) The mortality gap translates to a 10-20 year shortened life expectancy, which appears to be widening.(10)

Similarly, in a study by Lawrence et al (9) in Western Australia, mortality in psychiatric patients was compared to that in the general population over 20 years. Lawrence et al(11) found that since 1985 the gap in life expectancy has increased between the two groups. The authors reported that most excess deaths (difference between observed and expected number) were due to physical health conditions and not mental health conditions. They therefore concluded that more effort should be put into improving physical health to reduce mortality for people with mental illnesses.(11)

1.1.1.2 Comorbid health conditions

As highlighted above there are many physical health conditions associated with SMI and specifically bipolar disorder. A systematic review by Hert et al(12) reported that there is evidence to suggest that patients with SMI, including bipolar disorder, are at a significantly higher risk of cardiovascular morbidity and mortality than the general population. Further to this, a review by Roshanaei-Moghaddam et al found that mortality risk for CVD is between 35% and 250% higher among people with bipolar disorder compared to the general population.(13)

People with bipolar disorder do not only suffer from an increase in the risk of heart related health problems but also chronic viral infections. Hert et al also identified in the systematic review that people with SMI have a higher risk of contracting viruses such as Human Immunodeficiency Virus (HIV) (approximately 1.3%- 23.9%), hepatitis B virus (23.4%) and hepatitis C virus (19.6%). Furthermore, Hert's (12) review identified that there is a higher risk of respiratory tract diseases such as tuberculosis, pneumonia and chronic obstructive pulmonary disease. The authors (12) conclude that, while it does not provide an exhaustive list, the review illustrates that there are a diverse number of associated health conditions that can have a negative impact on the life of someone diagnosed with bipolar disorder. The findings from this study and others indicates more attention needs to be focussed on improving the physical health of people with bipolar disorder and SMI in general.

The physical health problems can be due to several different factors but some of the physical problems may be a result of complications of the medication prescribed to people in the treatment of their bipolar disorder. As described above, there are a number of different treatment options for people with bipolar disorder. Lithium is one of the medications regularly prescribed to people with bipolar disorder. Henry et al, investigated the side effects experienced by men and woman taking Lithium for at least 1 year.(14) The study involved 60 patients and they found that excessive weight gain occurred during the first year. The authors concluded that this may be the first sign of hypothyroidism.(14) It seems, therefore, that Lithium can have a negative impact on a person's physical health due to associated weight gain.

Antipsychotics can also impact negatively on a person's physical health. Marder et al reported that antipsychotics are associated with many side effects that can impact significantly on a person's physical health. These include conditions such as prolactin elevation, cataract formation, movement disorders and sexual dysfunction.(15)

1.1.1.3 Obesity

Obesity is '*a condition of excess body fat to the extent that it may have an adverse effect on health*'.(16) Obesity can be measured using body mass index (BMI). Having a BMI of 24.9kg/m^2 to 29.9 kg/m^2 is defined as being overweight; a BMI of 30.0 kg/m^2 to 34.9 kg/m^2 is defined as Class I obesity; a BMI of 35.0 kg/m^2 to 39.9 kg/m^2 defined as Class II or severe obesity; and a BMI of 40 kg/m^2 and over, defined as Class III or morbid obesity.(17) Obesity is a global epidemic that needs to be addressed. The Foresight report has indicated that by 2050, 60% of adult men, 50% of adult women and about 25% of all children under 16 could be obese.(18)

As can be seen from the systems map below, developed by the authors of the Foresight report, obesity is a complex problem with multiple interacting influences.(19) Figure 1 shows the full obesity system map. It highlights the complexity of the variables that influence the development and maintenance of obesity. The complex relationship between the variables makes the prevention and treatment of obesity challenging.(19) The system map, however, does indicate that there is unlikely to be one silver bullet which will solve the obesity problem and interventions will need to be multi-level and take account of different contextual factors. Interventions need to apply theory from different disciplines and understanding how the intervention relates to the wider system will be key.
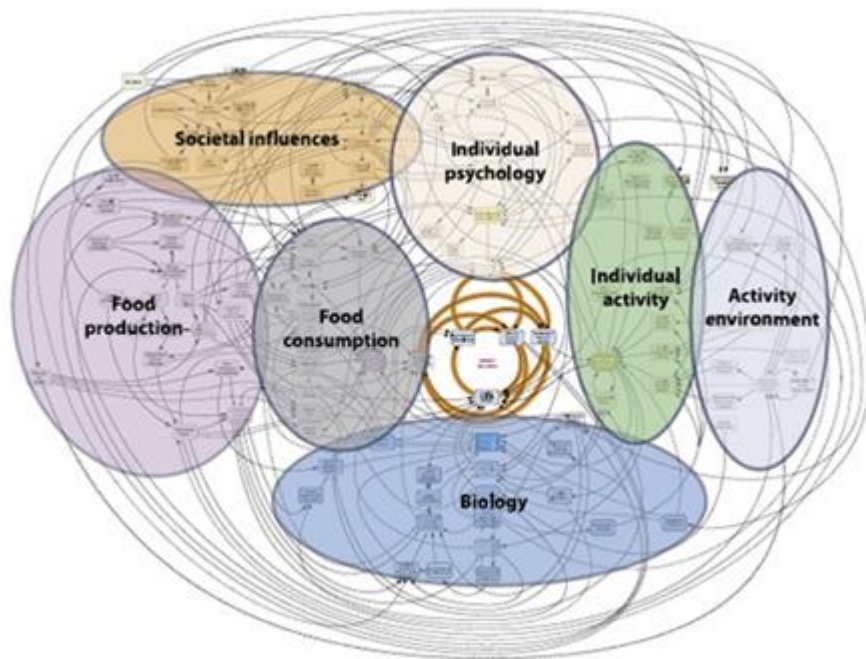
Figure 1. System map of determinants of casual pathways of obesity

Throughout this thesis I will attempt to take into consideration the complex nature of the relationships between the variables that contribute to obesity. I will focus on those with obesity and bipolar disorder where the picture is likely even more complex.

There is a high prevalence of obesity and overweight in individuals with bipolar disorder. Fagiolini et al stated that approximately 68% of people with bipolar disorder are obese or overweight.(20) This is higher than in the general population. Results from the Health Survey for England (2014) showed that 61.7% of the general population of adults were overweight or obese.

Weight gain is a very common side effect of psychotropic medications and it is one of the most frequent reasons for patients stopping taking medication.(21) It is therefore essential that weight gain within patients with bipolar disorder be investigated in order to encourage people to maintain their treatment plans. According to Devlin et al mental health professionals should not ignore the problem of mental health patient obesity(21), and that it is not just the actual obesity, but also its effects on self-esteem that require consideration.(21)

There is a strong focus on obesity within research, due to its link to poorer health outcomes such as cardiometabolic disease, including hypertension, diabetes, high cholesterol, heart disease (8) and cancer.(22) The number of deaths due to CVD in individuals with bipolar disorder is twice as high as within the general population.(8) Presenting with any of the above conditions can ultimately result in high financial costs pertaining to long term health care over and above the costs associated with bipolar disorder care.(23) A key point to note is that the likelihood of these conditions developing can be reduced by weight loss. Even when these conditions are ongoing, the risk can be reduced by increasing physical activity, improving diet and losing weight.(24)

Overweight and obesity in people with SMI, including bipolar disorder, is thus a concern as it can lead to an increase in mortality and poorer quality of life. Research to date indicates that there are a number of interacting factors associated with weight gain in bipolar disorder including, but not limited to, medication, sleeping patterns, eating disorders, managing symptoms, lifestyle, physical activity, genetics and high carbohydrate consumption.(25)

1.2 Weight management

From evidence identified in the previous section I have identified that weight gain is an important health risk for an individual diagnosed with bipolar disorder. Not only can weight gain impact on quality of life, lead to poorer physical health, and reduce life expectancy, it can also result in people refusing psychotropic treatments for bipolar disorder. This section will look at barriers to lifestyle change and different ways to help people manage their weight with a particular focus on diet and physical activity, as these are essential to weight management.

A number of barriers to weight loss in individuals with SMI have been identified. Research evidence identified low mood and stress as the most prevalent barriers. Many of the outcomes of exercise, for example mood improvement, stress reduction and increased energy, are inversely related to the barriers of depression, stress and fatigue. Depression, stress and fatigue, however, are frequently described by people with SMI as justifications for not participating in exercise. Providing patients with professional support to identify and achieve

their exercise goals may enable them to overcome psychological barriers, and maintain motivation towards regular physical activity.(26)

One study in the USA identified that healthy eating barriers, for people with SMI, include internal and external barriers.(27)The internal barriers were: negative perceptions of healthy eating; the decreased taste and satiation of healthy foods; difficulty changing familiar eating habits; eating for comfort; and the prioritisation of mental health. External barriers were: the reduced availability and inconvenience of healthy foods; social pressures; and psychiatric medication side effects.(27)

One particular issue is that people with SMI, including bipolar disorder, are often excluded from weight management trials even though the prevalence of obesity or overweight is higher for people with bipolar disorder than for the general population. Thus increasing inequalities. Current interventions for weight loss for people with SMI look to address a number of different variables that are highlighted in the system map of determinants, such as individual behaviour change and social support.(28)

Obesity is a global epidemic,(29) there are a large number of randomised controlled trials of weight loss interventions for the general population. Previous interventions that have been developed for weight management in the general population have low to moderate evidence to support successful behaviour change and weight loss. Evidence from systematic reviews of weight loss trials indicate that reduced energy diets, diet plus exercise, weight loss medications and weight loss surgery have been found to be effective for weight loss in the general population.(30) Advice-only or exercise-only interventions were found to be less effective.(30) Current evidence supports moderate energy restriction combined with exercise for effective weight loss.(31) There is little evidence from reviews to indicate that men and women should adopt different weight loss strategies.(31) Therefore, successful interventions should include a diet that is less than normal energy intake, along with exercise, as a first stage before contemplating more drastic measures such as weight loss surgery.

Systematic reviews report that there is limited evidence as to which behaviour change techniques (BCT) for weight loss interventions for the general population

are most likely to be successful.(32) Techniques including: higher autonomous motivation, self-efficacy, and self-regulation skills emerged as the best predictors of beneficial weight and physical activity outcomes.(32) One review by Samdal et al found that successful behaviour change occurred when goal setting and self-monitoring of behaviour tools were used during counselling of overweight and obese adults.(33) In addition, they found that person-centred and autonomy supportive counselling approaches assisted with maintaining behaviour change over time.(33)

A systematic review by Greaves et al indicated that intervention effectiveness increases with the intensity or amount of intervention delivered (total contact time or number of contacts).(28, 34) The authors identified that successful interventions employ a one-to-one approach.(28) The problem with more intensive one-to one interventions is that they increase the cost of intervening. These kind of interventions are not only costly to deliver but they can only reach a small proportion of the population.

As a result of these limitations there has been a move towards a new ways of supporting people to change their behaviour using both the internet and text (SMS) technologies. These new methods of delivery and support, known as eHealth and mHealth, involve the use of a range of different technologies, such as mobile phones, the Web, and sensors. Their purpose is to support users to change behaviour linked to health, mental health, and wellness. (35)There is evidence that using new technologies to promote health behaviour change can be effective.(36-38)

A problem with previous interventions using eHealth and mHealth is that they have been often been simplistic, not based on the evidence or on behaviour change theory.(39) This is important as theory based interventions generally have better outcomes.(40) The effectiveness of eHealth and mHealth interventions could be increased by applying strong evidence based BCT. eHealth and mHealth interventions could also incorporate support to achieve health-related goals from an individual's social network including family and friends. Social support is important for the initiation of and maintenance of behaviour change.(33) eHealth and mHealth may enhance interventions by increasing frequency, increasing contact, and increasing duration of the behaviour change

interventions in a more cost saving way rather than through traditional delivery mechanisms. They could also be important for longer term behavioural maintenance. Behaviour change is complex and difficult to achieve. Ongoing motivation of participants and maintenance of behaviour change are vital areas for consideration in intervention development.(41)

As described above there is evidence that interventions can be successful in helping people lose weight at least in the short term and eHealth and approaches involving various BCT including increasing social support may be useful. In the following section, I will review weight loss and weight management interventions that have been developed and tested for people with SMI, including those developed for people with bipolar disorder. Chapter 2 will cover this in more detail through a systematic review of the literature, so the sections below will give only a brief summary of the research to date.

1.2.1 Lifestyle interventions: diet and physical activity in serious mental illness

 I will begin by considering previous systematic reviews of lifestyle interventions and how effective they have been for weight loss in people with a serious mental illness (SMI); and then summarise individual studies which have had a particular focus on bipolar disorder. SMI clusters schizophrenia, bipolar disorder and major depression together. Research evidence for "what works" in terms of lifestyle interventions therefore comes from studies focusing on 1) bipolar disorder only as well as 2) SMI where bipolar disorder is included.

1.2.1.1 Systematic reviews focussing on mixed SMI populations

The majority of evidence about weight management for people diagnosed with bipolar disorder comes from studies that included SMI populations. There is mixed evidence from previous systematic reviews that suggests that lifestyle interventions can help support weight loss in people with SMI, and in turn people diagnosed with bipolar disorder.(42)

A systematic review by Naslund et al that included 17 trials, found that lifestyle interventions were effective for treating overweight and obesity among people diagnosed with a SMI.(42) The authors conducted quality scores for the studies

included, they reported that the quality of the studies was generally high and reported sufficient details to be replicated.(42) However, there were also several quality metrics that were not met by many of the studies such as follow-up of 12 months or greater.(42) Naslund et al reported that lifestyle interventions appear effective for treating overweight and obesity among people with SMI.(42) Additionally they found that interventions of ≥ 12-months duration compared to ≤ 6-months duration appeared to achieve more consistent outcomes.(42) There was a lack of evidence that the duration of intervention delivery had an impact on effect sizes.

A systematic review by Pearsall et al exploring exercise and SMI(43) which focussed more on schizophrenia symptoms concluded that interventions can lead to a slight increase in levels of exercise activity but there was a lack of evidence to suggest that these interventions resulted in an obvious change of mental health symptoms, BMI, or body weight. Another systematic review focusing on behaviour change for people with SMI(44) included a total of 42 studies with the majority of studies reporting improvements in health behaviours following interventions. However, not all of the interventions resulted in a significant difference in weight reduction between the intervention and the control group.

The studies included in these reviews often had methodological shortcomings which limit the usefulness of the reviews. McGinty et al concluded that many studies focusing on weight loss for people with SMI have lacked appropriate comparison samples, have small sample size and short term follow-ups.(45)

Previous systematic reviews focusing on SMI do provide some evidence that could be applied to adults diagnosed with bipolar disorder. However, these studies have focused more on schizophrenia and associated symptoms, than the symptoms experienced by adults with bipolar disorder. When looking at the evidence of what works for weight management for adults diagnosed with bipolar disorder, it would be important to focus more on symptoms associated with bipolar disorder and not schizophrenia which are very different.

1.2.1.2 Systematic reviews focussing on patients with bipolar disorder

Only one systematic review was identified from the literature search that focused on bipolar disorder and not the umbrella term SMI.(46) Bauer et al identified six studies focused on a combination of: nutrition, physical activity, wellbeing, psychosocial components and course of illness for bipolar disorder.(46) The six studies included all of the above components of lifestyle interventions, therefore it was not possible to identify specific results for each individual mechanism for weight loss. Of the six studies in the systematic review one resulted in no weight loss, three specified weight loss and two by the same authors stated their interventions were successful but did not specify weight loss. However, they identified that there was a number of methodological limitations from the studies included in the systematic review: small sample size, gender imbalance, inconsistencies in terms of measures, lack of randomised controlled trials, absence of follow-up and absence of longitudinal studies. They concluded that there was a strong need for studies to develop interventions which are informed by the patient's input, as well as to improve the methods of studies and to complete more randomised controlled trials.(46)

The evidence from systematic reviews for SMI and the one focusing on bipolar disorder suggest that although lifestyle interventions have been effective for weight loss, there is room for improvement in understanding what works for weight management for adults with bipolar disorder. More research is required to scrutinise the evidence base to gain further insights and to develop more effective weight loss intervention for adults with bipolar disorder, involving them in the development of any interventions.

1.2.1.3 Previous lifestyle interventions

Given the evidence that people with bipolar disorder are disproportionately affected by obesity, there is a surprising lack of intervention trials targeting this group. In terms of individual trial results, many of the trials are focused on supporting weight management for adults with SMI which includes bipolar disorder. Only one lifestyle intervention focussed on bipolar disorder only.(47) Previous interventions include diet and physical activity. To my knowledge there

were no interventions developed to address weight loss for adults with SMI that included only healthy eating related behaviour change.

Only one trial tested a physical activity only intervention for people with SMI. Lee et al (2014) conducted a feasibility trial for a telephone delivered physical activity intervention for individuals with a SMI.(48) The treatment group received pedometers and weekly phone calls and the control group received written information about physical activity. The outcomes of the intervention were weight loss and physical activity. A physical activity intervention delivered via telephone and using pedometers did lead to an increase in physical activity with participants increasing their walking. However, they found that neither the intervention group nor control group lost weight. Suggesting that interventions containing a solely physical activity focus may not be successful for weight loss, although this was just a small feasibility study so results have to be interpreted with caution.

The majority of interventions include both physical activity and diet. Bartels et al reported that physical activity and diet interventions need to be used in tandem to achieve optimum weight loss.(49) However, not all interventions that included both physical activity and diet resulted in weight loss. In order to explore this further the key components of the interventions need to be reviewed.

There are several weight loss interventions that have been adapted from the general population to be used by people with SMI. Previous interventions have included strategies associated with successful weight loss programs in the general population such as psychoeducation focusing on nutritional portion control and behavioural and motivational self-management strategies as well as exercise.(50) However, these have not been always been seen to be successful for weight loss, dietary or physical activity improvements for people with SMI.(50)

A fitness health mentor program was evaluated to assess the effectiveness of the program for people with SMI.(49) The intervention consisted of sessions with a fitness trainer, fitness club membership and nutritional advice about healthy eating. This is one of the longer interventions that were adapted for adults with

SMI. The intervention did not result in a statistically significant change in weight/BMI but there was an improvement in cardiovascular risk.(49)

Another adapted intervention included group weight management sessions, individual weight management sessions and group exercise sessions.(51) This study had a strong focus of group sessions with some individual sessions for weight management.(51) The intervention did result in weight loss but the control group also lost weight (not to the same extent).(51) Therefore, suggesting that these group and individual sessions were helpful for supporting weight management.

Another approach taken was to include meal replacement, nutrition and meal preparation education, as well as exercise and goal setting.(52) This did lead to a significant weight loss compared to the control group.(52) An educational style intervention was developed for people with SMI taking antipsychotic medication.(53) The intervention involved dietary changes, moderate calorie restriction and increased energy expenditure through moderate physical activity.(53) During the intervention stage the trial group lost more weight than those in the control group. However, after the intervention had finished there was no significant difference in weight change between the intervention group and the control group.(53) Although there was, an immediate benefit from the intervention in terms of weight loss, this intervention did not result in long term lifestyle changes to support weight loss.

Another approach that has been take is adapting a diabetes program. The Diabetes Prevention Program Group Lifestyle Balance, was adapted and focussed on general lifestyle changes with a focus on preventing diabetes for SMI. This intervention used peer support and mHealth rather than clinical staff to deliver the intervention. There was no significant change in mean weight, however, participants reported positive feedback about the peer support component of the intervention.(54) This suggests that peer support needs to be explored further in terms of the potential for weight loss interventions for people with SMI. People with SMI may prefer peer support compared to health professional support and this may have potential for future weight loss interventions.(55)

The interventions discussed above were developed to support people with SMI (including bipolar disorder). However, a specific intervention was developed for adults with bipolar disorder.(47) The intervention included a healthy lifestyle program delivered by a lifestyle coach. This was the only intervention identified that focused on improving mood stability and psychosocial functioning by reducing cardio metabolic risk factors for overweight or obese adults with bipolar I disorder. The intervention and control group both lost weight but the intervention group lost more weight than the control.(47)

One of the problems with previous interventions is a lack of understanding about why people with bipolar disorder are overweight or obese. It is possible that, due to the illness, there are additional factors that are leading to weight management issues, over and above, what the general population face. As above, interventions for the general population(50) and other chronic illnesses (56) have been adapted for SMI (including bipolar disorder), but these may not consider the specific challenges for people with bipolar disorder. Few successful interventions have been developed for weight management for adults with bipolar disorder. More knowledge is needed about weight gain and weight management in this population and only then will an intervention be able to be developed to address these factors adequately.

To sum up, the available research evidence shows a mixed picture with regards to the evidence of the effectiveness of weight loss interventions for adults with SMI. Interventions using both physical activity and diet components have the greatest potential. However, there is a lack of strong evidence that these are effective in longer term maintenance of weight loss for adults with SMI. A number of methods of delivery have been used in previous interventions, such as health professionals face to face or peer support with limited evidence for superiority of one over another. There is a lack of evidence regarding the optimum length of the intervention for effect. Finally, there was evidence in some studies of the control group as well as the intervention group losing weight.(47, 49, 51, 57) It could be possible that being in a control group is enough for participants to be more aware of healthy eating and physical activity and to motivate them to change.

To date studies have mostly been conducted in the USA and mainland Europe, very few studies have been conducted in the UK and interventions may not be transferable.(58) It is therefore important to consider what interventions would be appropriate for a UK population. Many of the studies testing lifestyle interventions for people with SMI have methodological shortcomings for example small sample sizes or no control group (59). Others were underpowered pilot studies or feasibility studies, so effectiveness of interventions tested cannot be ascertained. (60)

Most of trials the trials have tested lifestyle interventions for people diagnosed with a SMI. SMI consists of multiple disorders including: schizophrenia, schizoaffective disorder, bipolar disorder and depression. These disorders present with different symptoms and therefore may require different approaches within lifestyle interventions. So it is important to address what might work for weight loss or maintenance specifically in people with bipolar disorder.

The relationship between diet and bipolar disorder is complex. People with bipolar disorder face the same challenges as the general population when attempting to change their behaviour and lose weight. However, they also have to cope with the metabolic effects of medication and the impact of symptoms on motivation, poor dietary habits and higher levels of sedentary behaviour.(42)

1.3 Social support

The issues identified above of high cost of delivering one-to-one interventions, maintenance of behaviour change and ongoing support could potentially be addressed by interventions using eHealth approaches (discussed below) and engaging social support and social networks. These have shown promise within other clinical populations.(61, 62) Social support has been identified as important for facilitating the initiation and maintenance of behaviour change(63) and promoting improved health behaviours.(62)

When an individual is diagnosed with a SMI, the individual may receive differing levels of support from various people. NHS clinical staff, peers and family are all different providers of support. The support systems available vary from individual to individual. Trial evidence and the NICE guidance on behaviour

change highlights that social support is important in behaviour change and that there are various types of social support (64, 65) including practical, emotional and praise/reward.

It is unclear which type(s) of social support that might be most effective for health behaviour change and there is a lack of evidence as to how support might be best promoted. This is particularly relevant as some types of social support may be negative or unacceptable leading to co-dependency or bullying.(66) So it is vital that minimization of negative support be a consideration as well as promoting positive support for behaviour change. (67) A study by Tamer et al found that social support correlated positively with an unhealthy diet.(68) So while social support is generally a positive construct it can also have negative influence on behaviour change.(67, 69)

Understanding how adding social support elements could enhance interventions for physical activity and diet for people with bipolar disorder and exploring not only who can help and how (positive social influences), but also the ways in which people can negatively impact on an individual's efforts to improve health behaviours (negative social influences) may be useful. Understanding the varied support systems for people with bipolar could inform interventions to support behaviour change through enhancing these networks.

Thoits et al described seven possible mechanisms of how social support could improve physical and psychological wellbeing: social influence/social comparison, social control, role-based purpose and meaning (mattering), self-esteem, sense of control, belonging and companionship, and perceived support availability.(70) It therefore seems that social support is beneficial in improving lifestyle changes.

Social support is not about simply looking at the receiver of the support but also thinking about who provides the support. People are influenced, and can be supported by their family(71), friends(72), peers and work colleagues within their existing social networks.(73) Support from members of groups with a shared behavioural goal (e.g. weight loss, exercise)(74) has been found to be effective in supporting behavioural change. The research evidence has indicated that there are a number of BCT that can be supported by targeting people with

the same behaviour goals. These include: alcohol consumption; smoking prevention and cessation; physical activity; diet; and sexual behaviour.

Having a social network which allows individuals to draw on different types of support from different people may be important. Family and friends can have a significant social influence on an individual's health behaviour due to closeness, influence and regular contact with day-to-day health behaviours. These social networks are also pre-existing, and therefore a highly accessible form of support for individuals which not require joining any kind of formal group.

There is evidence that the positive influence from friends and family can affect health behaviours.[75] including healthy eating and physical activity. A study by Pearson et al found that support for healthy eating from a best friend correlated positively with increased vegetable consumption in adolescents.[76] Perceived norms of a friend's activity predicts an individual's activity level.[77] Approaches for enhancing behaviour change could include: having a friend to change behaviour with, removing barriers that could be presented by friends/family who continue with the harmful behaviour, managing self-presentation in front of others [78] or it might relate to social effects and social norms.

Social networks can have a powerful impact on mental health,[79] but the majority of research focusses on the effects of total network size rather than how the network influences the individual's mental health. However, in recent years there has been a move to a more informative examination of the types of social networks that people have and the implications that these social networks have on their mental health. [79] Social networks can have a significant impact on mental health. Holt-Lunstad et al reported that lacking social connection is a risk factor for premature mortality for people who have a mental health disorder.[80] Social networks are an important element in supporting people who have mental health disorders with evidence suggesting that social networks can have a positive impact on life expectancy and positive health outcomes.

Research using peer support to deliver interventions show potential.[81] Peer support often involves people who have similar lived experiences. However there are many shortcomings in the research evidence and there needs to be greater

consistency and rigour in the intervention trials. (81). It is possible that social networks can be utilised to enhance and support behaviour change. This thesis will explore the relationship between the individual with bipolar disorder and his/her social network and how the individual's social network could potentially assist with lifestyle changes.

1.4 eHealth- new technology

Behaviour change research and interventions have primarily focussed on physical interactions between individuals. There has, however, been a move within society to more online interactions and social interactions using mobile phones. Such a change offers an opportunity for behaviour change and intervention developers to assist delivery by incorporating new technology into their approaches. eHealth can be used to support behaviour change and intervention delivery for the general population. eHealth is term used to describe the combination of electronic communication and information technology within the health sector.(82) mHealth is a growing subsection of eHealth and is the use of mobile phones, such as phone apps, specifically smartphones to assist in the delivery of interventions.(83)

There is evidence that interventions delivered via new technologies have the potential to engage difficult-to-reach groups.(61) Growing evidence suggests that technology can be effective in promoting behaviour change. However, interventions have often been simplistic, lacking strong evidence and underpinning theory of behaviour change. There is a need to improve knowledge of how eHealth and mHealth interventions might facilitate behaviour change effectively. So while this approach has shown some promise, more work is needed.

The benefit of eHealth is that healthcare services can be delivered effectively to patients anytime and anywhere. eHealth systems use sensors, mobiles, and web-based applications to assist with the delivery of healthcare services and information.(84) Another advantage of eHealth is that it works remotely and can be delivered to a large number simultaneously. The use of smartphones has dramatically increased and therefore increased the opportunities for the use of smartphones for healthcare.(83) mHealth allows for two-way communication

using smartphones and this can support the implementation of health improvement. It could also support prolonged intervention delivery at a lower cost, thereby increasing the chances of maintenance of behaviour change.(83)

Smartphone usage is very diverse, with evidence suggesting that a high proportion of people from lower socioeconomic status have access to smartphones.(85) Smartphones were found to be more prevalent compared to computers in lower socioeconomic and minority communities. Some studies have suggested that eHealth and mHealth interventions may be able to reduce health inequalities due to their high reach, however a systematic review of 73 eHealth studies (qualitative, quantitative and mixed) found that having an understanding and use of digital technology is a barrier for eHealth interventions and contributes to health inequalities.(86) Reducing Social health inequalities could be reduced via eHealth by: increased access to the tools of eHealth: being aware of users' literacy level; taking into consideration cultural attributes of users; and encouraging users who may be at risk of inequalities.(86)

A growing body of evidence on web-based interventions employing social cognitive theory/goal setting/self-monitoring has demonstrated positive effects on program engagement and health behaviours.(40, 87) Adding SMS to web-based interventions was found in one systematic review to be more effective than other combinations of technology-based approaches.(40) There is also evidence that new technologies can be effective with both younger and older people, (88, 89) therefore new technologies do not exclude older populations.

A recent systematic review investigating eHealth to promote physical activity for mental health patients, concluded that eHealth interventions may be a cost effective method of increasing physical activity which may have a positive impact on mental health outcomes.(90) The authors of this systematic review concluded that although some of the studies in the review demonstrated promising results, there were methodological weaknesses of included studies and potential biases from using subjective measures of physical activity. (90) eHealth may also allow for more personalisation of interventions which again may increase success.(91) However, the evidence base for eHealth interventions is limited and to date somewhat mixed.(92)

Although there is limited research on eHealth interventions using social support, Anderson-Bill (93) found that perceived social support from family and friends in an online intervention was a strong predictor of improved physical activity and nutrition behaviour. While the online support was not specifically promoted as part of the intervention it was relevant to the success of the intervention. Similarly, Neuhauser et al (94) reported that interpersonal, affective (not just rational), interactive, individually-tailored communication is effective for behaviour change interventions. Furthermore, communication that is delivered within an individual's social context is also more likely to be effective for behaviour change e.g. safety for exercising. In order to achieve successful behaviour change through health communication the interventions should be specific to the individual, two way communication, meets the individual's needs, reaches the person on an emotional level, tailored to the individual and reaches social contextual barriers. Neuhauser et al (94) concluded that communication that is tailored to the individual should be incorporated within eHealth interventions.

While representing a promising new area for population health, to date studies of these eHealth and mHealth interventions have a number of limitations, e.g. short-term follow up (95) and high attrition.(40, 96) In addition, they are often not based on theory and do not include effective BCT. Including these in interventions could enhance effectiveness since goal setting, self-monitoring and review of goals have well-established benefits.(88) Additionally, there is a need to improve our understanding of how interventions involving new technologies may most effectively facilitate change. For example, factors such as optimal website or app design, how to maximise exposure to websites or apps or what type of prompting works best are still areas requiring development.(97)

1.5 Study rationale

As described earlier, approximately 68% of people receiving treatment for bipolar disorder are overweight or obese.(19) Obesity is closely associated with depression, schizophrenia and bipolar disorder.(19) Being overweight or obese and having a SMI is associated with higher morbidity and mortality. There exists a significant health inequality where individuals with bipolar disorder can expect a reduced life expectancy of up to 15-20 years and unhealthy lifestyles and

obesity related disorders contribute to this(6), and this is increasing.(20) Reduced life expectancy has been described as a failure of social policy, health promotion, illness prevention and care provision.(4) Over the last 20 years this health inequality has increased.

Individuals with bipolar disorder are more likely to present with metabolic syndrome, described as increased blood glucose, cholesterol, blood pressure and prevalence of obesity.(4) Metabolic syndrome is associated with the development of diabetes and cardiovascular disease (CVD). The number of deaths due to CVD in individuals with bipolar disorder is twice as high as the general population. As well as the impact on patient's lives, the health complications listed can have significant financial implications for the National Health Service (NHS) that is already over stretched. Additional support is needed to address and manage obesity for people with bipolar disorder, in order to reduce the prevalence of obesity health related conditions in these patients.

However we cannot assume that interventions for the general population are transferable to those with bipolar disorder or other SMIs. There are likely to be a number of different contextual and personal factors that interact to impact on obesity in a bipolar population. Alternative approaches are likely to be required. To date very few interventions have been developed for people with bipolar disorder who are obese or overweight and only a small number of studies have explored their experiences of weight management, diet and physical activity in order to inform intervention development. Therefore, it is essential to conduct research asking the people with lived experience of bipolar disorder what they are needing in terms of a lifestyle intervention.

The issues identified above of the high cost of delivering one-to-one interventions, maintenance of behaviour change and ongoing support could potentially be addressed by interventions using smartphones and engaging social support and social networks. These have shown promise with other clinical populations.(58) Social support has been identified as important for facilitating the initiation and maintenance of behaviour change(60) and promoting improved health behaviours.(59)

As highlighted previously the first phase of this study aimed to investigate evidence from RCTs, testing interventions for weight management (diet and physical activity) for individuals with bipolar disorder, as well as seeking insights from published qualitative work, using systematic review methods. There have been 14 previous systematic reviews that have investigated lifestyle interventions in people with SMI (including depression, schizophrenia and bipolar disorder) (26, 42-44, 46, 98-105), but only one that has focused solely on bipolar disorder(46). Reviews have clustered these groups together under the umbrella term of SMI and have focused on the effects of interventions on weight loss.(26, 42-44, 46, 98-105) Since starting the systematic review for this thesis, Bauer et al (2016) published a systematic review that focused on therapeutic interventions that targeted nutrition, physical activity and wellness for adults with bipolar disorder.(46) Although there is already a systematic review focusing on bipolar disorder and lifestyle intervention (46) the focus of the outcome measure was on mood and course of illness not obesity or weight management outcomes.(46) Therefore, the systematic review by Bauer et al (2016) is different from the systematic review undertaken in this thesis.(46)

The systematic review included in this thesis is the first mixed methods systematic review, generating new insights by bringing together findings from both qualitative and quantitative studies, with a particular focus on weight management for adults with bipolar disorder. This systematic review will also be the first, to my knowledge, that will include investigation of the BCT included in the interventions reported. The review is focused on bipolar disorder, bipolar disorder is often grouped with other mental health illnesses and termed SMIs, many studies investigating SMI include people diagnosed with bipolar disorder, consequently there is scope for learning from studies focussed on SMI. Therefore the review included research papers that contained participants with SMI as long as some of the participants had a diagnosis of bipolar disorder. Criteria for inclusion in this systematic review included studies involving participants with bipolar disorder, and schizophrenia but not solely major depression. This was primarily due to the clinical differences between the presentation of major depression and bipolar disorder.

The second phase of this study sought to understand the experiences of weight management for individuals with bipolar disorder, as there has been limited research exploring this issue. In order to gain an understanding of weight management for adults diagnosed with bipolar disorder the most efficient method is to ask people with lived experiences. This involved interviewing people with bipolar. People who support them, including family and health professionals were also interviewed to explore the importance of social support and other factors for weight management. Additionally, people with bipolar disorder were asked about the size and structure of their social network to try and identify if specific characteristics of social networks may be associated with more effective social support or weight management.

This is a novel study that draws together evidence from intervention studies focussed on weight management with the experience of people with bipolar disorder and the people who support them. This evidence could potentially inform the development of a lifestyle intervention for people with bipolar disorder.

1.6 Aims of the research and research questions

Overall research aim:

- To gain an understanding of the evidence base regarding weight management interventions for people with bipolar disorder and to explore the experiences of patients, their close social support and health professionals in order to inform weight management interventions for people with bipolar disorder.

Overall research objectives for the thesis are described below. Figure 1 gives a description of the more detailed objectives as well as where they are addressed in the thesis.

- To systematically review the research evidence and (1) to develop an understanding of the effectiveness of different lifestyle interventions for obese adults with bipolar disorder (or SMI) (2) to explore the most effective intervention elements, including behaviour change techniques

(BCTs), using qualitative and quantitative findings and (3) to review the qualitative evidence with regard to the experience of bipolar patients around weight issues and weight management and the challenges they face. In all three there will be a particular focus on social support, social networks and new technologies for the reasons described above.

- To develop an understanding of the context, experience, barriers, and facilitators to weight management and lifestyle change for adults with bipolar disorder by interviewing adults suffering with bipolar disorder, their families and health professionals.

- To explore the nature of a participant's ego network (people who support and influence an individual). An ego network is a subset of a person's larger social network however the individuals within the ego network are likely to have a strong influence on lifestyle behaviours. Qualitative and quantitative data will be used to try to understand how an individual's social network might be mobilised to help in weight management attempts.

- To use the qualitative data, social network data and evidence from the systematic review and review of effective behaviour change techniques (BCTs), as an aid in the development of initial ideas for an intervention and a logic model.

1.6.1 Research questions

Phase 1- Systematic Review

To explore:

1.1 What are the effects of lifestyle interventions for the support of weight loss or weight maintenance in adults with bipolar disorder?

1.2 What are the effects of lifestyle interventions for increasing physical activity and improving diet in adults with bipolar disorder?

1.3 What theories and behaviour change techniques (BCTs) have been used in the interventions tested in RCTs?

1.4 What behaviour change techniques (BCTs) appear to be the most effective?

1.5 What are the experiences of adults with bipolar disorder in relation to lifestyle changes for weight management (including weight loss and weight maintenance?)

1.6 What are the barriers and facilitators to behaviour change?

1.7 Is there any evidence that social network/social support or technology based interventions may be helpful for weight related behaviour changes in this group?

Phase 2- Qualitative Research

To explore:

2.1 What are the experiences of adults with bipolar disorder in relation to weight management and making lifestyle changes (diet and physical activity?)

2.2 What are the barriers and facilitators to behaviour change in relation to weight loss, weight maintenance, increased physical activity and a healthy diet?

2.3 What previous behaviour change techniques (BCTs) have they used to lose weight, increase physical activity or eat more healthily?

2.4 What type of interventions might help with weight management particularly in relation to physical activity or healthy eating?

2.5 What is the nature of a bipolar participant's ego network? Do they differ by BMI category?

2.6 What social support is provided by friends and family in relation to healthy eating, physical activity and weight loss?

2.7 What are service provider's opinions of NHS support available for healthy eating, physical activity, and weight management?

2.8 What are service provider's opinion of additional support that would benefit people with bipolar disorder in relation to healthy eating, physical activity, and weight management?

1.7 Development of lifestyle interventions

In order to address the research questions and aims described above I will use a framework for designing interventions called Six Steps for Quality Intervention Development (6SQuID). The six steps are: (1) defining and understanding the problem and its causes; (2) identifying which causal or contextual factors are modifiable - which have the greatest scope for change and who would benefit most; (3) deciding on the mechanisms of change; (4) clarifying how these will be delivered; (5) testing and adapting the intervention; (6) collecting sufficient evidence of effectiveness to proceed to a rigorous evaluation. (106) In this thesis I will focus on the first three steps in the 6SQuID model of intervention development. I will endeavour to identify, define and understand the problem of obesity for people with bipolar disorder. I will then attempt to identify the causal and contextual factors for obesity for people with bipolar disorder and using the data in stage 1 and 2 begin to consider what may be modifiable and what mechanisms of change might be useful by refining the logic model developed in stage 2.

The overarching aim of this thesis is to develop a weight loss intervention for adults with bipolar disorder exploring social support and digital technology. To address this aim there were ten related objectives:

Study 1: Systematic Review	Chapter 2	Objective 1. Review and evaluate randomised control trials (RCTs), non-randomised trials and feasibility studies that report on the effectiveness of behaviour change interventions (changes to diet and/or physical activity) which target weight management (control or loss), for people who have serious mental illness.
		Objective 2. Review and evaluate qualitative studies which seek to explore the weight management experiences of people with serious mental illness and the barriers and facilitators to change in this population, as well as the influence of family, friends and health professionals.
Study 2: Interviews	Chapter 4	Objective 3. To understand the experiences of adults with bipolar disorder in relation to weight management and lifestyle changes (diet and physical activity).
		Objective 4. To identify the barriers and facilitators to behaviour change in relation to weight loss, maintenance, increased physical activity and healthy eating.
		Objective 5. To explore previous behaviour change techniques that have been used to lose weight, increase physical activity or eating more healthily.
		Objective 6. To investigate the different types of interventions that might help with weight management particularly in relation to physical activity or healthy eating.
	Chapter 6	Objective 7. To investigate the ego network of people with bipolar disorder.
	Chapter 5	Objective 8. To explore the social support that is provided by friends and family in relation to healthy eating. Physical activity and weight loss.
	Chapter 5	Objective 9. To explore professional support opinion of NHS support available for health eating, physical activity and weight management for adults with bipolar disorder.
		Objective 10. To explore professional support opinion of additional support that would be benefit people with bipolar disorder in relation to healthy eating, physical activity and weight management for adults with bipolar disorder.

Figure 2. Objectives of the thesis and corresponding chapters

2 Phase 1: Systematic Review

Barriers and facilitators to behaviour change: a mixed method systematic review of lifestyle interventions for adults with SMI, exploring change in physical activity, diet and weight management.

The following chapter is a systematic review examining interventions for behaviour change focusing on weight, healthy eating, and physical activity for people with SMI. The purpose of the systematic review is to identify previous research which may provide evidence that will shape intervention development (step one of 6SQUID) and which will inform the content of the interviews conducted in phase 2 of the thesis. The review was registered with PROSPERO (see Appendix 1)

2.1 Background

2.1.1 Obesity and bipolar disorder

Being overweight or obese is defined by the World Health Organisation (WHO) as abnormal or excessive fat accumulation that presents a risk to health. As described in Chapter 1 obesity is a complex disorder that is associated with various health problems, including metabolic syndrome, type 2 diabetes, hypertension, coronary artery disease, strokes, respiratory effects, cancers, reproductive function, osteoarthritis, liver disease and gall bladder disease.[8] Furthermore, obesity and overweight can have an impact on an individual's mental health.

As mentioned previously approximately 68% of people receiving treatment for bipolar disorder are overweight or obese.[20] As well as increased morbidity and reduced life expectancy [10] these high rates of obesity and overweight have financial implications, including high costs to health services to support and provide treatment.[3] There are also cost implications due to people not being able to work because of health problems related to their obesity or overweight. Both of these have significant costs for society.

2.1.2 Interventions

Obesity is associated with excessive food consumption and a lack of physical activity. The World Health Organisation (WHO) recommends that individuals take part in at least 30 minutes of moderate physical activity every day. However, in order to control and reduce body weight people may have to do more than this. Healthy eating is regarded as a balanced diet with limited fat, sugar and salt that is also high in fruits, vegetables and whole grains.(107) This review will look at interventions that manage and reduce obesity/overweight by increasing physical activity and/or promoting healthy eating in people with SMI including bipolar disorder. Although this may be a highly simplified view of causes of obesity,(19) the majority of interventions for controlling or preventing weight gain focus on increasing physical activity and reducing food intake.

2.1.3 Why it is important to do this review?

Given the high prevalence of obesity in patients with bipolar disorder and the impacts on health, as well as the economic cost, it is vitally important to identify effective interventions. A number of systematic reviews have looked at behavioural interventions for obesity in the general population(30, 108, 109) and there are 14 systematic reviews looking at interventions in people with SMI focussed on diet, physical activity and weight loss.(26, 42-44, 46, 98-103, 105, 110) However, there have been no mixed methods reviews drawing together evidence on intervention behaviour change theories with qualitative evidence in order to inform improvements to interventions. The majority of reviews of general population interventions note that exercise has a positive effect on body weight and cardiovascular disease risk factors in people who are overweight or obese. The reviews highlight the importance of combining physical activity and diet rather than focussing solely on one.(30) Furthermore, there is evidence in the general population that when people take part in physical activity there are health improvements, such as a decreased risk of CVD and hypertension, even when no weight is lost.(30)

Previous systematic reviews have focused on the what can be done to improve physical health specifically weight management for adults with SMIs. (26, 42-44, 46, 98-103, 105, 110) These systematic reviews have identified that improving

physical health can be done through weight management for adults diagnosed with a SMIs.(44) BMI may not be reduced from physical activity interventions only.(26) Lifestyle interventions that combine dietary counselling, physical activity and health promotion show potential for addressing the physical health needs for adults with SMI.(110) Additionally, Vancampfort et al (2017) highlighted that it is not just about improving physical activity but future interventions should target the prevention of physical inactivity or sedentary behaviour.(102) However, diet needs to also be addressed and according to Teasdale et al (2019) higher dietary energy and sodium was found with people diagnosed with SMI compared to control and these factors were associated with poorer diet and eating patterns.(103) These factors need to be addressed to improve weight and physical activity.(104) What we do not know, is whether these types of interventions yield the same benefits for specific groups, like individuals with bipolar disorder or other SMIs. Nor do we know what intervention ingredients, for example BCTs, are associated with effective interventions.

2.2 Objectives

The objectives of the systematic review were to:

- Review and evaluate randomised control trials (RCTs), non-randomised trials and feasibility studies that report on the effectiveness of behaviour change interventions (changes to diet and/or physical activity) which target weight management (control or loss), for people who have a SMI including bipolar disorder.

- Review and evaluate qualitative studies which seek to explore the weight management experiences of people with SMI including bipolar disorder and the barriers and facilitators to change in this population, as well as the influence of family, friends and health professionals.

These objectives were achieved by conducting:

1) A narrative synthesis of quantitative data on the benefits of lifestyle interventions for improving physical activity, healthy eating and weight management.

2) A synthesis of qualitative data on participants' experiences, opinions and preferences with regards to physical activity, healthy eating and weight management.

3) A cross-study synthesis of the quantitative and qualitative data to explore the extent to which existing evaluated interventions address the needs and concerns of people living with bipolar disorder.

2.3 Methods

2.3.1 Criteria for considering studies for this review

2.3.1.1 Types of studies

Public health interventions are health improvement activities that can be complex, programmatic and context-dependent.(111) They are evaluated using a variety of approaches and study designs.(111) This review included both randomised controlled trials, non-randomised trials, feasibility studies and qualitative studies. RCTs are an effective way of determining whether an intervention has been effective, they are regarded as the gold standard in research.(111) This is because RCTs allocate participants randomly to control and treatment groups before the intervention is delivered. The purpose of randomly allocating individuals to control and treatment groups, is to ensure that any change in the participant's outcome, post-intervention, is a result of the intervention and not because of baseline differences between control and treatment groups. However, there are problems associated with RCTs as their findings are not necessarily generalisable to different populations with multiple conditions or different contexts.(111) In this systematic review non-randomised trials and feasibility studies were also included, where the study included a control group.

Qualitative study designs were also included as these studies offer insights into why interventions did or didn't work as well as barriers and facilitators to weight

management in this group which could provide valuable insights for future interventions.

2.3.1.2 Types of participants

This review included studies that involved adults with SMI as there were few studies that solely focused on bipolar disorder and valuable insights can still be gained in studies where other types of SMIs as well as bipolar are included. Adults (18 years and older) who have SMI including bipolar disorder, or schizophrenia were included. However studies that identified only major depression as the SMI were excluded. This is due to major depression having very different symptoms from bipolar disorder and schizophrenia, it also does not have the same intensity of impairment of functioning. Further exclusion criteria will be identified below.

2.3.1.3 Types of interventions

The review included lifestyle interventions that promoted physical activity and/or healthy eating.

2.3.1.4 Types of Interventions excluded

Studies that were excluded from the review were those that target medication, smoking, alcohol or drug use unless such studies considered diet, and/or physical activity related outcomes.

2.3.1.5 Types of outcome measures

Outcome measures were those that were related to the prevention and control of obesity, these are outcomes that directly indicate change or alteration in factors contributing to obesity.

2.3.2 Primary outcomes

Primary outcomes included: 1) measures of obesity such as waist-hip ratio, body mass index (BMI) weight change, weight gain, weight loss and waist circumference; 2) measures of diet such as food diaries, food preferences and

food habits; and 3) measures of physical activity such as walking, exercise and fitness.

2.3.3 Secondary outcomes

The secondary outcomes included 1) changes in knowledge regarding obesity, diet and physical activity, 2) changes in expressed motivation to modify weight, diet or physical activity, and 3) reported adverse outcomes/ harms and unintended consequences of the intervention.

2.3.4 Search methods for identification of studies

The search strategy below illustrates the terms that were used in the different databases. The specific example is the search strategy that was employed for psycINFO. The main way that psycINFO searches is using titles and abstracts to avoid a large number of irrelevant articles being returned. Considering the variety of intervention studies that could be included in this review, the search strategy focused on identifying relevant studies by: study type; population; obesity outcomes; and diet/physical activity behaviours that could be influenced by the interventions. I adhered to the PRISMA guidelines and following good practice the search strategy protocol was published on the PROSPERO International Prospective Register of Systematic Reviews.

Term set 1

1. Serious mental illness
2. DE Bipolar disorder/
3. ((bipolar or manic) n5 (psychos* or depressi* or disorder* or state*)) or mania*
4. 1 OR 2 OR 3

Term set 2

5. DE "Obesity"
6. DE "Body weight"
7. DE "Overweight"
8. (obesity or obese or preobese or postobese or overweight)
9. (weight loss or weight gain or weight maintenance or weight reduction)
10. (body mass index or BMI or body fat or skin fold thickness)
11. (waist* n1 (measure* or size* or circumference*))
12. 5 OR 6 OR 7 OR 8 OR 9 OR 10 OR 11
13. Diets/

14. food intake/
15. (Food n (habits or preferences))
16. ((calor* or fat* or salt* or fiber* or fibre* or sugar* or fruit* or vegetable* or carbohydrate*) n3 (intak* or consume* or consumption or eat* or diet*))
17. ((nutriti* or health* or balanced or good) n3 (menu or meal* or lunch* or dinner* or snack* or breakfast* or eating))
18. ((diet* or food* or dietary or eating or snack*) n1 (behavio* or choice* or habit* or pattern* or preference* or nutriti* or health*))
19. (regular* n1 meal*)
20. (((fizzy or sugar* or carbonated or diet or cal*) n1 drink*) or cola or coke or soda or beverage*)
21. (nutriti* n3 polic*)
22. ((cholesterol or lipid* or triglyceride*) n1 (chang* or influence or control or improve* or reduc* or decreas* or encourage* or maintain* or sustain* or discourage* or modif* or prevent*))
23. 13 OR 14 OR 15 OR 16 OR 17 OR 18 OR 19 OR 20 OR 21 OR 22
24. Physical activity/
25. Exercise/
26. Sports/
27. (run* or jog* or danc* or badminton or tennis or swim* or racquet sport* or squash or Pilates or spin* class* or step* class* or yoga* or gym* or football or rugby or netball or cricket or bowl* or tai chi)
28. (physical* n3 (fit* or activit* or inactive* or training or exercise* or sport*))
29. (aerobics or sedentary or fitness)
30. (aerobic* n3 (activit* or exercise*))
31. (walk* or bik* or cycl* or bicycle*)
32. 24 OR 25 OR 26 OR 27 OR 28 OR 29 OR 30 OR 31
33. mHealth
34. Mobile health
35. Wearable device*
36. Lifestyle intervention
37. Social support
38. 33 OR 34 OR 35 OR 36 OR 37
39. 12 OR 23 OR 32 OR 38

Term set 3 (Trials)

40. randomized controlled trial/
41. Random Allocation/
42. Double Blind Method/
43. Single Blind Method/
44. clinical trial/
45. controlled clinical trial.mp
46. randomized controlled trial.mp
47. multicenter study.mp

48. clinical trial.mp
49. 40 OR 41 OR 42 OR 43 OR 44 OR 45 OR 46 OR 47 OR 48
50. (clinical n trial*).tw
51. ((singl* or doubl* or treb* or tripl*) n3 (blind* or mask*))
52. placebos/
53. placebo*
54. randomly allocated.tw
55. (allocated n2 random*)
56. 50 OR 52 OR 53 OR 54 OR 55
57. 49 OR 56
58. case report
59. letter/
60. historical article/
61. 58 OR 59 OR 60
62. 57 NOT 61

Term set 4 (qualitative)

63. interviews as topic/
64. focus groups/
65. narration/
66. qualitative research/
67. ((("semi-structured" OR semistructured OR unstructured OR informal OR "in-depth" or indepth OR "face-to-face" OR structured OR guide) adj3 (interview* OR discussion* OR questionnaire*)))
68. (focus group* OR qualitative OR ethnograph* OR fieldwork OR "field work" OR "key informant")
69. 63 OR 64 OR 65 OR 66 OR 67 OR 68
70. 62 OR 69
71. 4 AND 39 AND 70

2.4 Electronic searches

For the purpose of this review relevant multiple databases were searched using a highly sensitive search strategy. The search strategy above was tailored for each of the relevant databases. The language was restricted to English due to time constraints and the following databases were searched for studies:

- PsycINFO

- MEDLINE

- EMBASE

- CINAHL

- Web of Science

2.5 Searching other resources

In addition to the database searches, other resources were searched for both published and unpublished studies. The reference lists for all relevant articles were reviewed for relevant additional studies not identified from the database search. Further to this, Google Scholar was also searched. No authors were contacted.
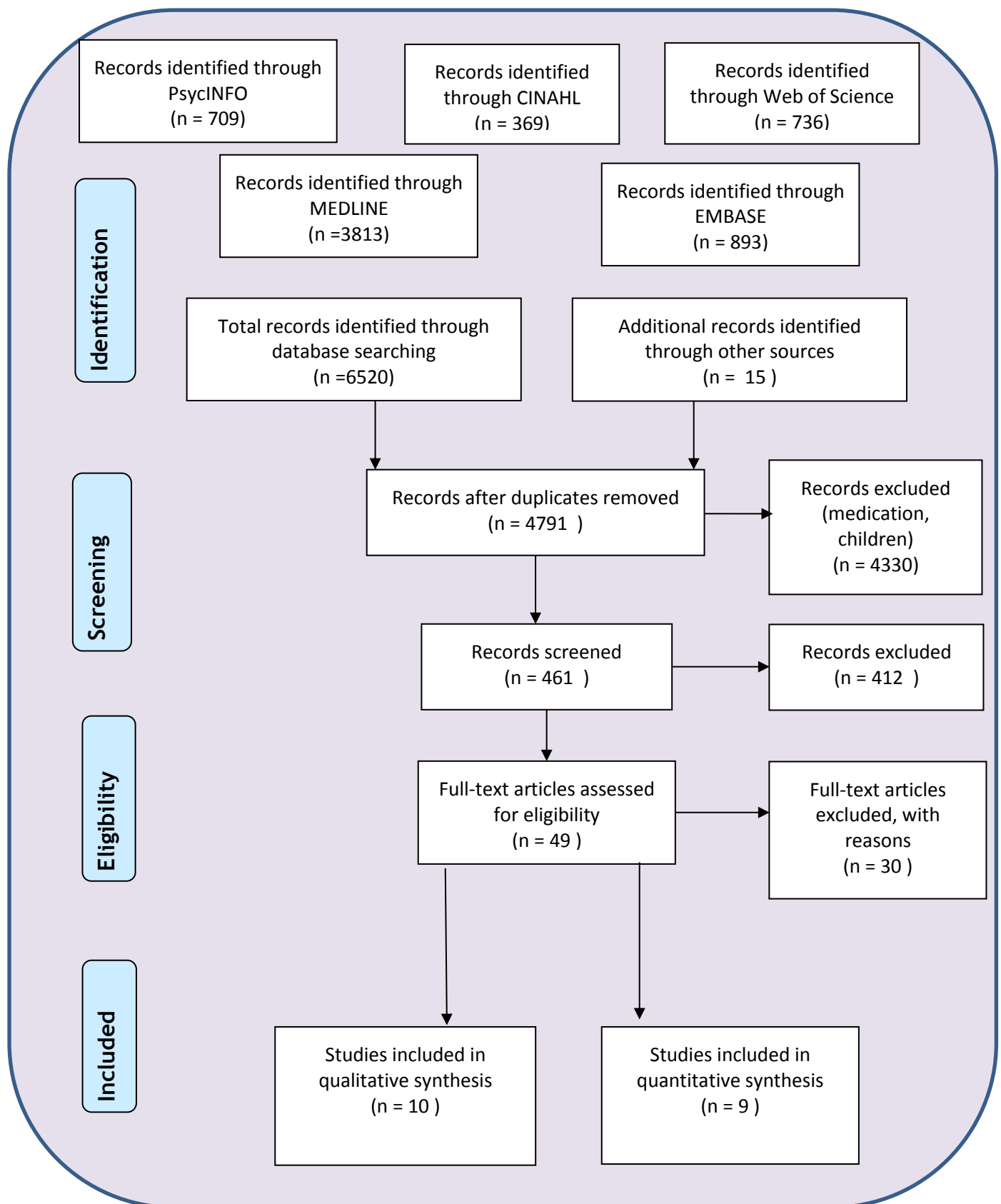
Figure 3. PRISMA flow diagram of studies included in the review

2.6 Data collection and analysis

2.6.1 Selection of studies

Two members of the team individually examined the search result abstracts, titles and keywords. The two reviewers were not blinded to the authors' name, journal or date of publication. The article records were imported into the bibliographic software package Endnote X7, duplicates were removed and the relevant articles selected. During the selection process the reviewers examined the title, keywords and abstract of each report using the inclusion and exclusion criteria for the review. If the article did not fulfil the defined inclusion criteria the study was excluded from the review. Abstract titles were included/excluded based on two reviewers assessing them independently. All disagreements were discussed and resolved within the team and a third reviewer consulted if necessary. The full article papers were accessed for 1) studies that fulfilled the criteria and 2) articles that did not present sufficient information from the title and abstract to make a clear judgment about inclusion.

2.6.1.1 Data extraction and management

Data extraction tools were developed based on a standard template provided by the Cochrane Public Health Review Group. The authors independently processed and summarised the data and completed the data extraction forms. The data were recorded electronically on all forms. The data included: descriptors (such as authors, year of publication, year of study and location); study design; intervention; setting; outcomes (primary and secondary) participants and analysis. The data extraction forms were piloted on four studies, two qualitative and two quantitative. The forms were evaluated for efficiency and capturing all the necessary data.

The full articles were considered by two reviewers independently to double check that each study fulfilled the inclusion criteria. Two reviewers examined all the papers that met the inclusion criteria, they independently summarised the data on the data extraction forms. The articles were then assessed using standardised quality assessment templates, and any disagreements discussed.

The quality assessment was completed using the critical appraisal skills programme (CASP) templates (see Appendix 2 and 3). There are versions for trials (Appendix 2) and qualitative studies (Appendix 3). Each version of the tool allowed for judgements to be made about the: methodological quality of the study; clinical importance; uncertainty in results; and if the study characteristics met the inclusion criteria.

I created a table to capture behaviour change techniques (BCTs) used in the interventions following Abraham et al (112). I used this table as a checklist to identify the BCTs used in each trial. This provided a clear way of identifying what BCTs were used and facilitated comparison of BCTs used in the successful versus unsuccessful trials.

2.7 Identified studies: randomised and non-randomised trials

First I will discuss the randomised and non-randomised controlled trials that were identified from the structured search.

2.7.1 Study characteristics

The flow diagram including exclusion of studies is illustrated in Figure 3. A total of 461 studies were screened. After the removal of duplicates, a total of 49 full text articles were assessed for eligibility. Nine with control groups testing lifestyle interventions for weight loss and or management met the inclusion criteria. The majority of the studies (eight out of nine) were conducted in the USA and one of the studies was UK based. A total of 462 participants were recruited across the nine studies in the intervention group. There was a large difference in the number of participants in the studies, they ranged from 16 to 279. A total of 450 participants were recruited across the nine studies for the control groups. Additional study characteristics can be seen in Tables 1, 2 and 3.

Table 1. Quantitative study characteristics

Author and year	Country	Location of intervention	Study design	Intervention	Length of intervention	Number of participants		Percentage drop out rate	
						Intervention group	Control group	Intervention group	Control group
Bartels et al, 2013	USA	Community mental health centre	RCT	In SHAPE	12 months	45	46	33%	30%
Brown et al, 2011	USA	Community mental health program	RCT	RENEW	6 months	47	42	unknown	unknown
Brown and Chan, 2006	UK	Community mental health	RCT	The Lily 'Meaningful day' package	6 weeks	7	10	53%	23%
Daumit et al, 2013	USA	Outpatient mental health clinic	RCT	ACHIEVE	18 months	137	142	5%	3%
Frank et al, 2015	USA	Psychiatric institute and clinic mood disorder program	RCT	Integrated Risk Reduction Intervention (IRRI)	6 weeks	58	56	5%	8%
Goldberg et al, 2013	USA	Outpatient mental health clinic	RCT	MOVE!	6 months	41	30	23%	46%

Author and year	Country	Location of intervention	Study design	Intervention	Length of intervention	Number of participants		Percentage drop out rate	
						Intervention group	Control group	Intervention group	Control group
Green et al, 2015	USA	Community mental health centres	RCT	STRIDE	6 months	93	88	16%	13%
Kilbourne et al, 2012	USA	Community based mental health outpatient programs	comparative study	Life Goals Collaborative Care (LGCC)	4 weeks	32	33	6%	3%
Lee et al, 2014	USA	unknown	RCT	Walking program	8 weeks	8	8	33%	20%

Table 2. Study outcomes and findings

Author and year	Intervention	Health outcomes assessed	Weight change		
			intervention group	control group	Outcome
Bartels et al, 2013	In SHAPE	•Cardiorespiratory fitness •Weight •BMI •Physical activity •Frequency of fitness club visits •Readiness to engage in nutrition	24% had both an increase cardiorespiratory fitness and a 5% or greater reduction in body weight	9% achieved both an increase cardiorespiratory fitness and reduction in body weight.	No p value reported but authors reported no significant different
Brown et al, 2011	RENEW	•Weight	32% lost more than 10 pounds	10% lost weight	P=0.005
Brown and Chan, 2006	The Lily 'Meaningful day' package	• Health screening questionnaire. •Height, weight, blood pressure and resting pulse • Diet •Frequency and intensity of exercise •Psychological health •Self report of physical health, physical fitness and mental health	-0.4kg	+1.11kg	p=0.05

Author and year	Intervention	Health outcomes assessed	Weight change		
			intervention group	control group	Outcome
Daumit et al, 2013	ACHIEVE	•Height • Weight • Blood pressure, •Waist circumference •Fasting blood chemical levels	-1.8kg (6 months) -3.4kg (18months	-0.3kg (6months) -0.2kg (18months)	p=0.002
Frank et al, 2015	Integrated Risk Reduction Intervention (IRRI)	•height •weight	2.3% reduction	0.2% reduction	p=0.006
Goldberg et al, 2013	MOVE!	• weight measurements • blood pressure • cholesterol, triglycerides, low density and high density lipoproteins cholesterol and glucose •general medical health, •Measures of dietary habits • self-reported rating of general medical health	no significant change	no significant change	p=0.720

Author and year	Intervention	Health outcomes assessed	Weight change		
			intervention group	control group	Outcome
Green et al, 2015	STRIDE	•weight • BMI, •Blood samples • Fasting tests •Blood pressure	lost 4.4 kg more than the control (6months) lost 2.6 kg more than the control group (12months)	the control group gained an average of 0.9% of their baseline weight	(1.77 kg, 95% CI=0.87 kg to 4.40 kg) during maintenance (6–12 months)
Kilbourne et al, 2012	Life Goals Collaborative Care (LGCC)	•Weight •Waist •BMI • Blood pressure •Health related quality of life •Functioning • Psychiatric symptoms	no weight change	no weight change	p=0.03
Lee et al, 2014	Walking program	•BMI •Waist circumference, •Blood pressure •Fasting plasma glucose • Fasting lipid profiles.	no significant change	no significant change	p=-0.35

2.7.2 Quality assessment

Quality assessments for the included studies are described in Table 4. I used the Critical Appraisal Skills Programme tools (CASP) for the qualitative studies and the randomised clinical trials (RCT CASP) (see Appendix 2 and 3).(113) There are a number of quality assessment tools available, however the CASP tools are widely used and validated.(114) The CASP authors do not recommend using them as a scoring tool.(113)

Table.3. Quality assessment of quantitative studies

Author, country, year,	Are the results valid?			Is it worth continuing?			What are the results?		Will the results help locally?		
	Trial addressed a focussed issue	Assignment to treatment group randomised	Patients accounted for at conclusion	"Blind" to treatment	Groups similar at start of trial	Groups treated equally	Effect size	Estimate of treatment effect	Results applied to your context	All clinically important outcomes considered	Benefits worth harm and cost
Bartels et al, USA, 2013	yes	yes	yes	no	yes	yes	yes	yes	yes	yes	yes
Brown et al, USA, 2011	yes	yes	yes	unclear	yes	yes	yes	unclear	yes	yes	yes
Brown and Chan, UK, 2006	yes	yes	yes	no	yes	yes	yes	unclear	yes	yes	yes
Daumit et al, USA, 2013	yes	yes	yes	unclear	yes	yes	yes	yes	yes	yes	yes
Frank et al, USA, 2015	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Goldberg et al, USA, 2013	yes	yes	yes	yes	yes	yes	yes	unclear	yes	yes	yes
Green et al, USA, 2015	yes	yes	unclear	yes	yes	yes	yes	yes	yes	yes	yes

Author, country, year,	Are the results valid?			Is it worth continuing?			What are the results?		Will the results help locally?		
	Trial addressed a focussed issue	Assignment to treatment group randomised	Patients accounted for at conclusion	"Blind" to treatment	Groups similar at start of trial	Groups treated equally	Effect size	Estimate of treatment effect	Results applied to your context	All clinically important outcomes considered	Benefits worth harm and cost
Kilbourne et al, USA, 2012	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Lee et al, USA, 2014	yes	yes	yes	yes	yes	yes	unclear	unclear	yes	yes	yes

Table 3 highlights that the quality of the papers were reasonable. Three of the articles did not state whether the researchers were blind to the group that the participants were in and in a further two articles the researchers were identified as not blind. Potential bias could exist in these studies where the researchers may have influenced the outcomes. However, the results of these five trials did not indicate more positive findings than the other trials. Three of the trials did not specify how precise the estimate of the treatment effect was.

2.8 Results: randomised and non-randomised trials

As mentioned above nine RCTs were identified from the search of the literature. These included interventions focused on: physical activity; nutritional support; and a combination of both. The intervention approaches were quite varied with different modes of delivery of interventions, different settings where interventions were delivered, different lengths of interventions, as well as different health outcomes used to assess the impact of the intervention.

2.8.1 Physical activity

Only one RCT identified was a physical activity only intervention. Lee et al (2014) conducted a feasibility trial for a telephone delivered physical activity intervention for individuals with a SMI.(48) The intervention applied goal setting, self-monitoring, feedback and social support. The treatment group received pedometers and weekly phone calls and the control group received written information about physical activity. The outcomes of interest were weight loss and physical activity. They found that there were no significant differences between groups and neither the intervention group nor control group lost weight. The intervention group significantly increased the number of minutes they spent walking (p=0.02) compared to baseline (p=0.11). Confidence intervals were not included in the article. These findings suggest that interventions solely focussed on physical activity may not be the best approach for weight loss. However, this was only a small feasibility study.

2.8.2 Both physical activity and diet

The majority of the interventions (seven of nine trials) consisted of a physical activity and a nutritional component. An RCT by Bartels et al evaluated the effectiveness of a fitness health mentor program called InSHAPE.(49) The purpose of the program was to improve physical fitness and weight loss among overweight and obese adults with SMI. The overall aim of the intervention was to achieve a reduction in cardiovascular risk by improving fitness and reducing weight or BMI. It also included nutritional advice about healthy eating (not calorie content), cookery classes and grocery store tours. The control group received fitness club membership and education. There was no statistically significant change in weight/BMI for the intervention group compared to the control group. The authors concluded that optimising weight loss may require a more intensive multicomponent dietary intervention on top of the InSHAPE program.(49)

Brown et al conducted a randomised controlled trial of a weight loss program called RENEW (Recovering Energy Through Nutrition and Exercise for Weight Loss).(57) The program consisted of meal replacements twice daily and intensive instructions in nutrition and meal preparation, exercise and goal setting. Weight was the primary outcome. The study found that the RENEW group had lost significantly more weight on average than the control group at three months and six months. At six months the intervention arm lost 4.4 pounds versus 0.9 pounds in the control (p=0.005). Confidence intervals were not included in this article. This RCT of the RENEW program provided evidence that individuals with SMI can benefit from weight loss programs.

A study by Brown and Chan (2006) tested a brief health promotion intervention in an RCT.(115) The program covered: weight control; healthy eating; exercise; structured daily activity; and substance misuse. The outcomes measured were weight, blood pressure, and resting pulse. They found that the intention to treat analysis showed small but statistically significant improvements in weight (mean difference of 0.9 kg, p=0.01) and exercise in the intervention arm compared to the control group. Again this paper did not provide confidence intervals.

Another RCT was conducted by Daumit et al (2013) that was a tailored behavioural weight loss intervention.(51) The intervention consisted of group weight management sessions, individual weight management sessions and group exercise sessions. Standard nutrition and physical activity information was provided to the control group and health classes offered quarterly with the content unrelated to weight. Weight loss was the primary outcome but they also measured blood pressure, waist circumference and fasting blood chemical level. At 18 months, the mean change in weight from baseline was -3.4Kg (95% CI, -4.7 to -2.1[-7.5lb; 95%CI, -10.3 to -4.7})in the intervention group (p=0.002). Both intervention and control group lost weight but the intervention group lost more weight than the control group.

An RCT of an Integrated Risk Reduction Intervention (IRRI) by Frank et al (2015), aimed to reduce body mass index for adults with bipolar I disorder.(47) The focus of the intervention was improving mood stability and psychosocial functioning by reducing cardio metabolic risk factors for overweight or obese adults with bipolar I disorder. Sessions were delivered by a specialist with advanced degrees in nutrition and exercise. BMI was the main primary outcome measure for this intervention trial and the most relevant to this systematic review. They found that the intervention group reduced their BMI by 2.3% and the control group reduced their BMI by 0.2%. Both the intervention group and the control group lost weight and there was a significant difference between groups in favour of the intervention arm. IRRI was associated with a significantly greater rate of decrease of BMI (p=0.006, 95%CI, -0.91 to -0.14)

A two-arm randomised controlled trial of the STRIDE weight loss and lifestyle intervention for individuals taking antipsychotic medication was conducted by Green et al (2015).(53) The intervention involved dietary changes, moderate calorie restriction and increased energy expenditure through moderate physical activity. The main outcomes were weight and BMI although fasting blood test investigating glucose levels and blood pressure was also measured. They found that the intervention group lost 4.4 kg more than the control group at 6 months (95%CI=-6.96kg to -1.78kg) and 2.6 kg more than the control group at 12 months(95%CI= -5.14kg to -0.07kg). There was no significant difference in weight change between the groups during the maintenance phase (6–12 months). They

also found that the control group gained an average of 0.9% of their baseline weight.

Goldberg et al (2013) conducted a randomised controlled trial of "MOVE!" a modified intervention, developed initially for the general population, for use with people with SMI.(50) The intervention included strategies associated with successful weight loss programs such as psychoeducation focusing on nutritional portion control and behavioural and motivational self-management strategies. The control group received monthly weight monitoring and brochures and handouts related to diet and exercise. Only 6% of participants in the intervention group lost any weight. This study did not find any significant differences in weight loss or related metabolic outcomes between persons receiving "MOVE!" and the control group. Furthermore, there were no significant differences between the study and the control groups across any of the dietary, physical activity, and attitudinal measures.

Finally, a pilot trial by Kilbourne et al (2012) tested the Life Goals Collaborative Care (LGCC) intervention compared to the control group of enhanced treatment as usual.(60) The intervention discussion focussed on setting diet and exercise goals; health behaviours; coping strategies; and collaborative care management. The outcome measures were weight, waist, BMI and blood pressure. They found that there was no significant difference between groups for weight loss.(60) However this study was an underpowered pilot study.

Overall, for two of the randomised studies identified above there was no weight loss.(48) One of these interventions focused solely physical activity via phone call and this was not successful for weight loss.(45) The other RCT was a pilot study of the intervention LGCC for patients with bipolar disorder. (60) As this is a pilot study a more definitive study would be required to address if LGCC could be used for patients with bipolar disorder.

Three of the trials identified demonstrated improvement in weight loss for the intervention group relative to the controls. The three trials were Brown and Chan (2006) health promotion intervention.(115), the STRIDE weight loss and lifestyle intervention for individuals taking antipsychotic medications(53) and Goldberg et al (2013) randomised controlled trial of "MOVE!" intervention that

was a weight loss program modified for veterans with SMI.(50) It is promising to see that these two trials did produce a significant difference between the intervention group and the control group. However, there were no obvious differences between the interventions where the intervention group lost significantly more weight and where there was no difference between groups.

Four of the successful trials also reported weight loss in the control group. The four trials were: a randomised controlled trial by Brown et al (2011) of the RENEW (Recovering Energy Through Nutrition and Exercise for Weight Loss) Program,(57) the intervention Integrated Risk Reduction Intervention (IRRI) by Frank et al (2015),(47) the trial of the InSHAPE intervention by Bartels et al (2013,(49) and Daumit et al (2013) trial of psychiatric rehabilitation programs.(51) The control and intervention groups are involved in some level of intervention. Whether it is just simply being in the trial, participants in both groups know that they are being weighed at time points and that in itself is a form of intervention. For all of the trials the control group received treatment as usual which included being encouraged to take part in exercise or healthy eating.

2.9 Behaviour change techniques

Only four trials found that the intervention group lost significantly more weight than the control group. In order to explore this further, the following section will look at the behaviour change techniques (BCTs) included in the interventions and investigate if there are any differences between successful and unsuccessful interventions. I used the behaviour change taxonomy developed by Abraham and Michie (2008) to identify, from the description of the interventions, which BCTs were present in the interventions. (112) Another PhD student read the articles and checked the reliability of my assessment of BCTs used against the taxonomy. Any discrepancies were then discussed. It was challenging to use the behaviour change taxonomy as there was overlap between techniques used in interventions and many of the interventions were not well described.

Table 4. Behaviour change techniques

	Behaviour Change Technique	Bartels et al, USA, 2013	Brown et al, USA, 2011	Brown and Chan, UK, 2006	Daumit et al, USA, 2013	Frank et al, USA, 2015	Goldberg et al, USA, 2013	Green et al, USA, 2015	Kilbourne et al, USA, 2012	Lee et al, USA, 2014	total
1	Provide information about behaviour health link (1)	Yes	yes	yes	yes	yes	yes	yes	yes	yes	9
2	Provide information on consequences (1)(2)(3)(4)	Yes	yes	yes	yes	yes	yes	yes	yes	no	8
3	Provide information about others' approval (1)(2)(3)	No	no	no	no	no	no	yes	no	yes	2
4	Prompt intention formation. (1)(2)(3)(4)	Yes	yes	yes	yes	yes	yes	yes	yes	yes	9
5	Prompt barrier identification.(4)	unclear	yes	no	yes	yes	yes	yes	no	yes	7
6	Provide general encouragement. (4)	Yes	yes	yes	yes	no	yes	yes	yes	yes	9
7	Set graded tasks (4)	No	no	no	yes	no	unclear	no	no	no	2
8	provide instructions (4)	Yes	yes	yes	yes	yes	yes	yes	yes	yes	9
9	model or demonstrate the behaviour (4)	Yes	yes	yes	yes	yes	yes	yes	yes	no	8
10	Prompt specific goal setting. (5)	Yes	yes	yes	yes	yes	yes	yes	yes	yes	9
11	Prompt review of behavioural goals.(5)	Yes	yes	yes	yes	yes	yes	yes	yes	yes	9
12	Prompt self-monitoring of behaviour. (5)	Yes	yes	yes	yes	yes	yes	yes	yes	yes	9
13	Provide feedback on performance. (5)	No	yes	yes	yes	yes	yes	yes	yes	yes	8

	Behaviour Change Technique	Bartels et al, USA, 2013	Brown et al, USA, 2011	Brown and Chan, UK, 2006	Daumit et al, USA, 2013	Frank et al, USA, 2015	Goldberg et al, USA, 2013	Green et al, USA, 2015	Kilbourne et al, USA, 2012	Lee et al, USA, 2014	total
14	Provide contingent rewards. (6)	No	no	no	no	no	no	no	no	yes	1
15	Teach to use prompts or cues. (6)	No	yes	yes	no	no	no	no	no	no	2
16	Agree on behavioural contract. (6)	No	no	no	no	no	no	no	no	no	0
17	Prompt practice. (6)	Yes	yes	yes	yes	yes	yes	yes	yes	yes	9
18	Use follow-up prompts.	Yes	yes	yes	yes	yes	yes	yes	yes	yes	9
19	Provide opportunities for social (7)	Yes	yes	yes	yes	no	yes	yes	yes	yes	8
20	Plan social support or social change.(8)	Yes	yes	no	yes	no	no	yes	no	yes	5
21	Prompt identification as a role model	No	no	no	no	no	no	yes	no	no	1
22	Prompt self-talk.	No	no	no	no	no	no	no	no	no	0
23	Relapse prevention.(9)	No	no	no	no	no	no	no	no	no	0
24	Stress management (10)	No	no	no	no	no	no	no	no	no	0
25	Motivational interviewing	Yes	no	no	no	no	yes	yes	no	no	3
26	Time management	No	no	yes	no	no	no	no	no	no	1
	Total	15	16	15	16	12	16	18	13	15	

(1) Information-motivation-behavioural skills model; (2) Theory of reasoned action; (3) Theory of planned behaviour; (4) Social cognitive theory ; (5) Control theory ; (6) Operant conditioning; (7) Social Comparison Theory; (8) Social support theory; (9) Relapse prevention theory; (10) Stress theories [note: red is not present, yellow is unclear and green is present]

In the above table, green boxes identify when a technique was explicitly described as part of the intervention and red identifies when the technique is not explicitly described as being part of the intervention. Some of the BCTs were implied by the authors to be part of the intervention, these are the yellow boxes. Each of the BCTs are mapped onto associated theories. Abraham and Michie (2008) identified 26 BCTs and ten theories that were associated with the BCTs.(112) As can be seen in Table 5 the BCTs used within the different interventions are not associated with just one or two theories.

Nine intervention studies were included in the behaviour change table (Table 2). From the table it is clear that there are similarities across the interventions. There are several BCTs that are included in all nine interventions. All the trials used: prompt intention formation; provide instructions; prompt specific goal setting; prompt review of behavioural goals; prompt self-monitoring of behaviour; prompt practice; and use of follow-ups prompts. These BCTs were associated with the following theories: information-motivation-behavioural skills model; theory of reasoned action; theory of planned behaviour; social cognitive theory; control theory; and operant conditioning.

The majority of the interventions contained 15-16 different BCTs. There was a total of 26 different BCTs used.(112) One intervention contained 18 (53), however, this intervention did not produce a significant difference between the intervention and control groups. Suggesting that having more BCTs does not make the intervention more successful.

None of the nine trials identified used: behavioural contract; prompt self-talk; relapse prevention; and stress management. These BCTs were associated with the following theories: Relapse Prevention Theory; and Stress Theories.

There were only four interventions where there was a significant difference in weight loss between the intervention and the control groups. These were: Brown et al(57); Brown and Chan(115); Daumit et al(51); and Frank et al.(47) Eleven BCTs were present in all four of the trials. These can be seen in Table 5 below.

Social cognitive theory and control theory are the theories most strongly represented in the BCTs present in the four successful trials.

Table 5. Behaviour change techniques present in interventions with significant weight loss

Behaviour Change Technique	Brown et al, USA, 2011	Brown and Chan, UK, 2006	Daumit et al, USA, 2013	Frank et al, USA, 2015
Provide information about behaviour health link (1)	yes	yes	yes	yes
Provide information on consequences (1)(2)(3)(4)	yes	yes	yes	yes
Prompt intention formation (1)(2)(3)(4)	yes	yes	yes	yes
Provide instructions (4)	yes	yes	yes	yes
Model or demonstrate the behaviour (4)	yes	yes	yes	yes
Prompt specific goal setting (5)	yes	yes	yes	yes
Prompt review of behavioural goals (5)	yes	yes	yes	yes
Prompt self-monitoring of behaviour (5)	yes	yes	yes	yes
Provide feedback on performance (5)	yes	yes	yes	yes
Prompt practice (6)	yes	yes	yes	yes
Use follow-up prompts	yes	yes	yes	yes

(1) Information-motivation-behavioural skills model; (2) Theory of reasoned action; (3) Theory of planned behaviour; (4) Social cognitive theory ; (5) Control theory ; (6) Operant conditioning; (7) Social Comparison Theory; (8) Social support theory; (9) Relapse prevention theory; (10) Stress theories [note: red is not present and green is present]

Table 5 shows that the 11 BCTs that are found within the successful four trials are mostly present in the other five trials included in this systematic review. Thus there does not appear to be a clear difference with regards to the BCTs used in the successful compared to the unsuccessful interventions. However, the BCTs identified in the four trials where significant weight loss was observed could be incorporated in future interventions to help support weight management for adults with bipolar disorder to further explore which may be most useful.

2.10 Identified studies: qualitative studies

A systematic review of qualitative research papers was also completed which will now be described. For the purpose of the thesis I will be focussing on the barriers and facilitators to behaviour change rather than all the themes identified in the research articles.

2.10.1   Study characteristics

Table 6 shows the ten interview and focus group qualitative papers for lifestyle interventions for weight loss and or management that met the inclusion criteria. Over half the studies (six of the ten) were from USA and three of the studies were from the UK and one was carried out in Ireland. The number of participants that took part in the qualitative studies ranged from four to 112. Additional study characteristics can be seen in Table 4.

Table 6.Qualitative study characteristics

Author and year	Country	Location of interviews	Study design	Aim of the study	Number of participants	Participant characteristics
Aschbrenner et al, 2012	USA	Public mental health centres, two in New Hampshire and one in Boston.	focus groups	Benefits and challenges of involving family members	30	Adults with SMI Mean age 48.23 years 15 male, 15 females
Aschbrenner et al, 2013	USA	Three public mental health centres, including two in New Hampshire and one in Boston.	focus groups	Understanding family members and significant others in supporting health behaviour change	30	Adults with SMI Mean age 48.23 years 15 males, 15 females
Browne et al, 2016	UK	Outpatient clinic in two cities in a Southeastern state.	focus groups	Client and clinician perspectives on exercise, exercise intervention, and associated barriers	26	Group 1 (n= 12): Adults with SMI 7 males, 5 females Age range 25-50 years Group 2 (n= 14): Clinicians 3 males, 9 females Age range24-55 years

Author and year	Country	Location of interviews	Study design	Aim of the study	Number of participants	Participant characteristics
Cabassa et al, 2014	USA	Community-based behavioural health organisations	interviews, focus groups and participant observations	Contextual factors in physical health	112	Group 1 (n=21): Administrators 8 males, 12 females Group 2 (n= 25) Mental health clinicians 5 males, 20 females Group 3 (n= 66) Consumers (Adults with a diagnosis of SMI and friends or family) 29 males, 37 females
Carless, 2007	UK	Insufficient information	ethnographic study-interviews	How four men with SMI successfully incorporated physical activity into their lives.	4	Adults with SMI All male participants

Author and year	Country	Location of interviews	Study design	Aim of the study	Number of participants	Participant characteristics
Carless and Douglas, 2008	USA	Rehabilitation centre gym and community facilities	Interpretive approach incorporating ethnographic research	Explore exercise and SMI	16	Group1 (n=11): Adults with SMI Age range 24-43 All male Group 2 (n= 7): Mental health professionals
Carson et al, 2015	USA	Medical centre located in a mid-sized city	qualitative interviews	Adults with severe mental illness describe eaters habits and diet	20	Adults with SMI Age range 40- 64 years. 2 males, 18 females
Cullen and McCann, 2015	Ireland	Outpatients attending a day centre	qualitative exploratory descriptive approach	Experiences of people diagnosed with SMI (SMI) in relation to physical activity.	10	Adults with SMI Age range 28–60 year 6 males, 4 females
wright et al, 2012	UK	Local community, third sector mental health organisation	qualitative interviews	Experiences of the relationship between exercise and Bipolar Disorder	25	Adults with diagnosis of bipolar disorder Age range 24-71 years 10males, 15 females

Author and year	Country	Location of interviews	Study design	Aim of the study	Number of participants	Participant characteristics
Yarborough et al, 2016	USA	Community mental health clinics Portland, Oregon	interviews	Factors that facilitate or hinder lifestyle change	84	Adults with SMI Mean age 48.1 years 30 males, 54 females

2.10.2   Quality assessment

The CASP was used to assess the quality of the qualitative papers. Table 7 shows the results of the quality assessment of the qualitative papers. Again no overall score is provided due to the nature of the tool.

Table 7. Quality assessment of qualitative studies

Author, country, year	Are the results valid?		Is it worth continuing?				What are the results?			Results help locally?
	Clear statement of aims	Qualitative methodology appropriate	Research design appropriate	Recruitment strategy appropriate	Data collection appropriate	Relationship researcher and participants considered	Ethical issues	Data analysis rigorous	Clear statement of findings	Valuable research
Aschbrenner et al, USA , 2012	yes	yes	yes	yes	yes	no	yes	yes	yes	yes
Aschbrenner et al,USA , 2013	yes	yes	yes	yes	yes	no	no	yes	yes	yes
Browne et al, USA, 2016	yes	yes	yes	yes	yes	no	no	yes	yes	yes
Cabassa et al, USA, 2014	yes	yes	yes	yes	yes	no	no	yes	yes	yes
Carless,UK, 2007	yes	yes	yes	yes	yes	no	yes	yes	yes	yes
Carless et al, UK, 2008	yes	yes	yes	yes	yes	no	yes	yes	yes	yes
Carson et al, USA, 2015	yes	yes	yes	yes	yes	no	yes	yes	yes	yes
Cullen et al,Ireland, 2015	yes	yes	yes	yes	yes	no	yes	yes	yes	yes
Wright et al, UK, 2012	yes	yes	yes	yes	yes	no	yes	yes	yes	yes
Yarborough et al, USA, 2016	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes

The overall quality of the studies was reasonable, one was higher quality (Yarborough et al, 2018). Across all ten qualitative studies there was little detail about the relationship between the interviewer and the participant. Little or no information was provided about who the participants were and how they were recruited. Limited information was also provided about the background of the interviewer. The study with the most detailed information provided basic information that participants were recruited from a specific health care centre (116) but how the individuals were selected to take part in the interviews was not included. This raises concerns about the recruitment and sampling process of all included studies.

With regards to sample size there is little information about how the researchers decided on the final number of participants. The number of participants that took part in the studies was highly variable, from four up to 112 participants. The latter is a large number for a qualitative study and there is no mention of data saturation or any other method for deciding when to stop data collection within any of the articles. It is unclear whether or not the study with only 4 participants provides as valid or reliable evidence as the study with 112 participants as there is no justification given for the numbers recruited. Apart from two studies, most of the qualitative studies reported that they used double coding to increase reliability and validity of the results and to reduce bias. (117) (118)

2.11 Results: qualitative studies

Ten qualitative articles were identified in the systematic review exploring the barriers and facilitators for lifestyle changes, physical activity and diet, specifically in relation to weight management. People with a SMI identified many different barriers and facilitators to weight management, these will now be considered below, grouped into diet and physical activity alone and together.

2.11.1   Physical activity

Five of the studies identified in this systematic review explored barriers and facilitators for physical activity. Browne et al (2016) conducted focus groups with both clients (people with a SMI) and also health professionals to explore their perspectives on exercise.(116) The participants identified a number of barriers as well as reasons to exercise. Both the clients and the health professionals identified the reasons to exercise as: physical health benefits and accessibility of walking. The clients also identified the positive impact on mood and the health professionals identified that exercise can be used as a form of transport such as getting from A to B. Both clients and health professionals saw physical health complications as a barrier and clients identified motivation and safety as barriers. Health professionals identified barriers as 'symptomatology', these are the negative mental health symptoms associated with SMI and 'transportation concern', the authors described this as having no reason to leave the house.(116) Additionally, the authors identified from the interviews incentives to exercise.(106) These incentives were walking groups and pedometers, both could increase motivation and increase social interaction. This study concluded that there are similarities but also differences noted in the themes identified by the clinicians and clients. It also highlighted the concerns about the lack of exercise that people with SMI take part in and the importance of exploring incentives and motivation further.(106)

Carless et al (2007) were also interested in the relationship between physical activity and SMI. They conducted an ethnographic study involving four men with SMI.(119) The study investigated how these men incorporated physical activity into their lives, the process of initiating and maintaining physical activity. The facilitators to behaviour change were: previous experience of positive physical activity, cessation of physical activity during acute stages of illness, stabilisation of mental health, intensive social support, immediate psychosocial benefits, diversification of physical activity forms and increasing personal control.(119) The authors concluded that in the experience of participants the process of initiating and maintaining physical activity is slow, frustrating and challenging. No barriers to behaviour change were discussed in this research article. All participants that took part in this study were identified by the authors as

'successful' exercisers but the opinions of 'unsuccessful' exercisers were not included in this study.

In a later study Carless et al (2008) interviewed eleven men with SMI. The focus of the interviews was to investigate social support and exercise. They found that different kinds of social support were given, e.g. informational, tangible (such as physical help with tasks or financial assistance), esteem and emotional support and these were both provided to and given by the participants through exercise.(120) The authors concluded that the experiences of both receiving and giving diverse forms of support can be beneficial for some people living with SMI.(110) A major limitation of this study was that it only included men that were involved in exercise.

Physical activity for people diagnosed with SMI was also explored in Ireland. Cullen et al (20015) identified four barriers and facilitators to behaviour change associated with physical activity and SMI.(107) The 'Physical activity as a meaningful activity' captured the fact that physical activity was described by participants as enjoyable and fun leading to benefits in physical and mental health. 'Physical activity as a mental activity' theme included that physical activity can help keep the mind occupied and can result in alleviating symptoms of the SMI. The 'Improved quality of life and recovery' theme included that the participants felt that they belonged to something and it gave them a sense of achievement. Physical activity also provided them with a structure and routine and that it was part of their recovery treatment. The perceived challenges were that people felt that they often didn't have a supportive gym instructor or nursing staff that provided support to implement change. Additionally a lack of safe places to exercise and medication side effects were identified as challenges to behaviour change.(117)The findings from this qualitative study supported the need for including physical activity in treatment plans.

Wright et al (2012), was the only qualitative study identified in the systematic review to be solely focussed on bipolar disorder.(121) Again this paper was focused on the participant's experiences of physical activity. Twenty five individuals were interviewed and the authors identified three themes in relation to physical activity. The three themes included both barriers and facilitator

elements. The 'Regulating exercise for mood regulation' theme includes using exercise to manage symptoms and altering exercise to maintain some level of exercise during mood fluctuations. The 'Exercise as a double-edged sword' was a key finding in this study as exercise was viewed as being helpful and harmful at the same time based on the individual's mood, circumstances or form of exercise. The authors also discussed that manic symptoms can increase the quantity or intensity of the exercise that can intensify symptoms. The 'Bringing structure to chaos' theme suggests that exercise can create structure to daily routine and also that the exercise itself is structured.(121) The authors also acknowledged that exercise needs to be tailored to the individual's needs and abilities. They also highlighted the need for support to improve motivation during depression episodes and to assist with controlling extreme exercise when experiencing manic episodes.(111)

2.11.2   Diet

Only one study identified in this systematic review focussed on the barriers and facilitators for changing diet alone. Carson et al (2015) conducted interviews with 20 adults with SMI about how they viewed their eating, whether they were a healthy eater or an unhealthy eater. They found that the participants could be grouped into two distinct groups: self-described healthy eaters; and self-described unhealthy eaters. Healthy eaters focused on fruit and vegetables, limiting sweets, eating three meals a day, overcoming cost concerns and highlighted the benefits of healthy eating. Whereas, unhealthy eaters focused on junk food, fried food and did not really discuss fruit and vegetables. They discussed the cost of healthy eating as an issue and mentioned household barriers to healthy eating.(122) This study was based on self-report rather than food diaries so caution should be exercised regarding the 'healthy and 'unhealthy' eater labels. The authors suggested that knowing how the individual views their eating may inform the nutrition education sessions needed to support healthy eating.(122)

2.11.3   Both physical activity and diet

Four studies identified in this systematic review explored both diet and physical activity. Aschbrenner et al (2012) identified key challenges for healthy behaviour for adults with SMI.(123) Only family and friends who supported adults with a SMI to make healthy lifestyle changes were interviewed, not people diagnosed with a SMI. The study focused on challenges to healthy behaviour, barriers to taking part in healthy behaviour and the benefits to healthy behaviour. They identified partner reliability and desire to help, scheduling (not able to provide regular and reliable support if people don't live with someone) and financial resources as the challenges for weight management interventions.(123) The benefits to involving friends and family in healthy behaviours identified in this study were: improving social support, people that provide support gain an increased understanding of the challenges of mental illness and the relationship between the person providing support and the person with the SMI improves.(123) The results of this study suggests that involving significant others could potentially help with health behaviour change.(123)

An additional study by Aschbrenner et al (2013) completed focus groups with people diagnosed with a SMI, to explore the barriers and facilitators to behaviour change.(124) They found that social facilitators to behaviour change were emotional, practical and mutual support from family members and that an unhealthy social environment was a barrier. (124) An unhealthy social environment included being in an environment where the person is surrounded by family and friends with poor eating habits and sedentary lifestyles. (114) Again, it was highlighted that a reciprocal relationship where the person provided and receives support leads to health behaviour change.

Cabassa et al (2014) conducted interviews and focus groups to explore the contextual factors that impact physical activity and diet for adults with SMI.(56) There were a variety of individuals that took part in this study, they included: administrators; mental health clinicians; consumers (people who use the mental health service); relatives or friends; and community or faith- based leaders. They found that diet was impacted by the consumers' food environment and social norms associated with dietary practices, such as lack of available or

affordable healthy food and easy access to unhealthy fast food. With regard to 'Consumers' interactions with medical 'providers', avoiding the subject of lifestyle to avoid disagreement during medical visits was an issue as well as mistrust of medical institutions and cultural norms favouring a fuller body image. Mental health practitioners were ambivalent about providing physical health care. Additional training was recommended by the authors to bridge the gap. The authors also found that social context can impact on physical activity which may influence "consumers'" engagement in physical activity, such as not having access to a safe environment to exercise. By improving both provider and consumer behaviours focusing on the social and environmental determinants of health will provide a more inclusive approach to enhance physical health for people with SMI.(115)

Yarborough et al (2016) conducted interviews as part of the STRIDE study (an intervention discussed previously(53)) to identify lifestyle behaviour change barriers and facilitators.(118) The barriers identified were: lack of support from significant others, the lure of unhealthy foods; and poor weather impeding exercise. These were the same as the general population but Yarborough et al (2016) also reported barriers that were specific to people with SMI, these were psychiatric symptoms or consequences of symptoms such as social isolation.(118) Facilitators for behaviour change were found to be ongoing group-based support which supported a sense of accountability. (118) Again this illustrates that social support may be an important factor for facilitating behaviour change for weight management.

To sum up the findings, these studies highlight the importance of social support as a facilitator for behaviour change for lifestyle factors. Social support was identified in 6 of the studies. Additionally, two of the studies highlighted the importance of reciprocal support where the person with SMI gives and receives support is more beneficial than just receiving support. Additionally, physical health benefits, accessibility of places to exercise, symptom management and the need to walk as a form of transport are also facilitators. Barriers identified varied across the studies but included negative SMI symptoms, lack of safe places to exercise, environment (for example the weather) and lack of motivation. One important factor that was more consistently reported in

qualitative studies than quantitative studies was social support. Having consistent positive social support can be a facilitator to behaviour change but having inconsistent social support or being in a social environment where there are poor dietary habits or sedentary behaviour can have a negative impact on behaviour change. Some of the studies(56, 118, 119, 121) raised the challenge of coping with psychiatric symptoms for individuals trying to change their lifestyle. Other barriers found to be important included physical health symptoms, financial resources, and the influence of contextual factors such as food environment where there is a lack of affordable healthy food or unhealthy food is more desirable.

2.11.4   Synthesis of the themes across studies

For the purpose of this review, I grouped the themes identified within the articles under four overarching themes during the synthesis of the qualitative data from these ten studies. These themes are: physical health; mental health; contextual factors; and social support. Within each of the themes barriers and facilitators are reported.

Theme: Physical health

Physical health was a common theme where individuals felt that their physical health could be both a barrier and facilitator to behaviour change. Some of the individuals reported experiencing physical health complications that can impact negatively on any lifestyle behaviour changes that they attempt to make.(116) Conditions such as arthritis, diabetes and body pain were identified as physical health barriers.(116) Obesity was also viewed as having a negative impact on physical activity.(116) Not being able to take part in physical activity can lead to problems with weight management. Individuals with a SMI were also concerned about their physical health.(118)

The health benefits of physical activity were seen as encouraging people to take part in more activity.(116) Also, by increasing their physical activity this could help with maintaining or losing weight. Taking part in physical activities and being physically healthy prior to becoming unwell were also reported to lead to

increased physical activity afterwards.(119) Using physical activity as a meaningful activity (where the physical activity is enjoyable and fun) was also a way of improving physical activity levels for people with SMI.(117) Potentially, addressing physical health complications and also promoting physical activity interventions as a way to improve health conditions, could help to reduce the impact physical health has on weight and ultimately have a positive impact on the individuals life.

Theme: Mental health

The majority of the data highlighted the influence of mental health on making lifestyle changes. Many of the individuals reported mental health as both a barrier and facilitator to behaviour change. Poor mental health was identified as a barrier for exercise. Particularly where the symptoms impacted on motivation.(116) Depressive symptoms in particular impacted negatively on lifestyle changes.(118). Furthermore, lack of motivation impacts on an individual's ability to adhere to a behaviour change attempt.(118)

However, mood was also viewed by individuals with SMI as a reason to exercise. Walking was seen to have a positive impact on mood.(116) Exercise was also found to improve mental health stabilisation.(119) However, in the study by Wright et al (2012) bipolar participants described exercise as a "double edged sword".(121) In other words exercise for people with bipolar disorder can impact mood in both a positive and negative way.(121) Thus careful consideration needs to be given with regards to exercise and bipolar disorder.(121)

It was also noted that mental health impacted on diet. Yarborough et al (2016) identified that participants felt that mental health symptoms were a barrier to healthy eating.(118) Depression led to poor eating choices.

Theme: Contextual factors

Data from the different studies showed that contextual factors were associated with behaviour change. Cabassa et al (2014) focused specifically on contextual factors for behaviour change.(56) They found that contextual factors impact

both physical activity and diet. Diet is shaped by the food environment and social norms.(115) There are both internal and external contextual factors that influence physical activity. Internally people with SMI appear to be aware of the importance of exercise but are inconsistent with their daily exercise routine.

Another contextual factor was income. Income was a factor for diet choices, lower income led to making food choices that were not always healthy. (56) Other contextual challenges for behaviour change included scheduling issues (such as organising exercise activities) (123), access to healthy food choices (115), safety for exercising (116), and bad weather (118).

Theme: Social support

Social support is a key theme that emerged from the studies. More than half of the qualitative studies included in this systematic review identified social support as being both a barrier and facilitator to behaviour change. Support for weight loss can be delivered by people in an individual's social network including peers (118) or family.(118) Social support can also be provided in face to face or via phone calls or text messages. However, social support is most effective when the person is able to be in the same environment.(123) Social support can include emotional support; informational and instrumental support such as financial support.(120)

When the individual does not receive enough social support, or when they receive negative behavioural support, then social support can also be seen as a barrier to behaviour change.(118) This is seen when the individual is in an environment where those close to them are encouraging unhealthy eating or sedentary behaviour. (124)

Two of the qualitative studies included in the review highlighted that social support should be in the form of a reciprocal relationship to be the most effective. (124) (120) People with SMI should both provide and receive support from those in their social network in order to achieve a more solid relationship with those who support them with their weight management. This approach could be helpful for weight related behaviour change.

2.12 Discussion

2.12.1   Main findings

Nine trials were identified in this review. The studies included a range of weight management techniques. The majority of interventions consisted of both physical activity and diet. Four studies found significant differences between intervention group and control group in favour of the intervention arm. In four studies the control group lost weight. This is a common finding across weight loss interventions and could impact on whether trials are able to detect a difference between arms.(125) Participants in trials that included physical activity and diet components were more likely to lose weight, than trials with just physical activity or diet alone.

I was also interested in exploring the content and BCTs that are used in the successful interventions. The BCTs used in the interventions where weight loss was achieved were: provide information about behaviour health link; provide information on consequences; prompt intention formation; provide instructions; model or demonstrate the behaviour; prompt specific goal setting; prompt review of behaviour goals; prompt self-monitoring of behaviour; provide feedback on performance; prompt practice; and use follow-up prompts.

Social cognitive theory and control theory were the theories most strongly represented in the BCTs present in the four successful trials. When comparing the successful and unsuccessful interventions there were no obvious patterns of BCTs used in the more successful interventions versus those used in unsuccessful interventions as they overlapped considerably. Although it is generally accepted that social support is important for successful long term weight loss yet not all trials included social support.(123)

Based on this review, there is a lack of evidence about what works for weight management in adults with a SMI. In addition, few studies focus solely on patients with bipolar disorder and their needs in relation to weight management which may be different from other SMIs. Gaps identified in the review include a

lack of interventions that focus on: identified areas of importance including mental health symptoms and their impact on lifestyle and social support or that achieve successful long term gains. Mental health disorders have different symptoms yet bipolar disorder and schizophrenia have been clustered together for intervention, however a more tailored approach might lead improvement in terms of lifestyle behaviour change.

2.12.2   Synthesis of findings

This review also evaluated qualitative studies mostly conducted with clinical staff supporting people with bipolar, family and friends of people with bipolar disorder, as well as patients themselves. The qualitative studies provided an understanding of the experiences of adults with SMI regarding lifestyle, physical activity and diet. Adults with SMI face barriers to lifestyle behaviour change due to physical health, mental health, contextual factors and social support. Intervention development should take into consideration the impact of the symptoms of mental health. The interventions included in this systematic review do not have a strong focus on symptoms of mental health and the impact that they can have on behaviour change for weight loss.

Social support was identified as important for facilitating behaviour change in the qualitative studies. However, social support was not used as a BCT in all of the trials. Only one of the trials that had a significant difference in weight loss between the intervention group and the control group involved social support. The method of delivery of social support varied in the qualitative studies and the interventions that include social support. Social support can be delivered in peer form, groups, health professionals, or family. It appeared from the qualitative evidence that different forms of social support provided different styles of support. Research evidence has shown social support can also have a negative impact on the individual and this must be considered.

The interventions described in the trials did not focus enough on the impact of mental health on behaviour change and on adhering to behaviour change plans. There certainly was a lack of consideration given to the cyclical variance of mental health symptoms and the impact these could potentially have on

behaviour change. Mental health was clearly identified from the qualitative studies as impacting on weight management and behaviour change.

The interventions seemed to assume that the participants realised that being overweight was not good for their health and therefore they would want to change their behaviour. However people with SMI may not prioritise this because they may feel that addressing their mental health problems is more important than worrying about being overweight.

2.13 Comparison to other systematic reviews

The majority of previous systematic reviews for weight loss interventions targeting people with bipolar disorder have focused on SMI (26, 42-44, 98-105, 126)and not bipolar disorder alone. Only one systematic review was published after the start of the current review for the thesis that included only bipolar disorder.(46) The review by Bauer et al (2016) focused more on lifestyle interventions for managing symptoms and the illness rather than weight management.(46) There has also been a focus on interventions on weight gain as a result of taking antipsychotics rather than general lifestyle weight gain.(127) Other reviews evaluate the use of medication to tackle obesity in this population(128). However, weight gain for adults with a SMI is not just due to antipsychotic medication and therefore weight loss interventions have been developed that are more broadly focussed on lifestyle (diet and physical activity).

Previous systematic reviews have often focused on either physical activity or diet separately.(44) (103) However, a review by Bonfioli et al identified in their systematic review that weight loss interventions should include both diet and exercise elements.(98) The current review also suggests that interventions where there is significant weight loss between groups included both a physical activity and diet component. This was also supported by Cabassa et al who found that the most promising interventions combine exercise and diet aspects.(126) Any future interventions should therefore include diet and exercise components.

This current systematic review also included qualitative studies that have explored the barriers and facilitators to weight management. Firth et al (2016) conducted a systematic review focusing on motivations and barriers to exercise for adults diagnosed with a SMI.(26) They identified that the barriers to exercise were: low mood, stress and lack of support.(26) These barriers are similar to the current systematic review. A number of facilitators in my review were also noted in the Firth et al review, such as a method to overcome the psychological barriers and maintain motivation is through professional support. However, Firth et al (2016) did not mention any aspect of informal support or reciprocal support to aid weight management.(26) This was a novel finding from this current review.

As with the current review, the majority of previous systematic reviews have grouped SMI together and not focussed on bipolar disorder specifically. Bauer (2016) conducted a systematic review of interventions for bipolar disorder.(46) Bauer's systematic review included previous interventions but not qualitative studies.(46) They found that future interventions should target: nutrition, exercise, wellbeing, beliefs, coping strategies and attitudes towards health.(46) These are similar to the findings from the current systematic review. Improving knowledge was also something that was highlighted as important in both Bauer's systematic review and this review.

To the best of my knowledge, this is the first systematic review that focuses on BCTs for adults with bipolar disorder. BCTs for lifestyle behaviours involve the general population has been explored.(28) The BCTs associated with diet changes were: providing instructions, establishing self-monitoring of behaviour; and use of relapse prevention techniques.(28) Associated techniques for physical activity change were; prompting practice, establishing self-monitoring of behaviour and individual tailoring.(28) These were similar to those that were identified in the successful interventions for adults with SMI in my systematic review. Furthermore, goal setting, self-monitoring and contingencies (for example planning) were also found to be associated with weight loss for the general population.(109) In this current review, goal setting and self-monitoring were both BCTs that were associated with effective behaviour change in adults with SMI.

A review of general weight loss interventions found that the social support was important for lifestyle behaviour change.(28) This current systematic review identified that only five of the nine trials had a social support element and not all the interventions that produced a significant weight loss involved social support.

There are many overlaps in the content of interventions developed for adults with SMI (including bipolar disorder) and those for the general population, including BCTs used. This is not entirely surprising, however, it is likely that extra components and potentially different BCTs may be needed in a bipolar population. Further qualitative research might help to gain insight into what might be needed to improve weight management for adults with bipolar disorder.

2.14 Strengths and limitations

This review had a number of important strengths; to my knowledge this is the first review that used a mixed methods approach to understand the challenges and effectiveness of weight management targeting diet and physical activity in this group. I also took a novel approach where I coded the intervention components to try and get insights into the most useful BCTs to facilitate behaviour change in this group. The review used rigorous methods and a number of approaches to minimise bias in the review including, independent double reviewing of abstracts and full papers as well as checking of data extraction forms by a second reviewer. In addition, another PhD student reviewed the extraction of the behaviour change components from the papers. The other PhD student double checked the tables and suggested any changes or recommendations. Any discrepancies were discussed and resolved.

There are several limitations of the studies included in this review. Only nine studies met the inclusion criteria for the study and there was heterogeneity within the trials in terms of outcomes measures used, therefore it was not possible to conduct a meta-analysis. BMI and weight are reliable and widely used methods of measuring obesity. However, there was a lack of standardised

approach to measuring weight loss in the included studies, such as % of reduction of body weight(49), Kg lost(115) or % of people lost more than 10kg(57). Although there was a number of different secondary outcomes collected in the studies these were also very variable across studies.

The majority of the trials and qualitative studies were conducted in the USA. This could mean that the findings are not transferable to a UK setting due to social or cultural differences. The included studies also had a number of methodological shortcomings making it difficult to draw conclusions. Drop out from trials was highly varied, within the intervention group it ranged from 4.9% to 53.3% and in the control group it ranged from 2.9% to 46.4%. Within the qualitative interview studies the range of participants interviewed was 4 to 112 participants, with the majority of qualitative studies having a fairly small number of participants. Since authors didn't justify the sample sizes there are questions about the validity and reliability of findings of some of these studies.

Three of the included trials were underpowered, feasibility or pilot studies (48, 60, 115). It was not possible to draw firm conclusions from these trials due to issues around power and bias. The studies also had reporting issues, for example, three of the studies did not report confidence intervals.(48, 57, 115) Some of the trials also had poor quality intervention descriptions making it difficult to identify the components of the intervention and difficult therefore to code the BCTs used. This issue has been identified previously by Campbell et al who developed guidelines to improve health intervention descriptions of studies in academic papers.(129)

There was a lack of longer term follow-up beyond 12 months post intervention, therefore it was not possible to determine whether weight loss was sustained over time among people with SMI. Sustaining weight loss following lifestyle intervention participation is crucial for reducing weight related health risks in the longer term. In some of the trials both the intervention groups and control groups lost weight. This could make it difficult to find a difference between arms. One reason may be that the control groups are often 'active' in that they receive some kind of intervention, for example a leaflet. They also know that

they are going to be weighed at different stages and this may be enough to encourage some change in habits.

The qualitative studies also had a number of limitations. This systematic review included studies that had participants with other SMIs not just bipolar disorder. Including the group of SMIs could provide useful insights but there needs to be a caveat that some of the findings may be more relevant to other disorders included in SMI than to bipolar.

There was a lack of detail about the sampling frame and recruitment of the participants in some studies.(49, 119, 123) Little detail was provided about the relationship between the interviewers and the clinics or the patients. There was also a lack of quotes from participants to support the themes.

With regard to the quality assessment, the CASP templates (both RCTs and qualitative) had limited fine detail about the different aspects of the studies, which is required to compare them and to make a judgments about the overall quality of the included studies. However the CASP is a widely used tool that does provide some insight to the quality of the studies included.

There was also a number of limitations of this systematic review. This review only included published studies and the grey literature was not searched. There was only 5 databases searched, therefore, there was the potential to miss significant studies that could have been included in this review. Data extraction was only checked by a second reviewer and the second reviewer did not double data extraction. A second reviewer did review the quality assessment but again this was only checking the data and did not do this independently.

Finally, although this work has provided some useful insights, since the included studies had a number of methodological shortcomings as discussed above, it is difficult to draw any definitive conclusions about the kind of interventions that are likely to be most effective in helping people with bipolar disorder manage their weight.

2.15 Implications for future research

This review included studies that involved adults with SMI as there were few studies that solely focused on bipolar disorder. Overall there is limited research on weight management interventions for adults with a SMI, and a lack of good quality RCTs and qualitative studies. There is thus a need for more research in this area. Future RCTs should use rigorous methods with sufficient sample sizes, explore ways to improve retention and adherence, report intervention components more rigorously and collect longer term outcomes to look at weight loss maintenance. Researchers should also involve people with lived experience in the development of the interventions. Future research should focus on investigating what intervention components and BCTs may be more effective in this group and researchers should be encouraged to improve the reporting of interventions using the TIDieR approach which would make intervention coding easier.(129) Trials should also standardise outcome measures, so that trial results are more easily included in meta analyses.

Although social support appeared to be important in the qualitative review only one of the three trials that produced a significant weight loss between groups included an element of social support. Further research is needed to explore the role of social support and the optimum methods of delivering the social support.

2.16 Conclusions

Considering the small number of trials identified, as well as the shortcomings of the trials and qualitative studies included in the review, it was difficult to identify effective intervention components and BCTs, or to make clear statements about the effectiveness of the weight management interventions. There is some evidence from the trials that lifestyle interventions in this group have potential and from the qualitative studies that potential facilitators to behaviour change are improving physical health, improving mental health, improving contextual factors (e.g. access to exercise) and social support.

This review was novel as it combined both quantitative and qualitative studies in a mixed methods review and identified the BCTs used in the interventions to

support lifestyle behaviour changes to improve healthy eating and physical activity, and to ultimately address weight management for people with bipolar disorder. Much of this work has been conducted in the last few years with the oldest study being 2006. There were few studies specifically looking at bipolar disorder instead studies tend to cluster bipolar disorder and schizophrenia together. This is a shortcoming of the evidence base because bipolar disorder and schizophrenia present with different characteristics and the differences between the disorders could potentially lead to different effects from interventions. Different weight loss interventions may be needed for these two groups, as the people with these disorders present with different symptoms, receive different medication and therefore different side effect profiles and they have different levels of cognitive functioning. To date there is a lack of good quality trial evidence to inform future interventions.

3 Phase 2: methods

3.1 Introduction

This chapter describes the mixed methods approach of phase 2 of the thesis which will explore the weight management experience of people with bipolar disorder. To date there is a lack of understanding of what kind of intervention might facilitate successful weight loss that has longer term effects in this population. Through the systematic review I was able to identify previous research on interventions and also qualitative work which gave insights into what elements may be important to include in a weight loss intervention in people with bipolar disorder. However, based on the systematic review evidence, I only had limited insight into the experiences of people with bipolar disorder in the UK and the challenges they face when managing their weight, as well as the views of family members and health professionals. To further explore the lived experiences of people with bipolar disorder in relation to weight management, I conducted semi-structured interviews with people diagnosed with bipolar disorder, I interviewed people who were overweight and those who were classified as 'normal' weight. I sought to understand the barriers and facilitators of weight management for people diagnosed with bipolar disorder, as well as to explore their perceptions of what support was available to them. I also

interviewed health professionals who care for people with bipolar disorder (professional support), as well as family who provide informal support. In order to gain insight into the support system of people with bipolar disorder I also gathered social network data in the form of ego network diagrams (sociograms). This will be explained in greater detail later in this chapter.

3.1.1 Methodological Approach: Mixing Methods

Phase two of this thesis sought to address research questions 2.1 to 2.8 (see section 1.6.1). In order to address these questions I applied a mixed methods pragmatic approach, which allowed me to select the most appropriate method to address each of the different research questions.(5, 6) For the purpose of this thesis an approach of missing my methods was used where different methods are used to gain a more complete picture(130), where both a qualitative and quantitative method were used together to enhance my understanding of the lived experiences. Both qualitative and quantitative methods have associated strengths, limitations and biases.(131) Using just one of these approaches can limit the research aims and the findings.(132) Thus by combining the methods, it enables different research questions to be answered in one research study, and a more holistic approach.(132) There are different ways to mix methods and a mixed method approach can provide a more comprehensive account of the research topic. Health researchers are increasingly using mixed methods (130) where the studies bring together one or more quantitative and qualitative techniques for data collection and/or analysis.(133) Mixing methods can be used for corroboration, to validate findings, for triangulation of data and to help clarify, explore or explain results. However, it is essential that mixed methods only be used if they are appropriate to the research questions and with justification.(134)

Quantitative and qualitative methods are very different in terms of application and process, as well as epistemology. Quantitative methods focus on objective measurements and statistical analysis of data collected through, for example, polls, questionnaires, and surveys.(133) Whereas qualitative methods are useful for gaining insights into experiences or behaviours.(133) Both methods can be

beneficial for social research. Quantitative data provide an understanding of a problem from usually a large number of people whose responses are measured against specific variables. While qualitative data provide an understanding of a problem from exploring the perceptions of a smaller number of individuals but to a greater depth.(135) Qualitative methods are most appropriate for understanding a person's lived experience.(133)

Qualitative methods have a number of strengths. These strengths include that they can: provide deeper insights; complement quantitative data, facilitate raising issues through broad open-ended questioning; provide insights into complex issues and values, beliefs and assumptions.(136) Weaknesses also exist for qualitative methods, and include: no objectively verifiable results; requires skilful interviewers; and that results are usually not generalisable.(136) The strengths of quantitative methods are: findings can be generalised if study is well designed; the results have high reliability; the results are replicable. (136) Quantitative methods also have weaknesses. The weaknesses include: no in-depth insights into the context of the topic under study, does not address well the 'how' and the 'why' questions and no depth of experience in the descriptions.(136)

Adopting a mixed methods strategy can be highly beneficial as it incorporates a more rounded approach, enabling some of the weaknesses to be minimised and enhancing the strengths of the two methods. Due to the benefits of combining qualitative and quantitative methods, a mixed methods approach is recommended in the development and evaluation of complex interventions.(137) The two approaches enable exploration of different aspects of the same research topic. Compared to using a single method, combining qualitative and quantitative findings may provide a greater understanding and increasing validity of the research.(138) Ultimately, using a mixed method approach increases the ability to identify findings that are useful for research, policy and practice. (131, 132, 138, 139)

However, using mixed methods approaches can be complex and caution is important as this approach, without justification, can lead to a research study that is fragmented and lacking focus. (135, 140) On balance, I felt that although

the main focus of the research is qualitative, using a mixed methods approach would most suitably address the research objectives.

3.1.2 Application of mixing methods approach

I collected both qualitative data and quantitative social network data.(132) This mixed methods approach was also included in the systematic review where I considered evidence from both quantitative and qualitative studies and narratively combined them. In phase 2 the quantitative section involved participants drawing their social networks and completing short questionnaires.

Combining both qualitative and quantitative methods within the same research objective is described as the complementarity method. Using a complementarity method is beneficial for enhancing and clarifying the findings from one method with the results from another (141).Through using the complementarity approach different findings from the data emerge.(142) The data gathered during conversations (qualitative data) about participants' social networks provided a greater understanding of the questionnaire data (quantitative data).

The data transcripts were analysed and the results were initially written up in two separate sections, for the people with a diagnosis of bipolar disorder and those that provide support. I then drew the findings from the qualitative interviews and quantitative social network data together to facilitate a more detailed understanding of issues around weight management, and participants experiences of support and if there were opportunities to use social support to further assist with weight management. Finally, the findings from the systematic review and the qualitative and quantitative data were used to develop a conceptual framework (Chapter 8) and this informed a preliminary logic model to inform a future intervention (Chapter 8).

3.1.3 Qualitative methods

Qualitative research enables a researcher to explore and understand an individual's or groups' experiences.(132) These methods of inquiry have increasingly been used in the field of health research as a way to explore the

'patient perspective'. That is, for the people receiving a health intervention, what their understandings are of their health and behaviours as well as the intervention itself. Exploring such understandings may help explain observed health outcomes, and adding a 'lay' perspective to service evaluations can allow for important improvements.(143)

The assumptions supporting the use of qualitative research methods to explore the understandings of weight management for adults with bipolar disorder, was that there were aspects of experiences associated with weight management, which could not be observed or quantified. Rather, the research questions required the discovery of meanings and lived experiences behind the complex issues of bipolar disorder and weight management, and the influence of social support.(132)

I employed a phenomenological approach to this study; this is an approach that emphasises the subjective experiences of the individual and how they interpret the world. I wanted to gain an understanding of the lived experiences of people with bipolar disorder as well as attempt to minimise interviewer biases and preconceived expectations about weight management for adults with bipolar disorder.(131, 132) To truly understand the experiences, it is essential to talk to people with lived experience. By exploring personal experiences related to weight management, and the way in which they construct their reality in terms of thoughts, beliefs and attitudes contributing to actions, we may understand the social context of weight management and health behaviours for adults with bipolar disorder.(144)

Qualitative research methods allow a researcher to come to understand the lived experiences of individuals.(135) Qualitative methods were considered the best way to gain an insight into the experiences of the participants in relation to the research questions (Questions 2.1 to 2.4 and 2.6 to 2.8).(138, 145) Gaining insight into the 'patient perspective' may help to inform more effective interventions to support weight management for adults with bipolar disorder.(144)

Semi-structured interviews were used in this thesis as they can be tailored around a specific topic, but at the same time offer flexibility to explore additional areas that participants wished to discuss. They allow the interviewer to probe further and check for participant interpretation of the questions.(146) Semi-structured interviews enable participants to discuss the factors that they felt were important. The topics discussed during the interviews were of a sensitive matter and focused around symptoms of their disorder and potentially anxiety provoking topics.

I employed a mixture of inductive (although not purely inductive) and deductive approaches to the interviews and analysis. I began the interview process with knowledge of the topic area. This knowledge was acquired from doing background reading of the topic, the systematic review of the qualitative and quantitative research and previous work I have done with people with bipolar disorder. This influenced the interview schedule that was developed for the interviews. In order to minimise the impact of previous knowledge, I employed techniques to allow themes to emerge from the data. For example, double coding helped to minimise the influence of my previous knowledge and beliefs on the emerging themes.(147) The themes were informed by the data rather than from the theory or my understandings.

3.1.4 Analysing qualitative data and my approach

There are numerous approaches to analysing qualitative data. Methods of analysis include: interpretative phenomenological analysis (IPA); grounded theory; conversation analysis; critical discourse analysis; and thematic analysis. This is not an exhaustive list. I will highlight some of the differences between each of these qualitative approaches and why thematic analyses was the most appropriate approach for the data I collected.

IPA is a qualitative approach which aims to provide a detailed account of lived experience, it acknowledges that people perceive the world in different ways depending on their previous experiences, life events and exposures. (148) It generally involves a small number of very in-depth interviews. IPA was not considered the most suitable method for my thesis, as I wanted to recruit a wide

range of people with different characteristics to the study, in order to gain a broader understanding of the weight management experiences of people with lived experience of bipolar disorder.

Grounded theory is another qualitative approach that uses empirical data to produce a theory. (149) Grounded theory is evidence driven but produces an explanatory theory. (149) This approach was also not considered as entirely appropriate as the aim of the study was not to develop a theory as such. Also, when done properly like IPA it is a very intensive method of analysis.

Conversation analysis is a qualitative approach that focuses on the study of talk. Hutchby and Wooffitt described conversation analysis as a systematic analysis of talk that is produced in everyday interactions and situations.(150) This kind of interaction is described as talk-in-interaction.(150) This was not considered appropriate as I am not interested in investigating the interaction in everyday situations or the language used by my participants and instead focus on their lived experiences of weight management.

Thematic analysis is a flexible method of identifying, analysing and reporting themes (which are patterns in the data) that is not tied to a particular theory or epistemology.(151) According to Braun and Clarke, thematic analysis is widely used but there is a lack of clear agreement about what it is and how to apply it.(151) The process of thematic analysis is one that has a more standardised, structured approach than some of the other qualitative approaches. There are six specific phases to the analysis of the data and each phase must be completed.(151) According to Braun et al these phases are familiarising yourself with your data; generating initial codes; searching for themes; reviewing themes; defining and naming themes; and producing the report.(151)

Thematic analysis was thought to be the most appropriate for my study aims for the reasons described below:

1. I wanted to use a mix of inductive and deductive approaches which is possible within thematic analyses. (151)

2. I did not want to be tied to any specific theoretical approach and narrow set of procedures (IPA, Grounded Theory).

3. A thematic approach is less time consuming than IPA or GT to complete but would still allow me to address my research questions rigorously and within the time frame of the PhD .

4. Thematic analysis acknowledges the fact that I already have an understanding of previous research, rather than having no knowledge of the topic in question. Although the analyses should be as unbiased as possible, it would be incorrect to assume that I have no prior knowledge. I was however aware of my previous held knowledge and beliefs and reflected on these during the analysis (see results section).

Given the above the interview schedule was developed in line with thematic analysis procedures and data were analysed using thematic analysis techniques as described by Braun and Clarke.(151)

I employed a mixture of inductive (although not purely inductive) and deductive approaches to the interviews and the thematic analysis. I began the interview process with knowledge of the topic area due to the systematic review and background reading. This knowledge was acquired from doing background reading of the topic, the systematic review of the qualitative and quantitative research and previous work I have done with people with bipolar disorder. This influenced the interview schedule that was developed for the interviews. In order to minimise the impact of previous knowledge, I employed techniques to allow themes to emerge from the data. The themes were informed by the data rather than from the theory or my understandings. The double coding helped to minimise the influence of my previous knowledge and beliefs on the themes emerging.(147) I completed analysis of the data alongside data collection.

3.1.5 Quantitative methods: social network analysis

I gathered quantitative social network data to supplement and aid in my understanding of social support in the bipolar participants. Social network

analysis seeks to understand the person's network, the people who make up the network and the interactions between them. I was interested in understanding the support that people with bipolar disorder get from those within their close social network, including their friends and family.

A person's social network consists of social connections that an individual has and their subsequent interactions. These interactions can impact and influence the behaviour of those involved. Within a person's network there are different connections between individuals, some positive and some negative. Additionally, within networks there are strong relationships and weaker relationships. However, it is important to consider all the relationships when exploring the impact of the social network on the individual.

Social network analysis has two main foci: the actors and the relationships between them in a specific social context.(152) According to Serrat, (152) social networks are individuals, groups, organizations, and related systems that tie in one or more types of interdependencies. These include: shared values, visions, and ideas; social contacts; kinship; conflict; financial exchanges; trade; joint membership in organizations; and group participation in events, among numerous other aspects of human relationships. When they succeed, social networks influence larger social processes by accessing human, social, natural, physical, and financial capital, as well as the information and knowledge content of these. This field is relatively new and researchers are still trying to understand social networks in a way that can harness their potential.(152)

Social network analysis is generally regarded as a quantitative method although recently there has been a shift towards using qualitative methods alongside quantitative in social network analysis. Herz (153) provided a structured procedure for combining social network data with qualitative interviews called Qualitative Structural Analysis (QSA). The purpose of QSA was to introduce qualitative procedures to analyse network maps and narrative data and to analyse the relationship between the participant and his social network.

For this study social network data were collected by getting participants to draw a diagram of the people who form their social (ego) network. This diagram is

called a sociogram. This method has been used in a number of different settings, such as in education (154), health (155) and also online networks.(156) In order to gather further social network data I used an egocentric questionnaire (see Appendix 4), to gather data on specific information about the people they identified in the sociogram. I did not include the person's entire social network in detail, instead I focused on those who were closest to the individual and provided a level of support and who are likely to be the greatest influence on lifestyle behaviours. (157)

Combining the qualitative data with the sociogram and the egocentric questionnaire data allowed for a more holistic approach providing greater insight than qualitative data alone.(158) The social network analysis explored: meaning, feelings, relationships, attractions, and dependencies.(159) Therefore by incorporating social network analysis into this phase I was able to get insights into the relationships and dependencies that an individual with bipolar disorder has in his/her support system which aided in understanding social support in this group and how the person's social network can assist with implementing successful behaviour change over time.

3.2 Ethics

The study had NHS ethics and Research and Development approval (see Appendix 5). The protocol and supporting participant documents were submitted to a NHS Scotland Ethics Committee for review. Any amendments were addressed prior to beginning recruitment. NHS Scotland Ethics Committee was informed annually about progress.

3.3 Setting

Participants were recruited through Bipolar Scotland (a charity) and NHS Greater Glasgow and Clyde.

3.4 Participant Selection

Group 1 Adults with bipolar disorder

I aimed to recruit up to 20 participants. Participants recruited for the interviews had to have a diagnosis of bipolar disorder although the length of time they had been diagnosed did not matter. Participants were sampled to try and ensure a spread of gender, socio-economic status and age as much as possible. I also recruited those of both overweight/obese and healthy weight. Comparing people in these two categories allowed me to explore potential differences in lifestyle, circumstances etc.

Exclusion criteria

Patient participants were excluded if they had dementia or poor competence in English as they would be unable to comply with the study informed consent process. Unfortunately, we did not have the resources to provide translation services. All participants were living in the community. All participants recruited were adults (18 years and older).

Group 2 Family

I aimed to recruit up to ten participants – either family members or friends - who support people with bipolar disorder. (The person that they supported did not need to take part in the study).

Group 3 Health professionals

I aimed to recruit up to ten health professionals that work closely with people who have bipolar disorder. These included dieticians, occupational therapists and psychiatrists.

There were no exclusion criteria for the family members or health professionals other than they had to be able to speak English and be over 18.

3.5 Recruitment

Participants were recruited using a number of approaches including: advertising on Facebook, website and Twitter by the research unit I am based in; on PhD supervisors' pages; and through Bipolar Scotland (a charity with local support groups) as well as through our own NHS contacts. To recruit participants from all socio-economic groups we targeted areas with different levels of social deprivation.

Participants for group 1 were identified via Bipolar Scotland (charity with local support groups), attended NHS Greater Glasgow and Clyde clinic to provide staff with information booklets, and the advert was uploaded onto twitter and Facebook for the University of Glasgow, Social and Public Health Science Unit that hosted my PhD. Bipolar Scotland staff members were contacted via email to ask if I could attend the support sessions/groups to recruit potential participants. I attended seven Bipolar Scotland support groups and I also attended the Bipolar Scotland Annual Conference. The participants at the support sessions/groups were provided with an information sheet (Participant with bipolar disorder information sheet v1.1_10.01.17), along with an advert (advertisement v1.0_11.10.16). This provided the participants with contact details so that they were able to get in touch with me if they wanted more information or to take part. Participants were given time away from the group to discuss taking part with their family. This allowed participants time to reflect on taking part in the study. Participants were also asked to pass on the advert to other people they knew who might be interested in taking part in the study.

Participants for group 2 were family who support someone with bipolar disorder. In many cases people who provide social support attend support groups to gain more knowledge and understanding of the person they know with bipolar disorder. Therefore, participants for group 2 were also identified via Bipolar Scotland. Additionally, I utilised advertising on social media (see Appendix 6) as well as contacting local social and community groups.

The Bipolar Scotland group facilitators were asked if I could attend the support sessions/groups to recruit potential participants. The participants of the support

sessions/groups were provided with an information sheet (friends and family information sheet v1.1_10.01.17), along with an advert (advertisement v1.0_11.10.16). Family members were able to get in contact with the researcher if they wanted more information about taking part. They were given ample time to discuss taking part with their family.

All participants who contacted me expressing an interest in the study were asked for their contact details. I then contacted them and discussed the study further and answered any questions. Then I arranged to meet them in person and obtained informed consent (participants with bipolar disorder consent form v1.1 10.01.17 and friends and family consent form v1.1_10.01.17). The meeting venues included the participant's home (SPHSU policies for lone working were followed), the University, or a community venue. The venues were identified by the participants.

Participants for group 3 were health professionals that worked closely with people with bipolar disorder. These participants were recruited through our contacts within the NHS. The contacts identified potential staff members who were interested in taking part in the research. I then approached them and provided them with an information sheet that described the study (Clinician information sheet v1.1_10.01.17). These potential participants were contacted after a few days to see if they were still interested in taking part and to clarify any queries they had. At this point an interview date was arranged and full informed consent was taken prior to the interview (Clinician consent form V1.1 10.01.17).

Due to resource constraints, and participants' preferences, two interviews took place via telephone. These participants provided informed consent via post, whereby an information sheet and consent form were sent out for completion by the participant and then returned to me.

3.6 Withdrawal

Participants had the right to withdraw consent at any time during the study. When participants did withdraw from or decline to take further part in the study this did not impact on the NHS care they received.

3.7 Informed consent

Three information sheet and consent forms were developed for each of the different participant groups: participants with bipolar disorder (see Appendix 7 and 8; health professionals (see Appendix 9 and 10); and family (see Appendix 11 and 12). The information sheets and consent forms were designed with the support of a survey design assistant. I had support with the design of the booklets and proof reading. The colours for the documents and layout were discussed and considered appropriate for the study. Most of the participants received the information booklets at the recruitment stage and therefore had time to read the booklets prior to taking part in the study. The information booklet and consent form were discussed again prior to starting the semi-structured interviews.

3.8 Interviews and social network data collection

As described above I aimed to explore participant's experiences of weight management, as well as identifying the barriers and facilitators to behaviour change. I also explored health professionals and family member's experiences of supporting participants with bipolar disorder. I mapped the interview questions to each of the research questions to make sure that all the research questions were covered and that the interview questions were relevant to the research questions. I completed a mapping process for each of the interview schedules for the different participant groups (see Appendix 13).

Each participant was contacted via telephone or email, to identify a suitable time to meet for a one to one interview or telephone interview. Each participant was given a consent form and an information sheet that detailed what the

research was about. The participants were then given the opportunity to ask questions about the study before they agreed to take part. They were given the opportunity to decline at any point.

Group 1 (participants who were diagnosed with bipolar disorder) were asked to take part in one to one interviews to discuss their experiences of weight management and maintenance, how their bipolar disorder has impacted on their experiences, and the barriers and facilitators to lifestyle change (see Appendix 14).

Once they had completed their interview, participants were then asked to complete an ego network diagram known as a sociogram and an egocentric network questionnaire. This was my vehicle for collecting social network data. Only participants in the group that had a diagnosis of bipolar disorder were asked to complete these. This will be described in detail below.

At the end of the interviews the participants were asked to complete a brief demographic questionnaire (see Appendix 15). They were then thanked for taking part and given a voucher for their time.

Group 2 participants, (the family of people who have bipolar disorder) were asked to take part in a short one to one interview with the researcher. The interview consisted of a discussion about the support they provided to someone with bipolar disorder (see Appendix 16). They discussed the experiences of the person they knew with bipolar disorder around the topic of weight management, lifestyle issues and behaviour change. All interviews were conducted face to face. One of the interviews I conducted involved two family member participants. At the end of the interviews participants were asked to complete a brief demographic questionnaire (see Appendix 17), thanked for their time and given or sent a voucher.

Group 3 (health care professionals who care for people with bipolar disorder) interviews were on a one-to-one basis at a suitable venue. Two were conducted by telephone due to extreme weather conditions. The telephone interview participants completed the consent form which was returned signed as a PDF.

The interview with the health professionals explored current advice or services that were available to people with bipolar disorder around lifestyle issues. They were also asked for their views of the barriers to change and ideas for things that could help people with bipolar disorder make healthy lifestyle changes (see Appendix 18). At the end of the interview participants were asked to complete a demographic questionnaire (see Appendix 19).

All interviews were audio recorded and an external company transcribed the recordings. Due to the involvement of an outside agency I checked all the audio transcripts against the original recordings to ensure they were accurate. At this point I also checked that the audio transcripts were anonymised by removing identifiers.

3.8.1 Social network data collection

Participants who had a diagnosis of bipolar disorder (Group 1) were asked after completing the interview schedule questions to draw their ego networks. Characteristics were gathered from each participant. In social network analysis the participant is known as the ego. The ego characteristics were self-reported by the participants and no objective measurements were taken to corroborate their self-reporting. Demographic information was gathered about the participant's weight and height. Participants were asked to self-report their weight and height. From this information I was able to calculate the body-mass index (BMI) of participants. BMI is a widely used measure to categorise weight. It was calculated by dividing each participant's weight in kilograms by his or her height in meters. This provided me with a BMI score for each participant. The lowest BMI recorded in this study was 20.7 and the highest was 53.3. I used a category ordinal format to split the participants into three groups based on their BMI score using a standardised approach. BMI scores of 18.5 to 25 indicate normal weight, BMI 25 to 30 is overweight and BMI of over 30 is obese. Half of participants were obese, three were overweight and five were normal weight. There were no underweight egos.

These participants were given a social network booklet (see Appendix 4) that explained what they were required to do and I also explained the process

verbally. We discussed that they were happy to continue and I answered any questions. I provided the participants with a blue, a red and a green pen. I provided an example of asocial network that I had drawn. The participants were asked to draw in the middle of the page information about themselves, a square shape for males or a circle shape for females and were asked to write "me" in the middle of the object.

The participants were then asked to map out their social network, identifying approximately five to ten individuals (these individuals are known as alters). They were asked to include people such as: friends, family, work colleagues, or anyone else. They were informed that it could be people that they had contact: face to face, via text or phone calls, email, or skype. These would be individuals who were close to the participant. The participants were asked to write the initials of those who came to mind and draw a circle round the initials, if they were female or a square round the initials if they were male. The participants were then asked to write the individual's age in decades (such as 20's, 30's, 40's etc.) next to the circle or square. Next the participants were asked to identify how well each individual knew every other individual. They were asked if they knew each other well enough to have a conversation. For example, if A and B met in the street, would they recognise each other and start a short conversation? The participants also drew a line between each of the circles and squares which knew each other. During this stage participants were asked to identify people who had healthy lifestyles and those who had unhealthy lifestyles in their opinioni. They were asked to outline each shape with a red pen for unhealthy, or green pen for healthy and if the participant thought that the person was neither or if they did not know, then they left it without being outlined. They were then asked to look at their diagram and identify if any of the people help them with weight management. Those who did help, participant wrote a "w" and a "+" symbol next to the person. We then had a conversation to discuss what the person did to help with physical activity or healthy eating and if they thought there was anything more they could do to help? Then we discussed if the people identified in the diagram unhelpful with any weight management. If so, they wrote a "w" next to them with a "–" symbol. We discussed what these people did that stopped the participant from eating healthily or taking part in physical activity.

Additionally, participants were asked to identify people they would choose to assist them with lifestyle changes in order to help them lose weight and those that would make it harder to make these changes. They used a "+" if helpful or a "-" if unhelpful. They were also asked to identify which members of their social network were trying to lose weight and wrote a "L" on the diagram. Finally, participants were asked to identify who they felt closest to and/or who they confided in, this could be one person or as many as they felt closest to. These individuals identified were marked with a star next to their initials. This was completed on the diagram by each of the participant, from group 1, who had a diagnosis of bipolar disorder. This section was audio recorded.

Participants also completed an egocentric questionnaire which asked for more detail about the individuals in their social network identified in the sociogram (see Appendix 4). The questionnaire asked for the following information for five of the people that they identified in the diagram. The participants had free choice about which of the five people they chose. Restricting the egocentric survey to five individuals is primarily to minimise participant burden. Previous research on social network analysis recommended keeping this to five.(160) The questionnaire included: gender; how old they are; how they knew them; how far they lived from the participant; how often they were in contact with them; were they physically active; did they eat healthily; would they support the participant if they were trying to lose weight; was the person they identified trying to lose weight; and to the participants knowledge, do they have a mental health disorder. This stage was not audio recorded as the participant completed the questionnaire and there was very little discussion between the participant and the interviewer.

3.9 Demographic questionnaire

At the end of the interviews and after drawing social network diagrams (for bipolar group only) all participants were asked to complete a demographic questionnaire in order to characterise the sample. People with bipolar disorder were asked questions about their age, postcode, and gender (see Appendix 15). Using the participant's postcodes, I was able to calculate their SIMD quintile (5 bands) (see Appendix 20). Quintile 1 contains 20% of the most deprived areas in

Scotland and quintile 5 contains 20% of the least deprived areas in Scotland. There were also questions focused on their bipolar disorder such as if they have a diagnosis and the number of years and months they have been diagnosed. Finally, I asked the participants questions to enable me to calculate their BMI, i.e., their height and weight.

Using a different questionnaire, the family group were asked questions about their age, postcode, and gender (see Appendix 17). Using the postcode from the family members, I was able to calculate their SIMD quintile (5 bands)(see Appendix 20). Same as with the first participant group, quintile 1 contains 20% of the most deprived areas in Scotland and quintile 5 contains 20% of the least deprived areas in Scotland. They were also asked to self-report of how physically active they are; and self-report of how they rate their own diet. These are on a Likert scale from one to ten. The health professionals were also given a demographic information questionnaire (see Appendix 19), they were asked: how old they were; their gender; their job title; and how long they have been in their current role.

3.10 Analysis of interviews

The digital recordings of the interviews were transcribed using a company that is independent to the University of Glasgow but is an approved company that conduct work regularly with the Social and Public Health Science Unit at the University of Glasgow where I am a PhD student. The digital recordings were transferred to the independent company using a secure approved transfer website using "7-Zip" which requires the use of a secure password. Only the person transcribing and I knew the code. The transcripts were then returned in the same format and again a secure code was used for me to download them. I then deleted the online version of the transcripts and digital recordings. Before analysis of the interview transcriptions began, they were anonymised as far as possible by the removal of names, places, and any other identifiable information. Following this I began to read and reread the interviews while simultaneously listening to the audio files to check the accuracy of transcription and to immerse myself in the data. Subsequently the individual interviews were

imported into NVivo version 11 software for analysis. NVivo software enabled me to code and analyse the interviews.

The coding framework was initially developed using three transcripts from group 1 (people with bipolar disorder) that were reviewed by myself and two supervisors. We independently read three transcripts and identified initial themes that emerged from the transcripts. This was not necessarily line by line, but sections could be coded with the same theme if felt the participant was discussing the same topic. We then met to discuss the initial themes that we had identified. We discussed similarities and differences and how they could be grouped to form the initial coding framework. I then drew out the themes on a large sheet of paper into a conceptual map and began to identify potential overarching themes, sub-themes and the links between different themes to inform the coding framework.

I then used the conceptual map and coding framework to create the different codes in NVivo and systematically worked through each transcript applying the appropriate themes to the interviews. Whilst working through the transcriptions, any new themes that emerged from the data were noted and discussed during meetings with my supervisors. During discussions with my supervisors the themes were collapsed, combined and grouped to form parent and child nodes and a finalised coding framework was developed.(151) All the interviews (people with bipolar disorder and people who provided support) were coded using the same coding framework. This was due to the interview schedule covering the same topics such as living with bipolar disorder; diet and physical activity; support; and intervention ideas. I also wanted to compare the two sets of interviews and coding to similar themes facilitated this. I checked that no data relevant to the research questions was missed, since I used the same codes for all three datasets.

All transcripts were coded by me however, to increase the rigor of the analysis, 10% of interviews were selected at random, and double coded by another PhD student who is conducting a PhD using qualitative methods. I then compared the transcripts that were coded by the other PhD student with the transcripts that I coded. Again, any differences in coding were discussed and resolved.

3.11 Analysis of social network data

At this point all the sociograms were on paper and in order for me to analyse the data, the sociogram information needed to be converted into a code for each question in Microsoft Excel before using the social network software UCINET. In social network analysis the participant is referred to as the ego and the people they identified are referred to as alters.(160) The data presented in the sociogram for the ego (the participant) and each alter identified by the participant, was categorised for each of the different questions asked around lifestyle. I coded the data into numerical values (see Appendix 21). I entered the categorical data into Microsoft Excel. The questionnaire given to the participant required the participant to answer questions about the alters they identified in the sociogram (see Appendix 4). The descriptive data gathered from the questionnaires was matched to the alters. This data was added to the spreadsheet and matched to the alters. This enabled me to bring together the information gathered in the diagrams and the descriptive data about the alters.

The sociogram data from the diagrams drawn by the participants were coded using "1" or "0". Each participant identified 5 to 10 alters with characteristics (see Appendix 4). Based on the answers from the participants I was able to allocate a "1" if the characteristic for the alter was present or a "0" if it wasn't present. Where data was missing this was allocated "99". This data was input into Excel spreadsheet The Excel spreadsheet that contained the data for the egos and all the alters was then put into UCINET. Using UCINET I was able to convert the data into sociograms. This software enabled me to compare the sociograms of all the participants (see Appendix 22). The questionnaire data was analysed descriptively and the sociograms were compared visually. Visually I was able to compare egos and the alter relationships and the alter-alter ties. I observed differences and similarities across the diagrams and looked for patterns that emerged from the diagrams (see Appendix 22). I was also able visually to compare the density of the networks (number of alters) across different participant demographic groups such as higher or lower body mass index of egos and alters (these were indicated by different colour coding on the diagram[green= normal weight, red= overweight or obese]) and gender, where

the alters and egos were identified in different colour coding (males were blue, females were pink).

4 Results: participants diagnosed with bipolar disorder

4.1 Introduction

This chapter presents the results of the thematic analysis of the interviews conducted with participants diagnosed with bipolar disorder. The aims of the semi-structured interviews were firstly, to gain an understanding of the challenges (including barriers and facilitators) that people face when maintaining or trying to lose weight and secondly, to gain insights into potential interventions that people with bipolar disorder believe would help them. This section will address research questions 2.1 to 2.4 identified in section 1.6.1. This chapter identifies the themes that were identified, provides evidence in the form of quotes that supports these themes and identifies the barriers, facilitators and differences across BMI groups.

4.2 Participant characteristics

All the participants who had a diagnosis of bipolar disorder were recruited through these support groups or conference. None of the participants with bipolar disorder were recruited via health professionals. Family were recruited from Bipolar Scotland Support groups and through online adverts posted on the social media Twitter pages and Facebook pages. The health professionals were recruited though contacts within the NHS and also my supervisor Professor Daniel Smith.

Sixteen people diagnosed with bipolar disorder were interviewed. This sample size of 16 was primarily driven by the number of available participants and also thesis timescales. Fourteen of these were recruited from Bipolar Scotland support groups, one was recruited from the Bipolar Scotland Annual Conference and one was recruited from NHS contacts. Table 8 displays the demographic characteristics of the participants diagnosed with bipolar disorder who took part in the semi-structured interviews.

Table 8. Demographic characteristics: people diagnosed with bipolar disorder

	Frequency	Percent
Gender		
Males	2	12%
Females	14	88%
Transgender	0	0%
Other	0	0%
Total	16	100%
Age range		
20 and under	1	6%
21-40	3	19%
41-60	10	63%
61 and over	2	13%
Total	16	100%
Time in months since diagnosed		
0-120	8	50%
121-240	4	25%
241-360	2	13%
361+	2	13%
Total	16	100%
BMI		
Underweight	0	0%
Normal	5	31%
Overweight	3	19%
Obese	8	50%
Total	16	100%
SIMD Rank (Quintile)		
1 (most deprived)	6	38%
2	3	19%
3	2	13%
4	2	13%
5(least deprived)	3	19%
Total	16	100%

4.3 Key themes

As described in the methods section, the interview schedule was developed in line with the research questions, using the systematic review findings (Chapter 2), and the issues that the author and supervisors thought would be key areas for exploration. The main areas of interest were: living with bipolar disorder; weight issues; diet and physical activity; sedentary behaviour; sleeping; barriers and facilitators to behaviour change; social support; and intervention ideas. The key themes identified from the qualitative interviews are indicated in the table below (Table 9). As is often the case with thematic analyses, these largely follow the content of the interview schedule.

Table 9. Themes from interviews

Theme	Subtheme
Living with bipolar disorder	Mood Medication Motivation Sleep
Lifestyle	Physical activity Diet Alcohol Coping strategies Habit and routine Contextual factors
Social support and influence	Influence on lifestyle choices Importance of social support Professional support Informal social support
Intervention ideas	

Within each sub-theme the participant's experiences and views are highlighted using quotes. Quotes from participants are identified using gender, age, and BMI classification.

4.3.1 Living with bipolar disorder

All the participants interviewed indicated that every aspect of their life was affected by their bipolar disorder.

> "having bipolar, both the depression and the hypomania, has really changed my life but not for the better, and it's affected things like weight, self-esteem, confidence, body image, ability to work, ability to function, and yeah, it sucks." (male, 43, obese BMI)

4.3.1.1 Mood

Mood was a major theme that all participants highlighted when discussing their day to day activities as well as their weight management. Participants described their experiences of the mania and depression phases, and how their mood changes negatively affected their ability to function.

> "Depends on my mood, very much. If I'm normal – well I'm never normal, but normal to high... I'm organised. But if my mood's really low, nah, everything goes out the window kinda thing. It's hard to just function if I'm really low," (female, 56, overweight BMI)

Mood affected every aspect of the lives of the people I interviewed. When participants were in the depression phase of their illness, very little was achieved.

> "But psychologically you think you can literally hardly get out of the bed….at that stage [depression stage]……" (female, 55, normal BMI)

During the mania phase a small number of participants reported that their daily activities also suffered a negative impact.

> "Buy things online. Over socialise. Don't sleep. Get a bit in everybody's faces, I think. You know, I'm not aware of it at the time but people tell me" (female, 56, overweight BMI)

Mood impacts also impacts on people's lives, this included what they eat and how much they eat. Many of the participants interviewed reported overeating and eating unhealthily when in a mania phase.

> "I think what happens is, when I'm a wee bit hypomanic, I might eat more rich foods, or junk food and things." (female, 34, normal BMI)

The same participant went on to say that even though she over eats when she is manic, she then does not eat when in the depression stage of her condition.

> "....like if I'm having a rough time, if I'm maybe quite depressed, I maybe won't eat now and then" (female, 34, normal BMI)

However, others spoke about actively comfort eating or emotional eating during this phase, which is another barrier to healthy eating.

> "That can be an issue with the bipolar, you know, if you're feeling low you eat to cheer yourself up." (male, 67, obese BMI)

> "I would overeat and, you know, it was stress that was really... stress or boredom were my two factors, really, that precipitated me to overeat or eat the wrong foods." (female, 55, obese BMI)

Mood was also highlighted when considering participants' experiences of exercise or physical activity. Due to the nature of the mood disorder it can be challenging to take part in regular exercise. Interviewees indicated that exercising can impact on mood and lead them to experience a mania phase.

> "Sometimes exercise makes me go high if I kinda do it too much. Like, if I book up for a race and then go out running every day of the week it does sound a wee bit loopy. So, I'm more likely to exercise when I'm high than when I'm low." (female, 34, normal BMI)

This participant did exercise as regularly as she could and enjoyed it but she struggled to exercise when depressed. This suggested that mood is vital when considering motivation to exercise.

> "When I'm low I just can't be bothered." (female, 34, normal BMI)

One participant highlighted that she is more likely to exercise when she is in the mania phase not the depression phase. She also stated that she mostly exercised when her mood felt stable.

> "when I'm stable I tend to eat healthier, exercise more regularly, yep, definitely" (female, 34, normal BMI)

Although one of the above quotes highlighted that exercising can result in a mood change to mania phase, some of the participants said that they used exercise to stabilise their mood. It is possible that it is the style and intensity of exercise that may make the difference.

> "Well obviously physically it's good for you, but I find walking helps me to think and if I'm feeling a bit hyper, burning up the energy calms me down a bit." (male, 67, obese BMI)

4.3.1.2 Medication

In addition to the difficulties caused by mood in relation to weight management, people diagnosed with bipolar disorder are often prescribed medication. Some medication for bipolar can impact on the person's weight.(27) Medication was reported by several participants as an additional complication for managing their weight that was out of their control.

> "lithium, when I first went on lithium my weight shot up about two stone in about three months. Something like that, approximately" (female, 55, normal BMI)

One participant reported that the problem was not just about the medication directly increasing weight, but the medication had a link to physical health complications that reduced the likelihood of taking part in physical activity.

> "I've got Parkinsonism, and there's nothing they can do. The psychiatrist said "Oh, there's nothing more we can do, it's a particular drug [for treating bipolar disorder] that's causing the problem but I so need this drug, I can't come off it.... And I've got kidney disease as well. That's from lithium that I was on. ..."(female, 57, obese BMI)

A small number of the interviewees reported that the medication they were prescribed led them to feel lethargic, consequently impacting on their physical activity levels.

> "I always felt quite tired, like, not a lot of energy but that could have been the medication."(female, 34, normal BMI)

As well as medication having an impact on physical activity, it was also linked to changes in appetite.

"some of the medication that I've been on makes you have a bit of a voracious appetite, and yeah... my weight certainly has, I've put a lot of weight on over the last... Even over the last, maybe year and a half, I've put on quite a bit of weight." (male, 43, obese BMI)

One participant, however, highlighted that sometimes it can be used as an excuse for weight gain.

"I'm on Lamotrigine [bipolar medication] which isn't supposed to be one of those [medications associated with weight gain]. I haven't even got the excuse that I've got a medication that makes you more likely to put on weight." (female, 51, obese BMI)

Although medication is known to be a barrier to weight management for people with bipolar disorder,(27) some people reported that they had not experienced weight gain.

"I haven't put on a huge amount of weight on the medication I'm currently on" (female, 34, normal BMI)

One participant reported that she actually stopped feeling as hungry as a result of taking new medication.

"I think the medication has just kind of stopped. It just doesn't make me feel that hungry, like I have to remind myself sometimes that like I need to eat." (female, 31, obese BMI)

Another reported that when she started on the medication, she felt that it stabilised all aspects of her life.

"I'm on Aripiprizole. And because my moods have been kinda more levelled out, I'm able to do more things, so I'm being more active. So even like socially as well, I'm being more social" (female, 31, obese BMI)

4.3.1.3 Motivation

Motivation can be a barrier for weight management. Participants highlighted that they had difficulty maintaining motivation as a result of depression and mood instability.

> "I'm a bit erratic. I mean, I have... you know, I know it's bad but I find it hard to, you know, keep myself on the straight and narrow"(female, 57, obese BMI)

Another participant highlighted that her motivation is affected by self-doubt about her previous weight loss attempts. One participant reported she has made previous attempts to lose weight but, when she reaches a certain point, she begins to question her own weight loss attempts and then is unable to lose more weight.

> "Have I tried – I'm not sure I've tried, you know, tried to get it down a bit. I seem to be on a... you know, I just can't get over a certain bit, you know" (female, 57, obese BMI)

Motivation can be negatively affected if the person does not see any progress.

> "I was like, quite motivated before, but sometimes I've felt like, I've been exercising, I've been eating healthy and I still feel low, so I'm like, what's the point kind of thing."(female, 27, normal BMI)

One male participant, highlighted that he had varying levels of motivation.

> "when I get into something, I'm very committed to something, then there's no stopping me, right? And I'll get right into it and I'll be there all the time, and I'll be fully active and I'll fully support something, and then at other times I'm less committed to things." (male, 43, obese BMI)

A number of those interviewed did identify that they were motivated to make behaviour changes. Several commented that their motivation to take part in exercise was to avoid weight gain.

> "I probably, like, exercise so that I can have treats and stuff like that."(female, 27, normal BMI)

The desire to counter other physical changes to their bodies acted as another motivator for participating in physical activity for some participants. The following participant highlighted how she decided that she needed to make lifestyle changes due to the impact of weight on her other health conditions.

> "But it was basically my physical health that really made me want to say "No, enough is enough, I've got to lose weight" because, you know,

> my long-term conditions have been getting worse, and more breathless, not wanting to go out the house, really, really tired, lethargic, no energy, just feeling crap all the time,"(female, 55, obese BMI)

The financial cost of gym membership was identified as a motivator to continue to attend and not waste money. This participant felt that attending once a week justified the financial cost and, therefore, she is more likely to continue to attend at least once a week.

"But I've decided once a week justifies the financial cost [of the gym] and if I can get more in, well, good." (female, 51, obese BMI)

4.3.1.4 Sleep

Sleep was raised by the majority of participants as impacting on lifestyle choices. Sleep quantity and quality can impact on food choices(161) and can impact negatively on taking part in physical activity.(162) Consequently, sleep can effect weight management. A number of participants highlighted issues around sleep, however there was a lack of insight about the effect sleep can have on their weight participants tended to focus more on their mood. Due to the different phases of the disorder, sleeping patterns can be erratic. This could impact on the participant's weight management.

> "I sleep less when I'm going through a manic stage,…….., but there's less need for sleep going through a manic stage, you know." (male, 43, obese BMI)

Several participants reported using a stimulus to assist with sleep when they were having problems sleeping. Taking medication to assist with sleep could impact on how the participant felt during the day and could impact on their food choices(163) and physical activity levels.(162) This could be due to the individuals experiencing side effects such as lethargic, drowsiness or fatigue.

> "normally I take Seroquel at bedtime and got tae sleep. Usually I'll sleep all night. If I do wake up, some strange hour in the morning, I'll try and take another one" (female, 56, normal BMI)

4.3.2 Lifestyle

This section covers data relating specifically to two aspects of lifestyle: physical activity and diet. The interviewees highlighted that they were aware of what they should be doing in terms of positive lifestyle but felt it did not improve their mood symptoms.

> "….. I've been exercising, I've been eating healthy and I still feel low, so I'm like, what's the point kind of thing."(female, 27, normal BMI)

4.3.2.1 Physical activity

Participants reported that one of the benefits of taking part in physical activity has been an improvement in their fitness, reduced feelings of isolation, and an improvement in their bipolar symptoms.

> "Even like going up stairs and things is a lot easier." (female, 56, overweight BMI)

> "'Cause I know it's, you know, it's good for me to get out and about rather than just become isolated in here." (female, 57, obese BMI)

Furthermore, participants noted that taking part in physical activity is beneficial for maintaining their current weight, while some also reported it helps with reducing their weight.

> "I would say I've noticed running does keep the weight off you." (female, 34, normal BMI)

At times, suggesting that increasing exercise routine could benefit in additional weight loss.

> "But I do monitor my weight, and, so I know that it has come down but it's not come down as much as I would like. But as I say, hopefully a combination of the exercise routine I've now got over and above what I used to do," (male, 67, obese BMI)

However, not all interviewees discussed having a positive experience with physical activity and the symptoms of bipolar disorder.

"But psychologically you think you can literally hardly get out of the bed, and so, at that stage [depression stage], I don't feel I can exercise." (female, 55, normal BMI)

It is not just bipolar disorder symptoms that restrict people from taking part in physical activity.

"I haven't been going to the gym as much 'cause I had problems wi' my leg last year." (female, 57, obese BMI)

One of the participants expressed that she was not really someone who wanted to go to the gym or an exercise class. An alternative method to encourage walking was reported, however, her mood symptoms might have a negative impact in owning a pet.

"Everybody's been telling me to get a dog, but I think when I'm really low I wouldn't get out o' bed to walk the dog..."(female, 56, overweight BMI)

4.3.2.2 Diet

Participants indicated that they understood what a healthy diet consisted of but some said that often they rely on convenience food such as readymade meals and takeaways.

"A healthy diet should consist of some carbs, a lot of fruit and veg, a little bit of fat and a little bit of sugar. But I do like eat something sugary, like every day. As well as fruit, but, and I quite like crisps as well." (female, 27, normal BMI)

"in the evening I just had like a microwave meal because I wanted something quick before I went out" (female, 34, normal BMI)

Participants do not all report consuming unhealthy food. One said that he restricted what he bought as a way of improving his diet.

"I don't, if I can avoid it, buy processed food, I'll buy proper meat and proper poultry and so on." (male, 67, obese BMI)

Psychological reasons were also identified by a few interviewees. Emotional eating and eating due to boredom were highlighted as a reason for overeating at times.

> "I would overeat and, you know, it was stress that was really... stress or boredom were my two factors, really, that precipitated me to overeat or eat the wrong foods." (female, 55, obese BMI)

> "I think it [weight] has went up a bit since I was diagnosed, but, I think, before I was diagnosed I was working and I'm not working at the moment, so I think I've got more time to eat."(female, 27, normal BMI)

Environmental factors were another reason people with bipolar disorder reported overeating. The participant also justifying overeating due to the environment as "normal" behaviour.

> "The main thing I noticed actually is, over the winter I always put weight on because I crave carbs. And I don't think that's probably that unusual and you know I think that's to do with the cold and everything else as well"(female, 34, normal BMI)

4.3.2.3 Alcohol

Many of those interviewed reflected that alcohol was an issue for them. Alcohol can lead to over eating and making the wrong food choices.(164) Additionally alcohol has hidden calories. Both of these can lead to problems managing weight.

Where the participant's mood is within the cycle, affects their drinking habits. Participants highlighted that they tend to drink more during the mania phase. Many reported that they tended to drink less in the depression phase, in part because of their awareness of the impact alcohol can have on mood.

> "And if I'm high, I'm more likely to drink more, irrespective of the effect it'll have on me" (female, 57, obese BMI)

> "But when I'm sort o' low, I don't drink at all." (female, 56, overweight BMI)

> "I'm conscious of the fact that alcohol is a depressant, you know." (male, 43, obese BMI)"I find that [drinking alone] depressing, if I did

that. I know from past experience that I'd get morose."(male, 67, obese BMI)

Some participants spoke about using alcohol to deal with life challenges. One participant highlighted that he tended to binge drink when his mental health had deteriorated and he was not able to manage his symptoms of mania and depression.

> "I would say hitting fifty to sixty units a week. Over two nights, which is a hell of a lot, and I was doing that pretty regularly."(male, 67, obese BMI)

Another described how she used alcohol to cope and get through day to day living.

> "… But that's when I knew there was something wrong. Really wrong, 'cause I didnae have…….my drink to…….Hold me up" (female, 57, obese BMI)

One participant reported that at times she used alcohol to help manage her sleeping patterns.

> "I could lie awake for, you know, from three o'clock through to getting up time if I'm that way inclined and thinking of all sorts of nonsense. Which is not there if I drink and lie on the sofa," (female, 56, normal BMI)

With some medication for bipolar disorder it is advisable not to consume alcohol at the same time. However, many of the participants reported that they continued to consume alcohol even with such medication.

> "I do drink. I know I shouldn't with my medication, but I do have a couple."(female, 31, obese BMI)

One participant reported that consuming alcohol resulted in her not taking her medication.

> "alcohol will make you depressed and then I think 'Here we go again, what am I doing? Why am I doing it?' And I'll probably feel really rubbish and then I might not take my medication that day and then I start to feel like, you know, irritable and anxious and more depressed"(female, 56, normal BMI)

However, for some being put on medication led to a positive change in behaviour. One participant stopped consuming alcohol as a result of her medication.

> "I started taking lithium in November, so they're like, "oh you can't really drink on that". But like, since I'd been [on medication], so I've not drank since November," (female, 27, normal BMI)

4.3.2.4 Coping strategies

Many of the people interviewed mentioned that they had previously tried to manage their lifestyles using various approaches. One method highlighted to assist in the management of lifestyle was the use of apps and other technology. Some participants reported that apps and technology helped link exercise to mood improvement.

> "it [running app on phone] shows you patterns so you can go back and see when you were doing a lot of running and when you weren't, so it does kind of tie in with my moods thing as well. 'Cause I used an app on my phone for quite a while there about logging your moods and I would always put a note on it if I'd been for a run or anything."(female, 34,normal BMI)

Many of those interviewed spoke about a willingness to try things to help improve their lifestyles. However, one participant, reported losing interest in using the technology and another reported in the interview that he was against the use of technology.

> "I'll use it [mental and physical wellbeing app]….. I'll try anything out."(female, 56, normal BMI)

> "Yeah, my ex-partner got me a Fitbit, but I've stopped using it, like, fell out of love with it……. it doesn't really bother me kind of thing. Like, I know that I feel healthy enough, so………., I think it's just a waste of money really." (female, 27, normal BMI)

> "I think it's actually, it doesn't help communication. It makes it worse. I'd rather talk to somebody, see their eyes, see their body language, hear the tone of their voice."(male, 67, obese BMI)

Some participants said that they had previously tried to reduce their weight. One method tried was increasing exercise levels.

"But I do monitor my weight, and, so I know that it has come down but it's not come down as much as I would like. But as I say, hopefully a combination of the exercise routine I've now got over and above what I used to do," (male, 67, obese BMI)

Another participant tried getting professional advice about healthy eating.

"I had been attending weight management [services]. I wasn't as heavy as I am now, but my weight had went up to say about 100kg, and I had spoken to my GP and asked if I could get referred." (female, 55, obese BMI)

Other strategies included avoiding unhealthy snacks in their homes.

"I've got to be careful about the biscuits. I've actually got none in there because I thought I would just be tempted" (female, 57, obese BMI)

The same person also reported that she tried to swap unhealthy snacks for healthier ones.

"I do try and eat sugar-free sweeties." (female, 57, obese BMI)

Another method participants employed to manage their weight was to distract themselves so that they did not snack between meals.

"Well I've tried to distract myself by watching something on the TV or as I say I listen, I'm a great listener of podcasts, or reading a book or doing a bit of housework. These things kinda provide a bit of a distraction."(male, 43, obese BMI)

4.3.2.5 Habit and routine

Habit and routine affect both food choices and physical activity levels. Participants reported it was not just the type of food they eat but also when they consume it that could be an issue. A male participant reported eating late at night has become a habit.

"Sometimes I'll eat a lot of cereal, like I'll have maybe a cereal later on at night kinda thing, not just in the morning, so plenty of milk there obviously, more so a couple of bowls of cereal maybe." (male, 43, obese BMI)

Some of those interviewed also reported boredom as a factor that at times led to the consumption of more food.

> "That was just a bad habit [snacking between meals], and I was doing it, it was a routine, you know, to break up my day." (male, 67, obese BMI)

> "Bored. Aye. Hungry and bored." (male, 43, obese BMI)

Habit and routine is also relevant for physical activity choices and level of intensity. One participant highlighted how exercise being part of a routine is important for maintenance.

> "I don't think it's as much effort as some people find it to go. I mean, there's always times when you think 'Oh, can I be bothered?' But now I'm doing it in the weekly pattern, I don't feel that. That's just the routine. I don't dislike going." (female, 51, obese BMI)

Although aware of the importance of establishing a routine of regular exercise to see improvements and benefits to their lives, participants highlighted that they often have problems doing so.

> "It's getting into a routine that's the hard part and the key for success, I think." (male, 43, obese BMI)

Although not all participants attended or enjoyed the gym or exercise classes, many participants said that they have established regular walking routines where they get fresh air and exercise.

> "If not most days, then certainly every second day I'll try and get oot a walk, even for as little as half an hour, just kind, to be kind of roon the village, stretch my legs type thing." (male, 43, obese BMI)

4.3.2.6 Contextual factors

Several contextual factors impacted on participants' efforts to manage their weight. In addition to the bipolar disorder, some participants reported additional physical health problems. These health problems impacted on their ability to take part in physical activity.

> "I haven't been going to the gym as much 'cause I had problems wi' my leg last year. It's my Achilles' heel actually" (female, 57, obese BMI)

Several participants highlighted that they had periods when they could not work, mostly due to their bipolar disorder and associated physical health complications. This led to changes in their normal routines and consequently they ate more.

> "I think it [weight] has went up a bit since I was diagnosed, but, I think, before I was diagnosed I was working and I'm not working at the moment, so I think I've got more time to eat."(female, 27, normal BMI)

Another factor highlighted by a small number of those interviewed was the impact of the seasons. One participant indicated that the seasons affected both her eating and physical activity habits.

> "The main thing I noticed actually is, over the winter I always put weight on because I crave carbs. And I don't think that's probably that unusual and you know I think that's to do with the cold and everything else as well"(female, 34, normal BMI)

> "it is more difficult to exercise over the winter" (female, 34, normal BMI)

Hospitalisation is common within patients with bipolar disorder and by its nature this impacts on all aspects of daily life, including physical activity and diet. Many of the participants interviewed highlighted a lack of things to do in hospital and eating more.

> "I was in hospital last year, maybe three times. I was in for about three months at one point, and I was doing no activity at all really. I might get out a walk to the shop or something like that but you tend not to be doing too much activity in hospital."(male, 43, obese BMI)

A number of those interviewed indicated that they were affected by commitments to family members. One participant highlighted that her daughter had an impact on her even leaving the house, never mind taking part in physical activity.

"trying to sort things round [my daughter], because o' (my daughter's) disabilities, everything revolves around (my daughter) which means that, for example, yesterday she refused to go out the house. Refused to go anywhere. If that happens then… going to things which are arranged, like classes etc, are very difficult because you don't know from one day to the next if you can get out." (female, 56, overweight BMI)

4.3.3 Social support and influence

Influence from those in our social networks can have both negative and positive impacts on behaviour including healthy lifestyles. This theme focussed on the impact of social influence and the importance of social support for these participants.

4.3.3.1 Influence on lifestyle choices

Individuals in the participant's social networks influence diet and physical activity choices as well as providing different types of support. For this participant her mother was a positive influence on her food choices but her friends were a negative influence.

"Like, I know if I'm not eating properly I should maybe go to my mum's for a few days and then she actually feeds me proper healthy foods" (female, 34, normal BMI)

"There are things like, at work everybody goes to McDonalds on a Friday. We always go to McDonalds on a Friday. It's just a social thing." (female, 34, normal BMI)

Another participant described how her friends encourage her to make unhealthy food choices.

"like my pal who's like coming over tonight, she's like… I think we're getting two for Tuesdays…....Like that's not good. So she's not helping."(female, 20, obese BMI)

The quantity of food that the participants consume is also influenced by those close to them.

"like my pal who's like coming over tonight, she's like… I think we're getting two [large pizzas] for Tuesdays [two for the price of

one]…....Like that's not good. So she's not helping."(female, 20, obese BMI)

In addition, many participants reported that when alone they ate in secret.

"but when I binge eat I can sit and eat rubbish and it's generally after I get (my daughter) to bed when I just go and I eat crap." (female, 56, overweight BMI)

Not all participants found family to be supportive of healthy eating choices. One participant noted that her eating habits improved when her children no longer lived at home.

"My diet's better now that the kids are out o' the house, I tended to eat more rubbish when they were here. I'd scrape their plates and that kinda thing" (female, 56, overweight BMI)

Positive social support or influence from family is also important for encouraging people to take part in physical activity and many of those interviewed mentioned this.

"Like, [my cousin] often, you know, says "Ah, come for a run on Sunday", and she'll kinda pester me, which is what you need." (female, 34, normal BMI)

One of the participants spoke about combining exercise and socialising and how this encourages her to take part in exercise. Another participant said that this was particularly important when neither of them really wanted to exercise.

"It's a combination of exercise and social and, you know, seeing people that I'm fond of, and just getting out" (female, 55, normal BMI)

"neither of us I think really want to go, if that makes any sense, but we know we kinda need to go and we know it's good for us to go, so we kind of have a wee laugh with each other and kind of gee each other on and cheer each other up." (male, 43, obese BMI).

Another participant identified that support from a partner was important and could help kick-start behaviour change.

> "My ex-partner actually got me into it. So he was quite supportive at the time" (female, 27, normal BMI)

Social support can also help in managing the barriers to exercise or physical activity.

> "No, he'll just send me a text and he'll say, so for example, last Friday or Saturday, I think he sent me a text, just, the weather wasn't very good on the Saturday, he said "the weather's to be nicer tomorrow, d'you fancy a game of golf?" (male, 43, obese BMI)

However, sometimes being reliant on others for support led to people to not do the exercise if their friend cancelled.

> "Pissed off basically. 'Cause I'm like, you know, I didn't go out last night 'cause I knew we were going to go for a run this morning and then she'll maybe text me, 'Oh, I just want a lie in with my husband' and I'll be like, 'Urgh'. You feel a bit like, 'cause I know I won't go for a run myself then, whereas I would have gone if we were going together. So, I suppose it's a bit demotivating isn't it. And I had another friend that for a while I was climbing with quite a lot but she kept letting me down and I ended up just not arranging with her any more." (female, 34, normal BMI)

4.3.3.2 Importance of social support

Many of those interviewed said that they had either a lack of support or did not have the kind of support that they needed. Participants often reported feeling isolated from their sources of social support. They identified the physical distance between participants and their families as being an issue.

> "because I was far away, there was limited what the family could do, and, of course, when I was on the phone, I was pretending that things were okay."(female, 57, obese BMI)

One participant said that not having other people around can impact negatively on mental health. Another reported that when she is unwell she does not want to be isolated from others and choses to stay with her family during her depression phase.

"I think the worst thing for people with mental health [issues], is isolation." (female, 55, obese BMI)

"usually when I'm ill I go tae my mum's and just stay there for a week. 'Cause I like the company, when I'm not well I don't like getting up to an empty house. I just don't like being on my own. So I usually stay at my mum's." (female, 56, overweight BMI)

A number of those interviewed spoke about the difference between received support and their perception of support. At times they indicated experiencing conflicting feelings. Some of the participants felt that they do not have any support. One participant relied heavily on one main source of support and when that person was not there, she felt she had no one else. She also felt that she was not getting the right type of support. This was in relation to both her mother and her friends.

"there's nobody there to kind of have a calming influence, so, I could just end up being… doing not well." (female, 56, normal BMI)

"So… so, yeah, she's never really been… the way I wanted her to be." (female, 56, normal BMI)

"I don't think she's (a friend) very supportive either, because any time I say something to her, she always comes up with an alternative argument, almost like seeing the other side of it."(female, 56, normal BMI)

Participants identified the type of support they wanted. One reported that she would like regular check-ins with her close family.

"But you'd have thought if someone was trying to be supportive, even just to say "Look, I'm here, just check in every day", but, no. And then nothing"(female, 56, normal BMI)

Those interviewed reported that they felt that people just don't understand what they are experiencing. One participant reported that she didn't want advice and just needed someone to be there for her and to listen.

"I felt like they don't understand what it's like for me. And, as I said, they don't understand why I'm feeling this."(female, 57, obese BMI)

"what I need is, this is, I know this, what I need is, I need to cry my eyes out, I need to be really cuddled, and I just need to get out

whatever's inside of me and I just need that person just to be exactly what I want them to be. Just want you to listen, just want you to cuddle me and I can't, don't give me any advice, don't try and talk - 'cause that just gets your back up and I've heard it all so don't... and that's what I need."(female 60, overweight BMI)

Participants often reported that they tended to reject social support when their mood was low.

"I cut myself off from people. I literally just go off radar and, yes, I don't really engage with people. I find myself so low I don't want to, to actually deal with people at all." (female, 56, overweight BMI)

4.3.3.3 Informal social support

Informal support includes support from friends, family, group members and work colleagues. Many of the participants reported difficulty in maintaining friendships and particularly finding the 'right' kind of friends.

"And then, it's just quite hard actually, maintaining friendships, and what we tend to do is, we tend to be kinda loners in a way. And then we come out to play when we're mad, then we disappear again"(female, 55, normal BMI)

 "But not just anyone, it's got to be the right people. Sometimes you're better being on your own than being around the wrong people. I've realised that the hard way."(female, 55, obese BMI)

One participant mentioned that she has a friend that will just listen to her when she needed to talk and that he knows when she is unwell.

"he's (a friend) very acutely aware of me if I'm not well and he kind of, I can talk to him" (Female, 55, normal BMI)

Participants also reported that as well as general social support, at times their family provided instrumental and emergency support.

"my sister, she said "We'll come to some arrangement and I'll do things for you...." …….. And she helps a wee bit around the house."(female, 57, obese BMI)

 "We have an agreement I can ring twenty-four hours a day,……, and that she's also changed her habits and so now does always have her mobile phone on, so if I wanted her in a hurry. And she says sensible

things and is concerned about me and so she is my first point of contact and when something happens we'll talk it through."(female, 51, obese BMI)

Support groups were also viewed as a beneficial method of gaining support for lifestyle changes in general. Support groups consist of both facilitators and peers. The majority of the participants attended at least one support group at some point. These groups were not only used to meet people in a similar situation, but also to socialise and some were specifically focussed on weight loss.

"I guess I just wanted to meet people in, that have bipolar and were in a similar situation" (female, 27, normal BMI)

One participant attends many social groups and uses these groups to keep himself busy and thus manage his symptoms, reducing his overeating and keeping physically active.

"I know if I keep myself busy I don't focus on myself, so it's part of my managing strategy for the, to keep myself on the level." (male, 67, obese BMI)

Some of the people interviewed reported that they had previously attended weight management groups.

"I had been attending weight management. I wasn't as heavy as I am now, but my weight had went up to say about 100kg…" (female, 55, obese BMI)

With regard to weight loss specific groups, one male participant mentioned that he was worried about attending as he would be the only man.

"I get the impression most of these sort of Weight Watchers and all the rest of the various clubs, there tends to be hardly any men go but a lot of ladies go. So I'd maybe feel a wee bit embarrassed if I turned up and I was the only man there sort of thing, you know." (male, 67, overweight BMI)

Another person interviewed did not enjoy weight support groups either.

"I didn't really like Weight Watchers, 'cause I really felt like it was just very competitive with people, about losing weight" (female, 55, overweight BMI)

4.3.3.4 Professional support

The majority of the participants had contact with some form of professional support. Professional support was highlighted by the majority of participants as being essential for their wellbeing. This could be in the form of a crisis phone line or as a regular professional contact

"The first thing I did when I got my permanent address here was link in with ……….psychiatric services," (male,67, obese BMI)

"I used to phone help lines a lot more when I was very suicidal," (female, 55, normal BMI)

"I mean he's [CPN] on the end of the phone if I need him" (male, 67, obese BMI)

Professional support was not there just to deal with a mental health related crisis but also to provide information related to other aspects of the person's life.

"The dietician is really good, because she's mature, she - you know, she's got a lot of common sense as well as giving you the information that's needed, you know, to lose weight." (female, 55, obese BMI)

4.3.4 Intervention ideas

During the interviews participants spoke about features that they would like to see in an intervention to help with weight management. However, participants mostly reflected on things they had tried before rather than discussing new ideas or concepts for an intervention. They discussed a number of technological solutions, as well as BCTslike self-monitoring. Many of those interviewed highlighted that they wanted a lifestyle intervention but careful consideration of the content was needed which may need to be adapted depending on whether people are manic, stable or depressive.

One participant spoke positively about using a diary to reflect on daily activities, she felt that her reflection could encourage behaviour change. Another participant also said that she could see the benefit of a food diary using an app as a weight management intervention.

> "I write sort of my days, so I'll sit down, so say maybe even after about two hours.............and then my plan is on a Sunday I'll reflect over the week, you know, and kind of like what was the best bit of that day, what was the worst day." (female, 60, overweight BMI)

> "I know people have like food apps where they can record everything, but I think if I wanted to lose weight, like, if my weight became a problem I'd maybe do like a food diary or something." (female, 27, normal BMI)

Apps were also highlighted as potentially useful if they could be designed to successfully use pop up messages to capture the person's attention. One participant highlighted the powerful properties of these pop up messages and how much influence they have on her.

> "Yeah. 'Cause like if it's like 'Just Eat,' and it's like 'fancy a curry tonight?' I'm like 'yes.' So like it does, it does work. But like on Instagram, if it's like someone's posted a photo like I'll look at it. So they do work, yeah."(female, 20, obese BMI)

In a similar vein messages could be delivered using texts or an app to highlight the consequences of a specific behaviour.

> "So like a kind of, a message? (interviewer) Maybe like that would help, yeah. A warning? Yeah. Like… go do your ten steps or you'll have diabetes. Like maybe not, but like… I suppose if it was kind of phrased in a way like it could prevent…? Yeah, that might be helpful. Like a helpful reminder." (female, 20, obese BMI)

The majority of the views of using technology to monitor physical activity levels were that the technology was not always helpful.

> "my ex-partner got me a Fitbit, but I've stopped using it, like, fell out of love with it……. I don't know, just, like, you'd check how much steps and stuff you'd done, but, it doesn't really bother me kind of thing. Like, I know that I feel healthy enough, so I don't, I think it's just a waste of money really. And I know like, I think most I-Phones and stuff have like a health app, so I'm sure other smart phones have

it, and I think they track your steps and things like that. So I guess, yeah, if you're not, if you don't feel you're getting enough exercise then they are a good way to track. But I'm not totally convinced how they pick up your steps as well, like, I don't feel it's accurate. I think it's just a fad." (female, 27, normal BMI)

"I dunno I just feel like people get obsessed by how many steps they've taken and, really, does that matter that much? I just don't know how much that data's important. I mean, at the end of the day I know if I'm doing loads of walking or if I'm not. I know it myself. I don't need something on my wrist to tell me." (female, 34, normal BMI)

Although a number of those interviewed felt apps could be helpful, one participant highlighted that apps weren't for everyone.

"I wouldn't know tae use them [apps]. My friend, who's at Weight Watchers, said that you can go into the supermarket – you've got tae have the app on your phone – and you can track, you know, if you pick something up, you can track it" (female, 59, normal BMI)

Interviewees were asked what would be beneficial if they were feeling low (depression phase).

"Probably like somebody to motivate me. Where if somebody came to my door and said, "Right we're gonna walk," I would go. It's just me trying to get over that door is very difficult. It's very isolating when you're down," (female, 56, overweight)

4.4 Theme synthesis

The following section attempts to illustrate how the identified themes may contribute to improved understanding of the barriers and facilitators people with bipolar face with regard to weight management; variations in accounts across different BMIs and how the themes interact with regard to lifestyle and weight management.

4.4.1 Barriers and facilitators to lifestyle change and weight management

During the analyses barriers and facilitators to behaviour change and weight management emerged. Figure 4 highlights the barriers and facilitators that were identified from the interviews with the participants with bipolar disorder.

Intrapersonal barriers
- Low mood impacts healthy eating
- Low mood impacts on physical activity levels
- Mania mood impacts healthy eating
- Lack of sleep
- Low motivation
- Breaking a habit or a routine
- Alcohol use
- Feeling isolated
- Physical health problems/ co-morbidities

Interpersonal barriers
- Negative social influences
- Not having consistent support

Other barriers
- Medication
- Hospitalisation

Figure 4. Potential barriers to weight management

Throughout the interviews participants spoke openly about the many barriers that they experience to healthy lifestyle behaviours and weight management. While these barriers are wide-ranging they are also interlinked. The barriers have been grouped into three domains: intrapersonal barriers, interpersonal barriers and other barriers. The intrapersonal barriers experienced by participants include barriers that are connected with an individual's personal internal control and lifestyle. These include: the participant's mood; sleeping habits; low motivation; breaking habit or routine; alcohol use; feeling isolated; and physical health problems.

From the interviews it would seem that participant's mood state and instability of mood were prominent barriers. Both low and mania mood appear to impact on the participant's healthy eating and physical activity levels. Low mood in some cases leads to unhealthy eating. Some reported undereating and others

overeating, both of which could potentially lead to weight management problems. Low mood also appeared to impact on physical activity levels where most participants reported not exercising with some reporting not leaving their bed. Mania is also a barrier as participants reported that feeling manic often led to unhealthy food choices and an increase in the quantity of food consumed.

Participants also spoke about the impact of lack of sleep on their weight management. They highlighted that sleep deprivation was a barrier that could potentially lead to more problems with mood and which may have a subsequent negative impact on weight management. There was no discussion of the effects that lack of sleep can have, such as poorer food choices and a reduction in physical activity.(162) Low motivation to take part in physical activity and to eat healthily was also reported by most participants. Where there was a lack of motivation participants said that they were doing little to improve this. Participants reported finding it difficult to establish and maintain healthy habits or a routines. Finally, alcohol was reported as barrier as some of the participants used alcohol as a method of coping with their symptoms. Alcohol consumption in itself can, of course, have a negative effect on weight management.(164)

The interpersonal barriers were: negative social influences; and not having consistent support. Participants highlighted that there are barriers related to the support provided by their family, as social influences can be negative as well as positive. The people interviewed in this study also reported feeling that they did not have consistent support during the different stages of their disorder.

The final barriers were classified as 'other barriers'. These included medication and hospitalisation. These barriers could potentially be addressed through improving the hospital environment to include healthier lifestyle options and increased clinical support and knowledge would enhance this. Participants in this study seem to report that they feel that some co-morbidities are not being addressed and treated effectively,(165) so by improving treatment and addressing these, health professionals could reduce additional barriers to improved lifestyle. Many participants spoke about how they experienced certain medication made them feel lethargic with a resultant negative impact on their

physical activity levels. Participants also highlighted that medication impacted on their food choices and caused cravings.
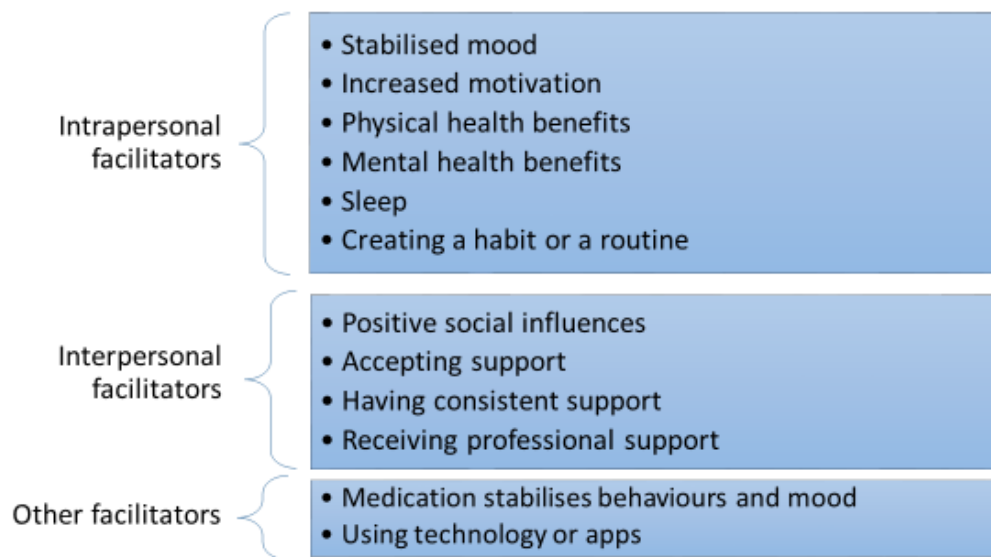
Figure 5. Potential facilitators to weight management

Throughout the interviews participants spoke about the many different facilitators that they found encouraged them to take part in weight management. These facilitators were separated into three groups: intrapersonal, interpersonal, and other facilitators.

The intrapersonal facilitators included: stabilised mood; increased motivation; physical health benefits; mental health benefits; sleep; and creating a habit or routine. Participants identified that stabilising mood was one of the main internal facilitators to behaviour change. Stabilising their mood allowed participants to feel more motivated to make positive lifestyle changes. Participants identified that both the mental health benefits and physical health benefits of a healthy lifestyle were also facilitators to more positive behaviour change, thus inducing a positive cycle of change.

When it came to sleep, most of the participants did not make the direct connection between sleep and their weight management efforts.(162) Participants were, however, aware of the relationship between their mood and sleep. Participants recognised that they could improve their mood, lethargy and

eating habits by improving their sleeping habits. Participants recognised that it was important to create and maintain a healthy habit or a routine which assisted with maintaining positive behaviour change.

Interpersonal facilitators were also identified from the interviews. Positive social influences were identified in many people's accounts as important for establishing positive behaviour change and maintaining the change. Support is not just about the actual support available, as only when the person with bipolar disorder is willing to accept that support can it facilitate behaviour change. Support can take the form of both professional support and informal support. The support however does need to be consistent during all stages of the illness.

A few other facilitators to behaviour change were identified. Many of those interviewed found that medication helped to stabilise their mood which in turn impacted on all aspects of their lives and gave them the space to address different issues including lifestyle. Technology and apps were also identified as enablers to behaviour change, and most participants reported using them in some form.

The relationships between the different barriers and facilitators to lifestyle behaviour change and weight management are complex. In addition, many of the barriers related to weight management identified are difficult to address.

4.4.2 Differences observed across BMI

Both participants with a normal BMI and overweight/obese BMI took part in this study. Five of the participants had a normal BMI while 11 were overweight or obese. I recruited both normal weight and overweight/obese participants to attempt to explore the differences and similarities in the accounts between the two groups with regard to lifestyle and weight management.

Exploratory analyses indicated that there appeared to be two groups of participants who took part in this study: those who report not eating during the depression phase of their bipolar disorder and those who report overeating, binge eating and comfort eating during their depression phase. This is likely to impact on their weight. There is some suggestion that those who under eat

during the depression phase are more likely to be normal weight, while those who binge eat during this phase are more likely to be overweight or obese. Of course it should be noted that these analyses are highly exploratory in nature and there will be many factors influencing weight. Nearly all participants spoke about making unhealthy, indulgent food choices when in the mania phase of their bipolar disorder, regardless of weight.

Most of those interviewed described participating in some form of physical activity whether that be swimming, walking, exercise classes, or attending the gym. Only two participants reported taking part in very little physical activity, one participant had a normal BMI while the other had an obese BMI. Most participants with a normal BMI talked more about physical activity being an embedded part of their lifestyle, those with an overweight or obese BMI spoke about having to take part in physical activity. Overall, apart from the possible impact of differences in eating patterns in the depression phase and the suggestion that for those of normal weight physical activity is more embedded in their lives, there were no consistent differences in accounts between those with a normal BMI and those who were overweight/obese.

4.4.3 Summary and conclusions

Mood state was highlighted by all participants in the study as having a substantial impact on every aspect of their lives. It appeared that their primary focus was on managing and coping with their mood cycles. Participants spoke at length about the feelings that they experienced and lack of control they felt during the different phases of their disorder. Participants had an awareness of the relevance of their mood on weight management, and they often gave their mood cycles as a reason for their lack of weight management. They also tended to give limited consideration of other aspects that might impact on their weight management in addition to mood, such as alcohol and sleep.

All of the participants spoke about the symptoms they are continuing to experience and the impact they feel that these symptoms have on day to day activities. The participants spoke about struggling to deal with the cycles of their disorder and about getting through each day. For most of the participants

who are overweight or obese, they were aware of their weight but this was less important than managing their symptoms and getting through the different phases of the disorder.

Across the group, all participants reported they were in receipt of varying levels and consistency of professional support. Although only 16 participants were interviewed almost all of them experienced a different level of support. While some participants reported having very little professional support others felt they had a good level of professional support. This lack of consistency could potentially impact on the individual's mood, physical and mental health, and how accepting of lifestyle changes they were. The majority of participants highlighted some level of physical health issues or co-morbidities that they felt had an impact on healthy lifestyle activities, potentially by addressing these positive behaviour changes may be effectively supported. Thus when trying to help patients with bipolar disorder with their weight the focus should be on the person as a whole.

Although participants indicated that social support was important, the majority of participants did not have long term close supportive relationships with a partner or family. Most of the participants lived on their own with only a few married or in relationships. The majority spoke about difficult previous relationships and marriages. Based on the interview data there did not appear to be any relationship between whether people were living alone or with family and their obesity levels.

The interviews provided a valuable exploration of the participants' experiences, the barriers, facilitators and behaviour change approaches they had employed previously. Furthermore, exploring these issues in an interview context has helped to develop an understanding of what could potentially influence the success of a weight management intervention in this group. The people who took part in this study reported that living with bipolar disorder affected all aspects of life. Any future intervention should recognise the importance that mood has on the lives of individuals with bipolar disorder.

All participants indicated that there is both a need and a desire for an intervention to support weight maintenance. However, providing support to people with bipolar disorder could be challenging, particularly in maintaining support during all phases of the disorder. Participants can be resistant to contact during periods of depression and it is essential that positive support is maintained during this phase. Such support could be delivered through digital methods at all times, but would be particularly useful during depression phase when participants reported having little contact with informal support. The majority of people who took part in this study reported that using technology may be something positive to support behaviour change.

To date there are few effective lifestyle interventions for weight management for people diagnosed with bipolar disorder. These interviews with people diagnosed with bipolar disorder gave important insights into the views of those who would be likely to use such an intervention.

The following chapter will focus on the interviews with those who support people with bipolar disorder.

5 Results: participants who provide support

5.1 Introduction

This chapter provides an interpretation of the qualitative study of semi-structured interviews with participants who support people with bipolar disorder. These include health professionals and family. The aim of this stage of the thesis was to gain insight into the support for healthy eating, physical activity and weight management and to obtain ideas for future interventions. This section will address the research questions 2.6 to 2.8 identified in section 1.6.1.

This chapter describes the same key themes and sub themes as identified in Chapter 4 and explores the extent to which the views expressed by the supporters are similar or different to patients with bipolar disorder. As above the themes largely follow the content of the interview schedule.

5.2 Participant characteristics

Ten people who provide support to a person with bipolar disorder were interviewed. Five of those interviewed were health professionals and five were family.

From the demographic questionnaire, family participants provided information about their postcode. I used their postcode to calculate whether they lived in a high or low SIMD area, using a spreadsheet developed by Scottish Government (see Appendix 20). Quintile 1 represented 20% of the most deprived areas in Scotland and quintile 5 represents 20% of the least deprived areas in Scotland. Family were asked in the demographic questionnaire to identify on a Likert scale how physically active they are on a scale of one to ten, with one being not active at all and ten being very active (see Appendix 17). They were also asked to identify on a Likert scale how healthy their diet is on a scale of one to ten, with one being not healthy at all and ten being very healthy (see Appendix 17). The demographic information of those interviewed is included in the table below (Table 10).

Table 10. Participant demographic information: support providers

Gender	Frequency	Percent
Males	2	20%
Females	8	80%
Transgender	0	0%
Other	0	0%
Total	10	100%
Age range		
20 and under	0	0%
21-40	4	40%
41-60	6	60%
61 and over	0	0%
Total	10	100%
Health professional role		
Dietician	1	20%

Occupational therapist	1	20%
Psychiatrist	3	60%
Total	5	100
No. of years in role of health professional		
5 and under	2	40%
6 to 10	1	20%
11 to 15	0	0%
more than 15	2	40%
Total	5	100%
SIMD Rank of family (Quintile)		
1 (most deprived)	0	0%
2	1	20%
3	2	40%
4	0	0%
5 (least deprived)	2	40%
Total	5	100%
Physical activity score of family		
1 to 2 (least active)	0	0%
3 tor 4	0	0%
5 to 6	1	20%
7 to 8	4	80%
9 to 10 (most active)	0	0%
Total	5	100%
Healthy diet score of family		
1 to 2 (least healthy)	0	0%
3 tor 4	0	0%
5 to 6	2	40%
7 to 8	3	60%
9 to 10 (most healthy)	0	0%
Total	5	100%

5.3 Key themes

The key themes and subthemes used to code these semi-structured interviews were the same as those used in the previous chapter for people with bipolar disorder. This was due to (1) the interview schedule covering the same topics:

living with bipolar disorder; diet and physical activity; support; and intervention ideas and (2) so I could compare the two sets of interviews, coding to similar themes facilitated this.

For ease of reference the key theme table in chapter 4 has been replicated below (Table 11).

Table 11. Themes from interviews

Theme	Subtheme
Living with bipolar disorder	Mood Medication Motivation Sleep
Lifestyle	Physical activity Diet Alcohol Coping strategies
Social support and social influence	Importance of support Informal social support Professional support Support groups
Intervention ideas	

The following section takes each theme in turn and explores the sub-themes that are associated with each theme. Within each sub-theme the participants' comments and opinions are highlighted using quotes that are related to the sub-themes.

5.3.1 Living with bipolar disorder

Similarly to the previous chapter (Chapter 4 participants with bipolar disorder), participants who provide support (called support participants in this thesis) highlighted that there are a number of barriers and facilitators that people with bipolar disorder face when dealing with healthy eating, physical activity and

weight management. Like individuals living with bipolar disorder, support participants stressed how much having bipolar disorder impacts on every aspect life for the person they support.

5.3.1.1 Mood

Both low mood and mania impact on daily activities and support participants are aware of the influence. Low mood was a barrier that family picked up on as impacting on a person's activities. One participant highlighted that she noticed that the person she supported started to withdraw from regular activities due to his mood.

> "I mean he seems, when he has become unwell it's very apparent. You know, it's very obvious to friends and family of his because he would start to maybe withdraw from things, so instead of playing five-a-sides a couple of times a week, he would withdraw, or, and so the brothers or friends would be like, "Hmm… what's going on here?" So they would know to maybe try and get involved a wee bit more." (family, I.D.9)

Furthermore, this participant also spoke about the fact that the person she supported tended to withdraw from the family during the depression phase.

> "…..he'll sometimes just stay in his bed for two or three days at a time." (family, I.D.9)

Health professional and family support participants felt that mood impacted on physical activity and greatly influenced the intensity of exercise among those supported.

> "he… was aware that he swung between being completely solitary and sedentary and did nothing, to over-exhausting himself." (clinician, I.D. 2)

Similarly, one health professional found that people she supported would over exercise.

> "To the extent that he was overly doing it. So he would become obsessed with exercise and fitness and so it wouldn't be that he would

> just cycle fifty miles a week, but he would then go out at the
> weekend and do like big treks and exhaust himself. So…he would kind
> of dip into that kinda mania." (clinician, I.D.2)

Mood impacts on food choices and the quantities eaten for many people with bipolar disorder. Family support participants talked about the complex relationship between food and mood. Some of the participants felt that the people they supported tended to eat less when they were in the depression phase while others felt that the people they supported comfort ate at such times.

> "She doesn't eat more when she's down. Some people might do that,
> but she doesn't. She's more likely… she does everything to excess
> when she's up." (family, I.D.6)

> "So he'll go from comfort eating to not eating at all, sometimes."
> (family, I.D.9)

Health professional participants shared the view that patients made poor food choices depending on their mood.

> "He was quite on top of that, except when he was at his lowest
> point. I think he was just kinda living off takeaways and not really
> cooking," (clinician, I.D.2)

5.3.1.2 Medication

Medication was highlighted by support participants as a barrier to weight management. Clinical staff are aware that medication can lead to weight gain for some patients.

> "it usually does go up, obviously, when they get onto the clozapine,
> for example, it's usually quite [a] marked increase." (clinician, I.D.1)

Clinical staff report that they can struggle to get patients to take their medication at times.

> "So… we have difficulties getting patients to take medication,"
> (clinician, I.D.3)

One family member said that the person she supports didn't want to take his medication due to the impact on his weight.

> "And I think that's one of the reasons he didn't want to take anti-depressants any more as well, because they were making him put on weight, and he started feeling bad about himself" (family, I.D.9)

However, health professionals report that at times patients can use their medication as an excuse for weight gain.

> "And if they feel like they can use that as an excuse, that it's clozapine that's putting the weight on them, it's nothing to do with them increasing their intake, just they don't want to take ownership of it." (clinician, I.D.1)

Not all patients on medication do gain weight and there are ways to minimise the effect.

> "they blame the meds for their weight, yes…I'm sure we've probably had more than one, but there's one man that sticks in my mind, that did not put on any weight with clozapine, and if he did, he worked it off…when I met him, he was a good weight, and I have said that to patients, not all patients will gain the weight. If you're careful with what you eat, and you exercise, you will, you can be fine." (clinician, I.D.1)

People with bipolar disorder who want to make changes to their lifestyle or behaviours often looked for more information regarding medication. Health professionals found that people asked questions and wanted more advice about the medication they were taking.

> "I kind o' just thought it seemed that I'd never heard so many queries at that time, and it's all lithium, so I felt maybe the services needed to be a wee bit better about explaining what they could do and what they couldn't do. If they're allowed, if they've got any leeway of changing their own meds." (clinician, I.D.1)

Being aware that weight gain can be a result of taking medication, health professionals have developed strategies to assist with this problem. One health professional, however, pointed out that the uptake of assistance was not great.

> "[the pharmacist would] speak to the patients about getting, you know, the next plan is you've to go onto [medication], and she'll explain... everything about [medication], basically, and she'll ask them then, or she'll suggest that I could come in because there's a likelihood that this might have an impact on their weight. And I would say that 99% would say 'no thanks'." (clinician, I.D.1)

One of the health professionals suggested another technique that could be used was to monitor medication and change as appropriate. This would obviously only work if the person being monitored was not over weight before he or she began to take the medication in question.

> "so I'd look at what, you know, what medication are they on and how important is it that they're on that medication? So, for example, if they were on an anti-psychotic medication, but you know, they hadn't been tried on Lithium or there was no good reason why they couldn't have Lithium, I'd think, I'd discuss with the patient." (clinician, I.D.4)

5.3.1.3 Motivation

Motivation was another barrier also identified by both family and health professionals. One participant discussed attending an exercise class with the person she supported.

> "I think she enjoyed it... but I don't know why neither of us kept that up either." (family, I.D.6)

Health professionals found that motivation was very much closely associated with mood. Low mood tends to lead to poorer motivation to change.

> "if somebody's very depressed then they might be very kinda slowed up and things like that and have much more poorer motivation in terms of doing these things." (Clinician, I.D.3)

In addition to low mood a health professional also reported that a feeling that the change being sought is too large to make can impacts negatively on motivation.

> "I think the barriers are likely to have been his mood, likely to have been the thought of 'This is a big mountain to climb, and I can't do it', and just feeling a bit overwhelmed by it." (clinician, I.D.2)

Health professionals reported that before they meet with someone to help with weight, eating or physical activity the person must have some level of motivation to change. Despite this, health professionals often find people don't have the motivation to actually make the behaviour changes.

> "So I think he had a bit of a wakeup call then and I think when he came to me, he'd already decided that he had to change. He just didn't have the, kind of, the wherewithal or the motivation or the kind of plan on how to do it safely." (clinician, I.D.2)

Even if the patient doesn't have the motivation to change then health professionals felt that they were still able to help.

> "So if you don't have the motivation to begin with, then they're in that kind of pre-contemplative stage and you're gonna have to seed some, some sort of worries for them. You know, try and stir up a bit of cognitive dissonance, "Oh, I know you like your food, and I know this medicine's kept you well, but you know, you might die fifty years younger than the rest of the population because you've got bipolar disorder." And that kind of… Obviously, I wouldn't say that" (clinician, I.D.4)

> "And then, you know, a bit of motivational interviewing to try and encourage them to change, a bit of signposting in terms of, you know, what they should do…." (clinician, I.D.3)

Structured activities for inpatients organised on the ward by facilitators encouraged patients to be more active. All inpatient based health professionals or those who had inpatient experience described this as a facilitator to positive behaviour change.

> "So certainly for the mile walk, the person that sort of coordinated that is very visible on the ward and known to the patients on the ward, so she was very good at motivating people, you know, to get them out to do the kinda mile walk even if the weather wasn't great." (clinician, I.D.3)

However not all support participants felt that people with bipolar disorder had poor motivation. One of the health professional participants that was interviewed felt that people with bipolar disorder were motivated to change.

> "Individuals with bipolar disorder …can be more motivated to change compared to other patient groups, especially depending on the stage of their illness" (clinician, I.D.3)

This health professional went on to explain that motivation was very much dependent on mood. This supports the evidence from the participants with bipolar disorder. Low mood was described as less motivating to change.

> "somebody's recovering from a manic episode, you know, they may well be quite motivated to do these things" (clinician, I.D.3)

Another health professional highlighted that motivation level may be linked to how a person felt about his or her appearance or connected to an additional poor health diagnosis.

> "If they said to me that they're fed up looking at this [themselves], they want to change it, if they've been diagnosed with diabetes, they're scared, then that's, you know, you pick it up on whatever wee angle that you can get into them." (clinician, I.D.1)

5.3.1.4 Sleep

Bipolar disorder impacts on sleep and vice versa. Sleep can negatively influence lifestyle such as taking part in physical activity and making food choices. This can impact on weight management. There was a lack of insight from the health professionals and family interviewed about the impact that sleep can have on the person with bipolar disorders weight. The main focus with sleep was the impact that it can have with their mental health.

One participant reported that stress really impacts on sleep and by not sleeping the person that is supported experiences deterioration in their mental health. No link was made between weight and sleeping, only the impact sleep and mental health.

> "But sometimes if there's anything really stressful going on, he just doesn't sleep. And then everything gets much worse, and his anxiety gets worse, and things just come to a head. He just can't cope" (family, I.D.7 and 8)

Other family support participants also highlighted that mood impacts significantly on sleep and how they attempt to support the person with bipolar during this stage the cycle. Again, this participant does not reflect on how sleep can impact on weight for the person they support.

> "When he's unwell [mania phase], sleeping goes out the window. It's like awake early, can't get to sleep, then awake really early, that kind of thing. But I would still encourage him to, when you're unwell to be, "Right, go to bed at this time and…" not have big long lies, not stay up really late or quite often it would be falling asleep on the couch. You know, if he didn't go to bed at the right time. And I'm away to bed and then he'll fall asleep on the couch. So, I'm saying, "Come up to bed now or don't be falling asleep on the couch," 'cause like getting that kind of rhythm, and that pattern for sleep's really important as well, and he does know that. It's just not that you always want to do it." (family, I.D.9)

Another participant identified that sleep can be an issue and indicated one method of assistance used was that of medication. It is well known that the use of additional medication may impact on healthy eating and physical activity (ref). But the family interviewed did not identify any association between sleeping medication and physical activity, diet and weight management.

> "he takes antihistamines during the week to help him sleep. It's ones that are for, like, anxiety and sleep and things. But she does give him to take, not together…. but on their own, zopiclone." (family, I.D.7 and 8)

5.3.2 Lifestyle

Diet and physical activity is essential for weight management and was something that both health professionals and family supporters discussed at length. The relationship between bipolar disorder, diet and physical activity is complex.

5.3.2.1 Physical activity

Both health professionals and family supporters highlighted a number of benefits arising from increased physical activity. Typically, exercise is beneficial for losing weight.

> "and it did do him the world o' good when he went tae the gym,
> 'cause he lost weight, and he was quite proud…" (family, I.D.7 and 8)

One health professional expressed the view that given the benefits associated with exercise more could done by health professionals to promote it. The same participant, nevertheless, was aware that exercise could not solely be used as a way of managing a patient's mental health.

> "I'd like to be doing a bit more, because of course, you know, there is evidence that being active, and regularly active, is good for your general wellbeing and mental health……….for some people unfortunately, that's not enough to contain or maintain their illness, or keep them relapse free. But certainly it shouldn't be… neglected." (clinician, I.D.5)

Another health professional highlighted a further benefit of exercise.

> "Yeah, absolutely. And it's not just about the walking, it's getting some fresh air out into the green space and they do sort of mindful walking" (clinician, I.D.2)

Additionally, one of the inpatient health professionals indicated that they had exercise groups that promoted improvement in other areas of life, not just the health benefits

> "We had a climbing group as well, which was a really kind of successful venture with the community team and that just—not only exercise, but was about relationship building and trust and stuff like that, so, you know, we're… we're keen to be thinking outside the box when it comes to healthy lifestyles and exercise." (clinician, I.D.2)

Family support participants also noticed that exercise improved how the people they supported felt within themselves. One supporter explained that even when the person being supported did not want to go out due to how he felt, the participant would encourage him to do so.

> "……..he would always [say], "Oh, I feel a wee bit better having done that. I'm glad I've done it." So, aye, when he has been in the quite unwell stages, that would be something we would—I'd say every day, "Right, come on, we'll go out." Once I've was in from work or whatever, "Right, we're going out a march."" (family, I.D.9)

Being an inpatient also impacts on an individual's physical activity levels according to inpatient clinical staff. The problem is that being on a ward can restrict leisure time.

> "The biggest barrier here was the restricted environment. People don't have free time………. that makes a big difference on people's recovery, their motivation for recovery, the momentum of the recovery and obviously their kind of impact on fitness levels as well." (clinician, I.D.2)

Family support also identified that finding the right balance of commitments such as family and work, looking after mental health, and juggling exercise, can be a complex matter.

> "again it's time and trying to now balance that with working full-time. We're lucky that, our kids aren't so young that they need us so much, so it's not so much time after, you know, time in the evenings is so taken care of, it's more working full-time, challenging job, you're a bit tired after that." (family, I.D.9)

5.3.2.2 Diet

Small food changes in what ward shops stock can help calorie intake. However the health professional who spoke about this did not feel that this was having much impact in addressing behaviour change.

> "But it's all about damage limitation, remember. It's, you know, it's maybe a smaller bar as opposed to a big bar, but it's still chocolate, and it's still full of sugar and fat. And we have more corn snacks, say 99 calories as opposed to 165 calories of a normal packet of crisps…... we're not really doing much to change their behaviour." (clinicians, I.D.1)

Patients seem to struggle to understand that the quantity of food eaten is almost as important as the choice of food consumed for successful weight loss. One participant highlighted that patients still over-indulge in food even if they make more healthy selections.

> "Well, that's one thing I think the patients can't get their head round, and I do struggle with that, when they say to me that, you know, "I've

> done... I've been doing really well with my fruit, I had a punnet of strawberries", that's 400g, "I had a punnet o' grapes", that's 500g... "I've had two bananas", and you just think 'How can I say to them "Actually, look, that's wrong"' when normally they would o' had Mars bars and the likes? And I know not to say that's wrong, but I can't let that go as if that's right." (clinician, I.D.1)

Family support participants also expressed concern about people making poor food choices. This is particularly relevant when the person being supported is going through a manic stage of bipolar disorder.

> "She's more manic or hyper manic ....she'll eat to excess potentially. You know, kebab shop stuff or whatever or takeaway pizza or, you know, all of that, so... And then, come home and start eating a whole chocolate cake or something, if it's there." (family, I.D.10)

One problem that health professionals face is that people they support are not always being honest about what they eat.

> "so we've got food diaries we can give them. They don't... They don't generally like keeping food diaries. That's quite common, actually. It's a pain. Those that do - I'm not saying everyone - but many of them don't always record what they eat. Not truthfully." (clinician, I.D.1)

Health professionals highlighted a number of contextual factors influencing patients' attempts to make positive changes to their lifestyle. These became very evident in my interviews with both inpatient and outpatient staff.

> "……. there's too easy access to... high calorie foods." (clinician,I.D.1)

The major problem is that patients have access to hospital shops but little is done by the hospital to restrict the calories purchased. Health professionals reported that they felt there was a lack of support from the hospital to restrict intake of food.

> "We have a shop [in the hospital]……..And they [the patients] can buy, like, 2,000 worth of calories, 2,000 calories a day, if they wish……It's not on a calorific restriction, as such, it's about the capacity of the shop to hold fizzy juice and sweets and crisps and bits and bobs. So, we allow them to take only so much." (clinician, I.D.1)

Furthermore, health professionals also highlighted that there are time issues that must be considered with regard to food preparation.

> "You need to then have the time to cook all these meals, and you need to, you know, have a degree of support from people around you as well." (clinician,I.D.4)

Other health professionals were more focused on addressing weight that had already been gained. One technique they used was making sure that any goals set were in manageable steps.

> "Oh, no, they do try, but that, you know, you have to do that negotiation where there's no point in them telling me they're no longer going to drink three litres of full sugar juice, and two Mars bars, and three packets of crisps every day, they're gonnae stop doing all that. That's not going to happen."(clinician, I.D.1)

5.3.2.3 Alcohol

Alcohol is an important lifestyle factor to consider when looking at issues of weight control and healthy lifestyle. Alcohol impacts on food choices and behaviours. There are also additional calories in alcohol which can lead to weight gain. Obviously support participants that worked with inpatients did not identify alcohol as an important factor given the patients limited access to it.

The difficulty of supporting someone who uses alcohol regularly was raised by a family supporter. This participant mentioned that when the person she supported drank more, she tended to be more manic.

> "that can sometimes be if she's drinking then everything's higher, if you know what I mean? She's more manic or hyper manic if she's drinking as well, so she'll drink to excess" (family, I.D.6)

The same participant went on to add that the person she supported also drank when she was in the depression phase of her bipolar disorder.

> "But she drinks – I would say she drinks when she's low, for sure. She drinks... When she's manic," (family, I.D.6)

One family support participant identified that the person they support can at times use substances to self-medicate.

"Dunno. I mean, he used to – when there were legal highs[substances that were legal to buy], the house was getting them [legal highs] delivered every other week." (family, I.D.7 and 8)

A number of family support participants felt that the people they supported used alcohol to manage their symptoms.

"there was a period she was just not managing …. every night she was having a drink," (family, I.D.6)

"she's bipolar and sort of part of that is that she uses alcohol to try and cope with a lot of the things that she feels. So, yeah, that's probably the biggest, sort of... for me, that's the biggest issue, to try and deal with." (family, I.D.6)

A further issue raised by a family participant was that of alcohol induced stress. In this instance although the person being supported drinks regularly herself she finds being in social situations where alcohol is being consumed stressful. This can impact negatively on her bipolar disorder symptoms.

"then there's the alcohol thing as well, so, if she goes out, you know, people are drinking wine or whatever, and it can be quite a stressful situation for her." (family)

5.3.2.4 Coping strategies

Creating a routine of regular exercise can be difficult. One of the family support participants commented that the person she supports does have problem maintaining an exercise routine due to working full time.

"Working full time and thus having difficulty establishing a routine to incorporate exercise "But, I suppose time's probably…..one of the factors at the minute because he is back to work full-time." (family, I.D.9)

Another factor one family support participant raised was that of building and maintaining a regular exercise routine around the needs of a family pet. This participant, however, felt that the person she supported did not use the opportunity appropriately often due to her mood.

> "Walking routine with dogs but only form of physical activity that she does and she does this at a relaxed pace." (family, I.D.6)

> "She does take them – in the afternoon, she'll take them on a walk round the park, which is probably about a mile, a mile and a half" (family, I.D.6)

One of the health professionals spoke at length about how exercise and establishing a routine of exercise can help with recovery. She found that a patient she had been working with exercised regularly before he became too unwell. Promoting a return to exercise became a goal.

> "Looking at how we can use leisure as a sort of way of bringing him back into a structured routine, so thinking about how we could get into the gym" (clinician,I.D.2)

One family support participant found that the person he supported used the routine of attending the gym negatively. The person being supported chose to go to the gym late at night so that he could only stay for an hour. He would then at times use this as an excuse to not attend the gym if he could only attend for less than an hour.

> "He took a burst where he went a few, he did go a few times. The gym closes at ten, he would go at nine o'clock, so ......he would have to get out at that time, so then he couldn't be waylaid. And if he was late, he wouldn't want to go because then he's not getting his hour." (family, I.D.7 and 8)

Habit and routine are important for healthy eating. One of the family support participants spoke positively about creating a regular pattern of eating. This supporter felt eating together at regular times with the person she supports, even when not eating the same thing, has helped to develop a habit of regular eating.

> "…..[when] she's staying with me, I would eat regularly anyway, so like a teatime is teatime. So, even if she wasn't eating the same as me, the only way I would manage to do it, is to do it at the same time……… so that was kind of routine." (family, I.D.10)

Inpatient experience tended to be very much focused on eating to create a daily routine. However, one health professional participant highlighted that since all

other bad habits have been restricted she feels that ward staff are less likely to take a hard line on treats.

> "there's lots of people [ward staff] feel that because we have restricted their smoking and everything else that there's nothing wrong with giving them treats." (clinician, I.D.1)

Lifestyle management strategies are important for addressing weight issues and many of the participants, both health professionals and family, highlight positive changes that the people they support have made. There was a focus on apps and technology use.

Apps and technology are great methods of supporting changes however these may not be available for everyone to utilise. One health professional was asked if she thought there would be apps or technology available to support her work with patients. The health professional highlighted that there were restrictions on internet access where she worked. When asked about access to technology that supports healthy eating and physical activity she said:

> "Tonnes [of technology for support]. If they [patients] were allowed on the internet." (clinician, I.D.1)

Not all technology requires internet access and one health professional spoke about using pedometers to encourage physical activity and create a bit of competition.

> "If they can get a pedometer, then that's their wee challenge. And in between the wards, they've all got different challenges going on. Oh, that happens a lot. So, all that kind of stuff is trying to keep them motivated." (clinician, I.D.1)

Health professional participants explained they encourage patients to use diaries to record what they eat and any physical activity they take. One health professional believed that apps could help with this provided they were easy to use.

> "I think the journals that people are using, and it's not consistent, would be like food diaries and exercise diaries...... I think pen and paper's still valid, invaluable, but you could absolutely transfer it into an app, and we already have these apps, so it's maybe just about

finding out which ones gonna be the most patient friendly or user friendly and introducing it earlier, before they go out into the community." (clinician,I.D.2)

Health professional participants also highlighted that weight loss attempts had proved successful when patients had been advised to make little changes that they themselves felt were manageable.

"We agreed that this week you were just going to not take five sugars in your tea. That was it. That was all. ....What about you said you were going to go and walk round the grounds for three fifteen-minutes throughout the day. Can you do that?" and if they think 'Oh, aye, that's more do-able', then I say 'that's fine...'" (clinician, I.D.1)

5.3.3 Social support and social influence

This theme was one of the most frequently talked about by supporters of people with bipolar disorder.

5.3.3.1 Influence of social support

A family support participant felt that the person she supported had problems socialising and struggled to make friends.

"She doesn't have a lot of friends and she kind of struggles to socialise with people. She'll sometimes just feel a bit anxious about it or she'll maybe get a wee bit manic if she is meeting up with people, she kind of can't cope with the whole making herself look presentable and going out and having normal conversation" (family, I.D.6)

Social support can influence physical activity. Family reported that other people impact on whether the person being supported takes part in physical activity. One participant reported that social influence can at times impact negatively on exercise and actually stop people from exercising.

"She tried salsa as well but it's quite couple-y....... but the class that she went to a couple o' years ago maybe now, it was all couples and they were quite cliquey, so I don't think she felt... ....said she felt excluded from the group and she didn't like the way it all made her feel, so she didn't go back." (family, I.D.6)

One participant interviewed reported that the person she supported no longer wanted to exercise with her.

> "And, it's like, she doesn't want to do anything [exercise activities] with me like that. I mean, we do loads of stuff, we go out with her sister…. But,…when she was fourteen, fifteen, …she would come out for a run with me." (family, I.D.10)

The same participant reported that the person she supported found social norms impacted on physical activity.

> "she used to be, she used to do running, and hockey, and all sorts of things at school…but obviously having left school and being a girl of a certain age when it's not… cool to do that in the same way." (family, I.D.10)

Both family and health professionals highlighted the importance of support in encouraging physical activity. One family support participant felt that the person she supported received very little encouragement to exercise from her friends.

> "I don't think she has any proper friends that do exercise classes. Her best friend ……. doesn't exercise at all………. Her other friend…… I don't get the impression she does any exercise. She's a wee bit older, I think she's in her 60s, but not that that would stop her from exercising, but she doesn't - I don't get the impression that she does anything either." (family, I.D.6)

This participant had tried in the past to encourage the person she supported to take part in physical activity but with little success.

> "We have suggested before going together to, like, a class at the gym, like, either yoga or something else, something that's not too, like, not a spin class or anything like that, I think she would die and I would die as well," (family, I.D.6)

Where health professionals have been able to offer professional support by participating in inpatient exercise sessions it has proved easier for patients to establish regimes of regular exercise.

> "So I [OT] would be exercising with him. I would be going along to the gym with him and we'd set a programme, we'd do that together, and

then I would step back and just let him get on with it and then I would start to prescribe exercise on a more regular basis without support." (Clinician, I.D.2)

As well as physical activity, support can also influence healthy eating. Families showed they were aware that social influence can have a positive impact on healthy eating. One participant described how she tried to support someone with bipolar whose willingness to eat was dependent on her mood.

"I try and cook for her, and when I'm not there, I remind her to eat." (family, I.D.6)

For other families the influence is more about healthy eating choices rather than making sure the person eats.

"if I meet her and we go out, I try to sort of make sure that we have, you know, I mean you don't, you're not going to have healthy food, but have healthier food. So, we wouldn't go to Pizza Hut buffet for example, but we might go and have a pizza with salad or whatever." (family, I.D.10)

Other family participants spoke of how promoting healthy eating is not just about food choices but also involved providing social support on a practical level to encourage attendance at appointments. One participant did go on to say the level of help required varied depending on the phase of mood cycle.

"So, it is more, it is more kind of practical things, or maybe going with him to appointments, or making sure he knows what's coming up in that respect. So, it kind of depends on what cycle—what phase in the cycle he's in." (family, I.D.9)

Family support participants also found that social influence has a significant effect on the eating habits of the people they support.

"….he [boyfriend] doesn't eat very well, he's very sort of pernickety about his food, She says, "Oh, he'll only eat," you know, "white bread and… plain pasta," or something. But, it… it's not going to help her with food. She has to take even more responsibility with that, which is what she struggles with" (family, I.D.10)

Health professionals are also aware that social influences are important in facilitating behaviour change. Structured sessions are offered where professional support provides information that may influence later choices.

> "Yeah, the OTs do a lot of the cooking with the patients, and I work often with them to help them with the recipes and that kind of thing. –Or give them the resources from webpages, that have healthy, healthy eating pages." (clinician, I.D.1)

For many people food used to celebrate events. One health professional participant felt that in an inpatient environment food was used to celebrate everything for both staff and patients.

> "There's lots of reward around food, so if it's a birthday, it's a cake or a carry-out. Somebody's leaving, somebody's going on holiday, or somebody's having a baby, there's a carry-out or cake." (clinician, I.D.1)

The same health professional reported that food being shared on the ward can impact on a patient's attempt to eat less and more healthily. Unfortunately the health professional felt that there was very little that they could be done to improve the ward environment.

> "also, if you've got somebody that's really struggling with sticking to the programme, and then somebody brings in cake... you know? I mean, they'll complain to me, "I wish they wouldn't do that because it really tempts me 'cause it's right there", and they can't ban it, you can't say to wards, "You cannot bring any cake in." You can't do that. I would love to, but we know you can't. And the guys are feeling that they're doing a good turn to everybody by sharing." (clinician, I.D.1)

A health professional reported that the social aspect on the wards impacted on what people ate.

> "I mean, they can sometimes do that, buy crisps and give them out, or buy chocolate bars and share them, or pot noodles, all the things they don't need…I mean, it would be better if they weren't allowed to share, they weren't allowed to buy each other anything, but that's unrealistic, and that's not normal society. So, it is difficult for them. And it's maybe about giving them that authority to say no, you know, to help them with assertiveness to say "Actually, no."" (clinician, I.D.1)

One of the family support participants identified that she feels unable to provide the right support for the person with bipolar disorder.

> "The amount of times I could take [husband] for a walk or make sure he was eating the right food, and he doesn't really, it's like a drop in the ocean. So that feels a bit, it's like a bit of a waste of time sometimes. Like, 'oh, this is making no impact at all'," (family, I.D.9)

Another reported that she feels that professional support is not always beneficial. Although this can be useful at times it can sometimes impact negatively on how the person she supports felt.

> "She goes to an alcohol counsellor on a Friday and sometimes after that she can be, like, really positive about things, and then sometimes it doesn't, she doesn't help at all, basically. She's almost worse because she's been talking about things, bringing up emotions." (family, I.D.6)

Health professionals were acutely aware of the impact that family had on a person trying to make changes. One health professional spoke about a patient they had been working with encouraging him to make changes.

> "And I think there was elements of trying to please his family and external motivators that maybe put a bit more pressure on him. But also maybe made him do it a bit more." (clinician, I.D.2)

Another health professional highlighted that most patients have someone close to them that could help them to improve their lifestyle.

> "I think most people had a significant other or family close by that would check in on them and be able to, you know, really haul them out of bed and throw them in the shower, and be a bit rough with them." (clinician, I.D1)

5.3.3.2 Informal support

Family support participants indicated that they struggle to provide Informal support during periods when those they support are feeling unwell as a result of their bipolar disorder

> "When he's unwell [depression phase], he's resistant [to support]" (family, I.D.9)

Furthermore, this participant also finds providing support during the mania phase difficult.

> "he's ....has been a bit untouchable at that point [mania phase]. So there's not really much I could do anyway because he's got everything under control in that manic phase" (family, I.D.9)

Hoarding is a common behaviour associated with bipolar disorder and can impact on the life of those trying to provide support. Practical family support is often needed to address such behaviour.

> "she's a hoarder as well, actually, so she has some hoarding tendencies and over the years has bought a lot of clothes so our house is full of clothes and there's a room that actually is like a storage room for all the clothes that we want to get rid of but that she can't let go of. So, last night, or yesterday, she came home from work and decided to start pulling stuff out of the room to get rid of it, and I came home and there was literally a mountain in the hall, of clothes. And she obviously found it overwhelming to deal with that so then she started drinking and I had to, sort of, pick up the pieces and deal with the mountain of clothes." (family, I.D.6)

Many of the family support participants discussed practical support as being something they provide. For one participant this meant sorting out the food shopping and, for a while, also paying for it.

> "I go to the supermarket. Well, I used to pay for the supermarket shop every week." (family, I.D.6)

Other informal support included providing encouragement to take part in physical activity. One family support participant spoke about her attempts to encourage the person she supports to take part in exercise although these met with resistance.

> "I've tried that. But she's not interested. So, like I flag things. I'll say, "Oh, that looks interesting." Or I'll message her or whatever and say, "Do you fancy doing that?" Or... but she's not interested." (family, I.D.10)

Informal support can often be about being patient and listening. One participant described how her support is not always welcome. For example, when she tries

to make sure the person she supports is taking her medication she often meets with resistance.

> "I think sometimes she feels like – 'cause, like, if I think she's not great then I'll ask her, "Are you okay?" Like, "Are you sure you're okay? Do you want to talk?" And she'll just be like, she just doesn't want me to ask. And I think it is quite a pressure thing, like, if she doesn't feel great, she kind of tries to hide it so that I don't know so that then she doesn't have the pressure of trying to feel okay. And, yeah, sometimes if I sort of say to her, like, "Have you taken your pills?" Like I'm just doing it out of... for her health, but I can understand that she'll, sometimes she doesn't like me sort of checking that she's... But I care about her, so, yeah. But she gets annoyed about it sometimes." (family, I.D.6)

Health professional participants are also aware of the importance of informal support and how important informal support can be for achieving goals.

> "And then you may not also have the kinda intensive support around you in terms of family and friends pushing you on to do these things [lifestyle changes]. So, yeah, that's all the things that I could imagine make it very difficult." (clinician, I.D.4)

5.3.3.3 Professional support

All health professional participants realise the importance of physical activity and healthy eating and believe that professional services should be encouraged to promote these more.

> "you know, in terms of the service provision I think, you know, we definitely could do more in terms of promoting the physical activity and the healthy eating, you know, from our end. So I think both ends could be addressed." (clinician, I.D.3)

In consequence, some of the health professional participants plan to make changes to their practice or services to offer more support to people trying to make lifestyle changes. One health professional suggested that raising awareness through teaching could help future staff provide more effective support to those with bipolar disorder.

> "I've also taken an interest in ensuring that…… our staff more widely are aware of the need to have such conversations with people with bipolar disorder. So I've done teaching, you know, teaching on the topic, presenting on the topic, and I've also, you know, helped develop a programme of training for staff, you know, with a focus on health improvement and, you know, co-morbid long term conditions, so that our mental health – largely mental health nurses, occupational therapists – when they're working with patients, they have a background knowledge of this." (clinician, I.D.5)

Another health professional participant felt changes could occur if patients were asked how they thought clinical staff could assist them and what help they were looking for.

> "I'll ask them 'What do you feel I can do for you? How do you want me to help you?' and whatever it is they say, then, you know, I'll put them right if it's something ridiculous, but… Yeah, so I tell them I can't do it for them, I can't do anything to them, not going to do anything to them, but it's about guiding them, supporting them in making healthier choices, and if they're accepting of that then we can work together quite well." (clinician, I.D.1)

Dieticians are not always present on wards and it is, therefore, often difficult for an inpatient to get professional advice at a time when he or she feels particularly motivated to make changes

> "So the dietician isn't that visible on the ward, to be honest. They cover other sites other than just the hospital I worked in, so there wasn't a regular kind of visibility on the ward or anything like that. You would have to refer to her and she would, you know, you would get an appointment sorta thing and often you could be waiting kinda two weeks for the appointment and then she would come and review people." (clinician, I.D.3)

Many of the professional support participants highlighted positive weight loss attempts by people they support. One participant stated that one of the patients she had worked with had been very successful in both weight loss and lifestyle changes.

> "But by the end of the ten months he was back at work. He had a meaningful structure to his time. He was losing weight again. His mood had greatly improved… And he was much more stable." (clinician, I.D.2)

With regards to inpatient care is the health professionals on wards didn't feel that they had the capacity to spend as much time as they would like with patients. This can impact negatively on the care of the patient.

> "If they [the patients] ask for more, it's usually weekly. I don't have the capacity, really, to do weekly reviews, but maybe if their first instance just to see how needy they are, how unwell they are, what the benefit would be to them for seeing me more often. If I can justify it then I would do it. For a while." (clinician, I.D.1)

Another contextual factor that is a barrier is that there is very little collaboration between inpatient and outpatient clinics. This can be problematic in the view of clinical staff.

> "But I think maybe that['s] the problem is that there's too much of a gap between what is existing in the community to what we know about and what we know how to link into. We are trying to kind of bridge that gap a little bit so that they're not relying on our service to… to be engaged, it needs to be other services as well." (clinician, I.D.2)

One family participant's comments about professional support was not positive.

> "And she had a very abrupt manner. It was just the tick list. You know, there was… and right from the start, 'cause I went in with him. She wouldn't allow my husband in with him." (family, I.D.7 and 8)

5.3.3.4 Support groups

There was considerable discussion of techniques which could be used to facilitate behaviour change in people with bipolar disorder and one of these was group support. Group support is something that is widely used in addressing lifestyle changes. Health professionals are aware that already established weight loss support groups may be beneficial not only for patients but also in the management of staff workload.

> "And I suppose the model I have in my head is, you know, the whole Weight Watchers stuff, where people come in a group. The key, of course, is that they need to be, you know, like-minded. What you don't, you want to avoid a situation where someone feels overly pressured or ashamed because they're not doing as well as others. Even if there's good reason for them to be limited. So I suppose there needs to be a balance, 'cause you want them to see where they're

doing better. But I just think, for staff involvement, the reality is, we're more likely to get time if they're dealing with several patients at once." (clinician, I.D.5)

One family member indicated that the person being supported had attended a slimming group to assist with weight management.

"weight loss he sort of, when he became kind of well again and got himself back on it, he took himself to Slimming World and kinda thought, 'Right, I need to start losing a bit of weight." (family, I.D.9)

This family member also used practical tips to help the person to lose weight while he attended the slimming group. Her techniques were supportive and encouraging.

"there's a lot of those kinda plans, there's all this bumph to read [from weight support groups] and he needs so much of this and so much of that, and I would—when he got involved in it, I would say, "Well, that's how much of milk you can have. You measure it to there," or, "that's how much of that's cheese as it's talking about. You can't have any more of that." And just to try and quantify and it would be, again, it's just practical things like that." (family, I.D.9)

As well as weight loss groups, one family participant spoke about the person she supported attending a wellbeing course. However this course was not always positive according to the participant.

"….. a ten-week course for…..self-esteem, coping techniques, and things like that. Again, sometimes after that, she can be really positive and she's picking up……techniques of how to try and change her thinking to more positive than negative….. But then other times, if she's been talking about things, it'll just, again, make her feel rubbish, and she won't be able to cope……." (family, I.D.6)

Two of the family support participants attended bipolar support groups regularly and they felt this was a really positive experience for them as it provided the support they needed.

"…..we've learned such a lot from going to the group as well, about his illness." (family, I.D.7 and 8)

However there was not a consensus among all family participants. One participant felt that she had gained so little from attending the group for a first time that she did not return.

5.3.4 Intervention ideas

Interviewees were asked about intervention ideas to improve lifestyle behaviours for people with bipolar disorder. One health professional mentioned that an intervention being run in the community to assist in the understanding of food labelling in order to make healthy food choices could help.

> "Public health and the community dieticians developed the programme for, I think it was 6-8 weeks, but that was for the general community. I can run it for about 16-weeks…….. And they also then have a choice of choosing what they want to cover [within the course]." (clinician, I.D.1)

Health professionals indicated that there are systems in place to give people the opportunity to attend gyms at a reduced cost and to provide people with exercise programmes.

> "Live Active scheme, GP referral system, which kind of got him a discount, I think, at the time, and he also linked in with, you know, professionals writing his treatment—not his treatment programme, his exercise programme." (clinician, I.D.2)

The interviewees also felt that future interventions should involve practical support in avoiding unhealthy convenience food particularly when patients are in the depression phase of their bipolar cycle.

> "One of the things that came most was when they were quite low and they just wanted the staples of a carry-out, fish and chips, noodles, something just to eat that's ready-made, and it's about having the family prepare healthier things that they know that person likes, and having them in the freezer in small portions so you can bang one into the microwave. So, you think 'Right, that's one of your favourites', rather than have to phone out and all that kind of thing. But it's about being on top of it a', really. And having that support." (clinician, I.D.1)

A further suggestion from a health professional, who had used the "Eat Well Plate" intervention in the past, felt a similar approach could be adopted in future interventions to assist with the appropriate quantity of food to eat.

> "if I do a diet plan with patients - so, if they've got a personalised diet plan - it's all about calories. Not that I expect a patient to count calories at all, but I'll try and work out how many of the food groups." (clinician, I.D.1)

One health professional felt that any future intervention should be user friendly.

> "[interventions should be] easy read, no jargon. Easy flow between different pages. Being able to sort of navigate through the tool without it being complicated... Not a massive focus on literacy." (Clinician, I.D.2)

Family that were interviewed highlighted that they were aware of support evidence for weight management.

> "I think bipolar's got a good evidence-base for kind of peer support and psycho-education and things like that... That's my impression."(family, I.D.9)

Family also identified interventions that would be ideal for promoting weight loss but these were viewed by the participant as unachievable.

> "...of course everybody would....have a sort of allocated key worker and CPN...They would have a dietician-led dietary plan, which is evidence-based. And then they would have a personal trainer...I mean... they would have some means of exercising." (family, I.D.9)

Interviewees were also asked about the use of equipment to enhance the delivery of the intervention. Using equipment for future interventions could be problematic. One health professional spoke about a previous unsuccessful intervention using pedometers.

> "We had bought hundreds of pedometers since I've been here, for sure. They're all not very good regardless of what you pay. We've bought really expensive ones, we've bought cheap ones, and they all end up down the toilet or stood on or just not working that well." (clinician, I.D.2)

Some of the interviewees were very supportive of the use of technology to record information from patients and one even reported being keen to develop something for their own service. She suggested that technology rather than pen and paper could be more beneficial to some participants. Technology could also be used to capture more data.

> "I've got an interest in time use and how patients spend their time. I think an app would be an appropriate way of capturing all of that instead of writing it in a journal. So, that would capture activity levels, it would capture… And you could also work out, you know, what level of enjoyment they were experiencing, what the purpose of their activity was" (clinician, I.D.2)

Nevertheless this health professional still felt there were issues in the use of technology which would have to be addressed before it would be helpful in interventions, including the cost of development.

> "So, that would be a helpful thing to teach or to develop if you had the cash." (clinician, I.D.2)

Some health professionals continued to express concerns about the use of technology with one suggesting that there are ways in which the use of technology could be simplified.

> "I think people think about phones or technology and get really kind of put off …..But I think the easiest to use apps that I've seen have been kind of pictorial and drop down boxes and things like that….." (clinician, I.D.2)

This health professional also highlighted that technology could be used as a way to earn rewards.

> "my husband has this thing that he has a watch…..and it's connected to a heart monitor that he wears at the gym and he earns points and he gets discounts at Starbucks and cinema and it's linked to his health insurance. So, it's a kinda win-win situation, 'cause he does all the exercise anyway. (clinician, I.D.2)

One health professional stated that she felt that, to encourage behaviour change, it is better to start with small tasks rather than to put people off by setting more intimidating targets like attending a gym.

> "I think just introducing them to the idea of a different activity, 'cause then people will start thinking, 'Oh, I need to lose weight. I'll need to go to the gym.' And that word just puts people off. Whereas actually there's other things that can be done, like just simple walking, to promote a bit of activity."(clinician, I.D.2)

Health professionals also pointed out that it is important patients have access to advice to assist with behaviour changes when they are unsure of how to make changes. One way to do this might be to have better availability of resources that provide information and access to appropriate activities.

> "So instead of thinking, 'What could I do instead? I'll just go—' So that's where we come in. We're like, "Let's think of alternatives."" (clinician, I.D.2)

> "I think better access to things like the gym and... dieticians, having...more robust Activity Coordinators who are able to deliver,... when appropriate, ... a robust package of activities and things like that for people when they're inpatients to access." (clinician, I.D.3)

Access to support and resources would clearly be helpful in encouraging behaviour change. Equally important would be that access to such support and resources transfers seamlessly from inpatient to outpatient status.

> "I think if we could... make the inpatient system even more robust and even more well developed in terms of,... more activities, better... equipment. 'Cause the gym in [hospital] pretty basic, whereas if it was... a bigger gym that could take more people, if we had ...more than one physiotherapist...that would be able to do this. ...You could set up a really good physical health intervention package in the inpatient setting an' then you could do a similar thing...in the outpatient setting for individuals. And then obviously there's a total gap in terms of the dietician support for outpatients." (clinician, I.D.3)

A further view expressed by one family participant was that apps and technology could assist with goal directed behaviour change.

> "I suppose it's kinda goal driven stuff, isn't it? Create an achievable goal and just try and meet that.......But, there'll still be some days you go.... "I can't be bothered." You know, like that full apathy thing. Again….. it depends where you've caught the person in that stage of wellness." (family, I.D.9)

The same participant felt that social support would be beneficial when an intervention involving technology was being implemented.

> "I think it helps having a person or somebody there to encourage and say, "Right, come on. Come on we'll do this." But that kinda human side of things." (family, I.D.9)

Mood was a recurring theme in the views expressed by family support participants particularly with regard to the effectiveness of interventions. One family support participant highlighted the problem app alerts via mobile phones can cause. While such alerts are meant to be helpful in that they let users know there are new notifications available sometimes they become an irritant. Response appears to vary depending on the stage of the cycle of bipolar disorder a recipient is in.

> " Noises, notifications, she's got an app that actually asks ......and it asks her at certain times every day how she feels, and she has to answer ......But even that now, I hear it go off and she just ignores it ......then sometimes if she's in a sort of agitated state, the noise in general will annoy her" (family, I.D.6)

Family participants were not always supportive of the use of apps and technology. When they were asked whether the person they support would use an online forum on their phone or computer, the participants did not think this would be beneficial.

> "I don't know that forums would work for him just now, 'cause I don't know whether he would go onto a forum or anything like that, I don't think he would do that" (family, I.D.7 and 8)

With the use of technology becoming a common feature of everyday life one family support participant spoke positively about how social media could be used to draw attention to information about mental health as well as other areas of interest.

> "So, if I see something,[linked to college course] and so if I see something like a conference.......or a film that I think she might be interested in that she probably wouldn't have seen 'cause it may be not on at a normal place, or... like Bipolar Scotland or whatever, or if there's just a really nice meme that I think of her then I would do that."(family, I.D.10)

Some of the interviewees mentioned step counters, particularly now most people have them on their phones. One family participant supported this view by stating that the person she supported initially used a step counter on her phone, however the app failed to maintain her interest.

> "….on her old Samsung, she had the Samsung health thing and she saw how many steps she was doing and stuff like that, and she still has it on her phone but I don't think she really uses it now. " (family, I.D.6)

5.4 Summary and conclusion

The interviews provided a valuable exploration of the experiences of those who support people with bipolar disorder. Similar to the previous chapter, topics covered included barriers, facilitators, previously used BCTs and future intervention ideas that they felt could be important for people with bipolar disorder. The interviews facilitated an exploration of the opinions of support providers with regard to these themes, including strategies they felt were useful to help people with bipolar disorder when trying to manage weight. They also facilitated comparison with the accounts of the people with bipolar disorder.

Similar to the participants with bipolar disorder, support participants identified that living with bipolar disorder was a key theme. Mood was discussed by support participants and reported to impact on daily activities. Low mood can lead to people withdrawing from daily activity and their support, and mania can lead to people taking part in extreme activities. Professional and informal support were also aware that mood impacted on food choices, periods of low mood could lead to overeating or undereating depending on the individual. From the interviews, it seems that the support participants were more focused on the periods of low mood rather than mania. Both professional and informal support identified that medication can impact weight management, and that medication can be used as an excuse for weight gain. According to professional support, healthy eating and exercise can minimise the effects of medication. Professional support highlighted that people with bipolar disorder are more motivated compared to other mental health disorders. Sleep was identified as a factor that impacted on

mental health and vice versa but there was little evidence that support participants highlighted the importance of sleep on weight management, healthy eating or physical activity.

Both physical activity and diet need to be considered for weight management. Professional support felt that more should be done to promote physical activity and improve access to food in hospitals. Informal support was needed to encourage physical activity and healthy eating during depression and mania phases. There was very little evidence in the support participants interviews of recognition of the effect alcohol can have on weight management, instead support participants focused on the relationship between alcohol and bipolar disorder. Alcohol was seen to impact on the symptoms and symptom management. Both professional and informal support reported that creating a habit or routine for promoting physical activity and healthy eating was important. Making small manageable changes, according to professional support, is the best method to promote weight management.

Providing support to people with bipolar disorder was complex and people with bipolar disorder tended to isolate themselves from their support systems during periods of low mood. Both professional and informal support tried to provide practical and emotional support for promoting healthy eating and physical activity. Professional support spoke about hospitals doing more to improve food access and encouraging physical activity, however, there is a lack of capacity on the wards. Inpatients should be encouraged to establish exercise regimes and healthy eating patterns with hospital staff. Maintaining this behaviour change is difficult between inpatient and outpatient clinics. Informal support found that people tended to react negatively to attempts to encourage physical activity and healthy eating. This potentially resulted in a lack of behaviour change success. People providing support highlighted a need to understand bipolar disorder, in order to provide a greater level of support.

All participants believed that for people with bipolar disorder weight management support is important. Participants noted that when developing an intervention it would be essential to incorporate manageable goals with no negative impact on motivation. Both those providing professional support and

those offering informal support recognised the importance of mood and accepted that mood impacts not only on how much support they can provide but also on the style that support takes. Again, as found in the previous chapter there was agreement that providing information on healthy eating and physical activity is important.

The participants had some ideas about future interventions, they felt that the intervention would ideally contain some form of goal setting. Ideally the goal setting should not be on long term weight or fitness goals as this can seem unmanageable, but instead on smaller more manageable steps. Additionally, motivational interviewing techniques could be used in the intervention in an effort to maintain or increase the motivation to change behaviour. This would be useful in addressing the changes in mood that can impact on motivation. Health professionals were also keen to include ideas and tips for making small lifestyle changes that could make significant impacts in the longer term. Another factor to be considered in the development of the intervention would be to incorporate, in an accessible format, simple, clear and concise information on healthy eating and physical activity. They felt that consideration must be given to the potential setting of the intervention and to resources, including staffing.

Families provide a lot of practical support and advice. Family support participants were keen, therefore, for interventions to be practical. In particular they spoke about the difficulty of maintaining the motivation of the individuals and they supported the use apps or technology. Health professionals and family are aware that technology and apps have not as yet been used to their full potential. Family support also highlighted the complex nature of providing support during all phases of the disorder stressing that any future interventions should take this into consideration.

To date there has been little qualitative research into what family members and professionals supporting people with bipolar disorder think are the barriers and facilitators to successful lifestyle behaviour change, as well as what components need to be included in a lifestyle intervention for weight management in people diagnosed with bipolar disorder. The results of this work have given important insights into these issues which will help inform future interventions.

6 Results: The social networks of adults with bipolar disorder; a preliminary exploration.

6.1 Introduction

The following chapter reports the results of the social networks analysis. This section will look to address research question 2.5 identified in section 1.6.1. This is, to my knowledge, the first time that adults with bipolar disorder were asked to draw out their social networks and consider them in relation to weight management, physical activity and diet. People in our social networks have a large impact on our lifestyle choices.(123, 166) For the purposes of this thesis I have explored participants' (those diagnosed with bipolar disorder) close social networks called 'ego networks' using sociograms.(167) In this chapter, I present preliminary descriptive and observational findings from 16 sociograms (see Figure 6). I wanted to explore ego network structures and how the structures might vary by BMI category. The different weight of the egos could have different alters, specifically focusing on healthy behaviours and support. I also wanted to explore if network density impacts on social support for weight management.

Participants with bipolar disorder were asked to identify between five and ten people that provide support to them: people that came to mind easily and could include: friends, family, work colleagues or anyone else. Data were collected using both sociograms and questionnaires. With the help of my supervisors I developed questionnaires. Characteristics were gathered about the ego (the participant taking part in the research) and the alters (the people who provide support to the participant). The alters were not interviewed.

6.2 Results

A total of 16 participants (egos) completed the sociograms. The following essential information was collected on the egos. The gender split of the egos was unequal with more females (n=14) taking part in the study than males (n=2). This, however, is very common in research studies. Nevertheless, having two

male participants allowed me the opportunity to observe similarities and differences between the two males and females. These will be explored later in this chapter. Half of the egos were obese, three were overweight and five were normal weight. There were no underweight egos.

The number of alters identified by each ego was recorded on their sociograms, giving us the network size. The egos identified between four and 11 alters and the mean number of alters identified was 6.5. Some participants struggled to think of 5 while others were able to complete this section with ease.

Table 12. Number of alters identified by egos

Number of alters	
Range	4-11
Mean	6.5

The characteristics in Table 13 were collected from the egos about the alters. The alters were not interviewed as part of this information gathering process and consequently I could not verify the information.

Table 13. Attributes of alters

Gender	Number	Percentage
male	31	30%
female	74	70%
total	105	100%

Age (in decades)		
20	13	13%
30	11	10%
40	14	13%
50	36	34%
60	19	18%
70	8	8%
80	3	3%
90	1	1%
total	105	100%

Lifestyle		
healthy	66	63%
neutral	11	10%
unhealthy	28	27%
total	105	100%

Influence on healthy lifestyle		
positive	45	43%
neutral	52	49%
negative	8	8%
total	105	100%

Influence on trying to lose weight		
positive	45	43%
neutral	48	46%
negative	12	11%
total	105	100%

Number of close alters		
yes	28	27%
no	77	73%
total	105	100%

Alters trying to lose weight		
yes	27	25%
no	41	39%
don't know	9	9%
missing data	28	27%
total	105	100%

Relationship		
spouse	2	2%
family	29	27%
friend	31	30%
neighbour	0	0%
workmate	3	3%
other	12	11%
missing data	28	27%
total	105	100%

Distance from participants home		
live together	5	5%
less than a mile	11	10%
less than 10 miles	37	35%
10-50 miles	15	14%
more than 50 miles	9	8%
missing data	28	27%
total	105	100%

Physically active		
never	14	13%
sometimes	19	18%
usually	20	19%
always	23	22%
don't know	1	1%

| missing data | 28 | 27% |
| total | 105 | 100% |

Provide support for lifestyle change		
yes	65	62%
no	4	4%
don't know	8	7%
missing data	28	27%
total	105	100%

Frequency of contact		
daily	19	18%
once a week	39	37%
once a month	18	17%
less than once a month	1	1%
missing data	28	27%

total	105	100%

Healthy diet		
never	7	7%
sometimes	19	18%
usually	32	30%
always	15	14%
don't know	4	4%
missing data	28	27%
total	105	100%

Mental health condition		
yes	27	25%
no	43	41%
don't know	7	7%
missing data	28	27%
total	105	100%

The egos identified a total of 105 alters. Due to the method of data collection some information about all 105 alters was missing. This was due to some participants not answering the questions about the alters identified and some participants opting to leave questions blank.

The majority of the alters were female, 70% female and 30% male. Participants were also asked to identify the alters' ages in decades, providing categorical data. The ages ranged from 20 to 90. Similarly to egos the majority of alters were in their fifties. Egos were then asked to identify and indicate their perception of the "lifestyles" of their alters (basically this was the egos reporting on their knowledge of their alters). Egos were asked if they thought that the alters they had identified led "healthy lifestyles". The majority of alters were identified by the egos as having "healthy lifestyles" (63%). Twenty eight alters were deemed "unhealthy" and 11 categorised as "neutral". Egos were also asked if the alters they had identified were "trying to lose weight". According to the egos, the majority were not (39%). Twenty seven alters were "trying to lose weight" while the egos were unsure about the remaining nine. With regard to this question, information was missing for 27% of alters.

Egos were asked if they thought their alters were "physically active" and had "healthy diets". Egos identified that they thought more of their alters were "always physically active" (22%). The result for diet identified that (14%) alters reported as "always eating a healthy diet". The majority of alters who had "healthy diets usually" was (30%). Egos, therefore, thought that their alters were more physically active than they were healthy eaters. Data was missing for 27% of alters.

Next, egos were asked whether, to their knowledge, any of their alters had a "mental health condition". The majority of the alters did not have a "mental health condition" known to the ego (41%). Twenty five percent of alters did have a "mental health condition" known to the ego with no knowledge about a further seven. Again data was missing for a total of 27% of alters.

Following this, egos were asked to rate if they thought the alters would be able to "provide support". Egos were asked about the influence alters would have on promoting a "healthy lifestyle" for the ego they supported. A slight majority of egos identified the alters as being "neutral" in providing influence for a healthy lifestyle (49%). It was encouraging, however, to see that 43% of alters being identified as having a "positive influence" and only eight percent as a "negative influence" on a "healthy lifestyle". A similar pattern was seen when egos were asked if the alters would "provide support" when the egos were trying to "lose weight". A slight majority of alters were identified as "neutral" (46%), 43% were described as providing "positive support" and 11% having a "negative influence" (slightly higher than general lifestyle changes). Additionally egos were asked about whether alters would provide support for any lifestyle change. It was encouraging to see that the majority of the alters would provide support for "lifestyle changes" (61%) with only four providing no support. The responses of eight alters to requests for support were classed as unknown by the egos. Data was missing for 27% of alters.

Egos were asked to identify who, from within their alter group, they felt "closest to". Egos identified a total of 27% alters that they felt "closest too". Most egos identified either one or two alters. Egos were also asked to identify the relationship between themselves and their chosen alters. The most common relationship identified was that of "friends" (30%), shortly followed by "family" (27%). Eleven percent of alters were identified as in the "other" category and these consisted of ex-spouses and health professionals. An additional piece of information asked for was the "distance between the homes of the egos and their alters". The egos identified that the majority of the alters "lived less than 10 miles away" (35%). Fourteen percent of the alters "lived 10 to 50 miles from the ego" and "11 less than a mile". Interestingly eight percent of alters "lived more than 50 miles from the ego" whereas only five percent of the egos and the alters "lived together".

Finally, the egos were asked about the "frequency of contact" with their alters. The majority of the egos were in contact "once a week" with their alters (37%). Numbers for those in contact "daily" were similar (18%) to those in contact

"once a month" (17%). Only one ego identified one alter with whom he or she was in touch with "less than once a month".

6.3 Sociograms

As well as identifying characteristics of the people who provide support, participants drew their sociograms using pen and paper following my instructions. I then used UCINET software to import each participant's data to develop the sociograms. All 16 sociograms are included in Appendix 22. The sociograms display the distribution of alters round the ego. The distance between the alters and the ego does not represent a variable. Instead they have been spaced to clearly show the ego- alter ties and the alter- alter ties. Although this is a small sample size for social network analysis a few interesting observations can be made. All 16 participants identified different networks of support, every diagram being unique. Nevertheless some similarities as well as differences can be observed across the sociograms.

Although no clear patterns according to gender or BMI were evident, I have selected some interesting comparisons from the sociograms to describe below. It must be noted that these are descriptive, as no statistical analysis was conducted.
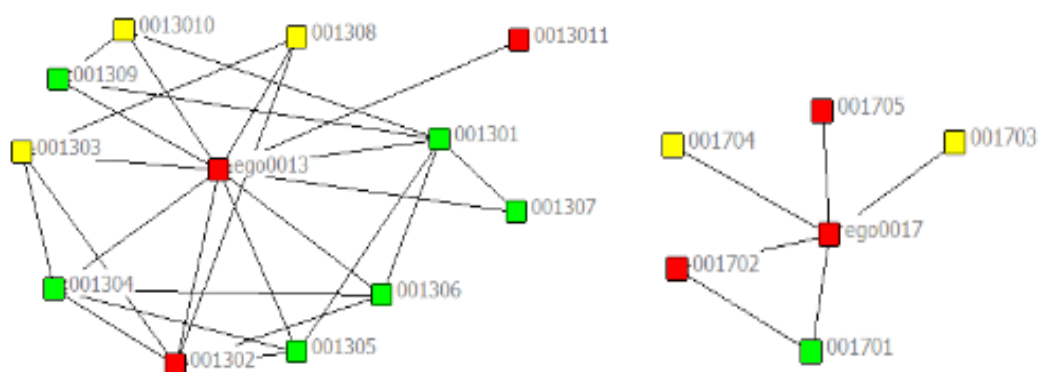

Figure 6. Sociograms

Figure 1 highlights an example of the difference between the density of two people's sociograms. The two participants (the egos) are represented in the centre of the sociogram by the ID ego0013 and ego0017. Both diagrams represent

participants with a BMI of greater than 25 so were overweight or obese and were therefore coloured red. The alters are represented on the diagrams with codes 001301- 001311 (11 alters) and 001701- 001705 (5 alters). These alters were colour coded based on how healthy a lifestyle the ego thought the alter had. Alters were coded as: healthy (green); neutral (yellow); and unhealthy (red).

These two diagrams are for egos who were overweight or obese. While both egos had a mixture of healthy, neutral and unhealthy alters, they had very different social networks. The diagram on the left is very dense: 11 alters were identified, with a lot of alter-alter ties, indicating whether the alters knew each other. By comparison, the diagram on the right had only 5 alters and very few alter-alter ties. Although both of these sociograms come from egos with an overweight or obese BMI, they are very different from each other.

When comparing the sociograms between egos with a BMI greater than 25 who were overweight or obese and BMI between 18.5 and 25 who were normal weight, there were also similarities and differences.
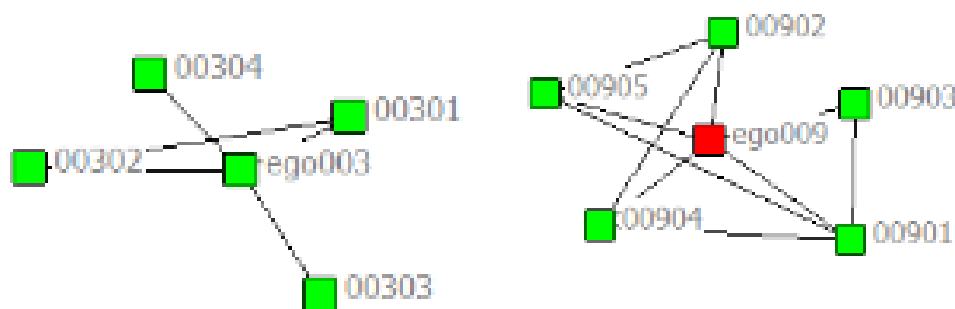
Figure 7. Sociograms with all healthy alters

The two sociograms above represent ego003 and ego009. Ego003 had a normal BMI and ego009 had an overweight or obese BMI. Both of these sociogram featured only healthy alters and had a similar number of alters, though the diagram on the right has higher network density (i.e., more alter-alter ties).

I also chose to investigate possible gender differences. However, my sample mostly comprised of females participants (see Table 2) with only two male

participants taking part in the study. The two male sociograms are below (Figure 2) and there are a number of differences between the two.
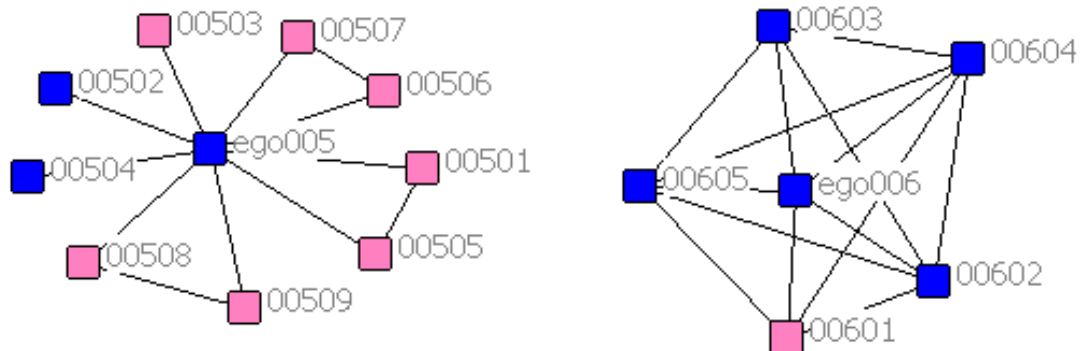
Figure 8. Male sociograms

Both participants had a BMI greater than 25. Blue represents male ego and alters and pink represents female alters. The diagram on the left (ego005) identified 9 alters, only two being male. However there were not a lot of alter-alter ties. In contrast the diagram on the right (ego006) identified mostly male alters (4 of the 5 alters). Furthermore, these alters were all connected producing a lot of alter-alter ties.
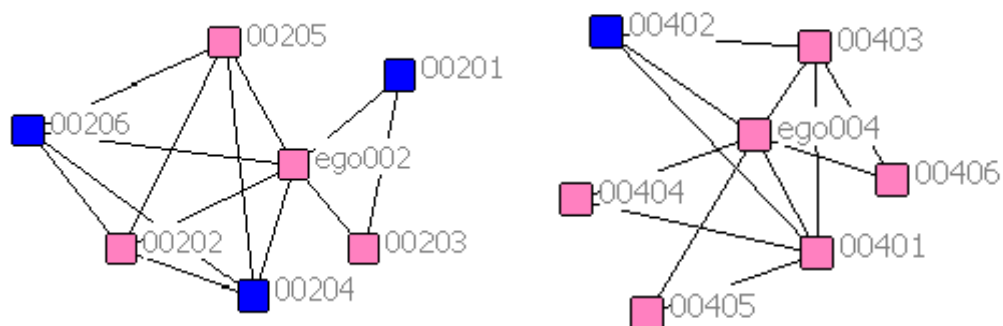
Figure 9. Female sociogram

Figure 9 are female sociograms (ego002 and 004). Ego002 and Ego004 had a normal BMI (18.5-25). Both diagrams identified 6 alters (00201-00206 and 00401-00406). Ego 002 identified 3 male (00201, 00204 and 00206) and 3 female alters (00202, 00203 and 00205) and ego 004 identified only one alter being male (00402). Again both of these diagrams have a lot of alter-alter ties and are

similar to that of ego006. However not all female sociograms had a lot of alter-alter ties (see Figure 10).

Figure 10. Female sociogram

Figure 10 is another female sociogram (ego 0010). The ego identified 7 alters (001001-001007). The ego 0010 had a normal BMI and all the alters were female. Interestingly, this female sociogram has no alter-alter ties.

6.4 Discussion

This chapter described the results of a preliminary exploration of the structure and characteristics of social networks for adults with bipolar disorder. The aim was to investigate sociograms focusing on diet, physical activity and weight management and to explore the network size and the nature of participants ego networks. This was identified as of potential interest due to the importance of social support and there was a lack of previous research exploring sociograms for this participant group. Due to the small number of participants included in this work no statistical analyses were conducted.

We hypothesised that ego network structures might vary by BMI category, i.e. that normal weight individuals would be more likely to have healthier and more supportive people in their networks and that more dense networks might be better for social support for weight management. Some interesting observations were found regarding the ego networks and these are discussed below.

Overall, ego attributes were similar across the group. For example, most of the egos were female and in their 50's as were their named alters. The alters were primarily classified as "friends" or "family" of the egos, rather than "neighbour"

"spouse" or "colleague". Egos felt that slightly more alters were "neutral" rather than "positive" about encouraging egos to take part in "healthy lifestyles" or in "trying to lose weight". The majority of egos did, however, feel that the alters would support them in attempting "lifestyle changes". The majority of egos reported that alters also had a "mental health condition".

Through observation of sociograms, in this exploratory study, it appears that having a high density sociogram (i.e., a lot of alter-alter ties) was not linked with a particular BMI category for this study. In addition, having a larger proportion of healthy alters was also not related to a particular BMI category. The majority of participants who took part in the study had a mixture of healthy, neutral and unhealthy alters. Additionally, most egos had a mix of male and female alters but the majority of participants had more female than male alters.

6.4.1 Conclusions

This study was a small exploratory study that consisted of only 16 participants. So due to small sample sizes these findings need to be treated with caution, further work with larger samples is needed to further explore these findings. The findings indicated that the participants in this study felt that they had support if they wanted to make healthy lifestyle changes. Slightly more participants reported that the level of support for "healthy lifestyle" or "trying to lose weight" was "neutral" than "positive". Very few egos reported the level of support as "negative". There did not appear to be any clear differences between sociograms for participants with normal or overweight/obese BMI but this may be due to the small sample size.

7 Reflections on rigour and integrity

7.1 Introduction

Ultimately the findings of this thesis could be used to improve weight management interventions for this group and to inform a logic model for a

future intervention. Taking this into consideration, evaluating the quality of the research and interviewer biases is crucial in ensuring the integrity of the study, thus increasing the usability of its findings for potential intervention development.

7.2 Interviewer biases

In order to achieve the aims of the thesis I conducted qualitative interviews with people with bipolar disorder and people who provide support to adults with bipolar disorder. Central to qualitative research is the interviewer.(168) As the relationship between the interviewer and interviewee is an active role, it could influence the data collected.(169) Consequently, to avoid the possibility of biasing any responses the interviewer must try to set aside his or her own experiences, beliefs and attitudes.(132) The role of the interviewer is to guide the discussion around the topics of interest and to take direction from the interviewee.(132) The interviewer should attempt to refrain from using his or her own pre-conceived expectations to influence the findings.(132) The interviewer should try to express warmth and empathy during interviews to help with the flow of conversation and thus encourage participants to open up about their experiences.(170) As there is always the potential for data collection to be influenced by the interviewer's unique characteristics the role of the interviewer requires reflection.(171) This is particularly important in this thesis as the central component of the study comprises one-to-one interviews between participants and myself (a PhD student.) I have, therefore, found it important to reflect on the role as interviewer and my previous experiences.

In total twenty six interviews were conducted. Before conducting the majority of the interviews, I had previous face to face contact with participants through a support group meeting during the recruitment process. There were, therefore, only a few support participants that I had not had prior contact with. This made building trust between the interviewee and the interviewer an easier process. During the initial recruitment process I ensured I engaged both formally and informally with potential interviewees. The group session provided a formal setting while the refreshment break allowed for a more relaxed approach. During the support group meeting I provided people with information about why

I was recruiting potential participants and what I was hoping to achieve from their participation. By adopting such an approach I hoped to provide reassurance to members of the group and hopefully encourage them to take part in the interviews. Consequently, the relationship between the interviewer and the interviewee had already been initiated prior to the interview itself. The building of relationships was made easier by the fact that all but two of the interviews were conducted face to face (this was due to a severe weather warning). During the actual interviews I provided reassurance to the participants that their experiences were important by accentuating that I wanted to both learn about and understand their experiences. I achieved this through the use of both verbal and non-verbal techniques.

My study comprised two participant groups. The first group were participants with bipolar disorder. I have had significant work experience with people with mental health disorders, in both research and clinical settings, since 2006. Using the skills I had developed through previous experience of conducting interviews I was able to put participants at ease and engage them in discussing their experiences of having bipolar disorder. While I personally do not have experience of bipolar disorder I do, however, have experience of being overweight. This may have helped encouraged participants to open up about their experiences of weight, healthy eating and physical activity.

The second participant group in this study were people who provide either formal or informal support to someone with bipolar disorder. As I had previously worked as a trainee forensic psychologist and in a clinical setting, building rapport with formal supporters was relatively straightforward. Not only was I able to relate easily to them but, as we no longer shared the same employer, the supporters were able to be honest about their experiences.

The majority of the informal support participants were recruited from the bipolar support group. My approach with them was similar to that which I adopted with the participants with bipolar disorder. As the informal support participants had a clear awareness of the need for more research into lifestyle and bipolar disorder they were comfortable about engaging.

I have previously completed a BSc (hons) Psychology, MSc Forensic Psychology and a MRes Psychological Research Methods. All of these formal qualifications provided me with training in qualitative research interview techniques. As a research assistant, on several projects, I put my training into practice and used these techniques in a real world setting to interview young people, adults with learning disabilities and forensic participants. In addition, I have worked as a trainee Forensic Psychologist. My previous experiences as both a researcher and a health professional provided me with skills that I could apply to my interviews. While some PhD students might have found some of the information being discussed by participants distressing my significant experience working in mental health and forensic mental health proved invaluable. It allowed me to use previously developed coping skills to ensure my understanding of without becoming emotionally involved. I did at times find it difficult, given some of the experiences being described, not to try to help. I wanted to provide my participants with coping strategies or talk them through alternative behaviours. On occasion, I had to actively stop myself from doing this and to remember that I was there solely to gain information from the participants about their experiences. Furthermore, due to my experiences as a health professional I recognised that I had pre-conceived ideas about the topic and therefore needed to try to ensure when interviewing both people with bipolar disorder and supporters that I did not allow this to influence the interview process or the analyses.

7.3 Introduction to study rigour and integrity

As discussed in Chapter 3 there are strengths and limitations to both qualitative and quantitative research. There is still a belief that qualitative research lacks scientific rigour and produces weaker evidence.(172) It is important that qualitative methods are clearly described and transparent. (172) There are few tools for researchers to use to aid in improving rigour in qualitative studies.(173) A recent research article created a step by step guide for improving rigour for qualitative studies, however, the focus was more on the thematic analysis once the data had been collected rather than on the data collection process.(172)

Quantitative methods involve a number of processes that can be employed to improve scientific rigour, for example in the areas of reliability; validity; and generalisability. Noble and Smith(174) published a paper that identified qualitative approaches to increase scientific rigour in relation to each of these concepts. Their approach is not the only way in which the scientific rigour of qualitative methods can be improved,(172) but it is a clear concise approach that highlights that traditional quantitative methods have qualitative equivalents related to rigour (see Table 14).

Table 14: quantitative method and qualitative alternative

Quantitative method	Qualitative equivalent	Methods
validity	truth value	reflexivity and reflection
		representativeness of the findings in relation to the phenomenon
reliability	consistency/ neutrality	achieving auditability
generalisability	applicability	application of findings to others contexts

I will take each qualitative strategy related to scientific rigour in turn, explain the method in line with Noble and Smith(174) and identify how I applied the strategies to my study.

7.3.1 Truth value

According to Noble and Smith(174) truth value is about being aware that multiple realities exist. They suggested that the researcher should outline his or her personal experiences and viewpoints. As previous experiences can result in

methodological bias, the data should, ultimately, clearly and accurately represent the participant's perspective.(174)

In order to account for truth value, Noble and Smith(174) stated that the researcher should reflect on his or her own perspectives. My reflections were recorded in a reflective journal throughout the study. It contained decisions made by myself and my supervisors while documenting my experiences of the whole process. This allowed me, with the support of my supervisors, the opportunity to reflect on the interviews I conducted and where necessary, to make changes to the interview schedule.

The next way in which truth value can be applied is through the representativeness of the findings in relation to the phenomena.(174) In other words how the findings truly represent what the participants said. All my participants were willing to share their experiences of weight management, diet and physical activity in an open and honest way. I audio recorded all the interviews, which allowed me the opportunity to repeatedly revisit the data to check the emergent themes and thus accurately represent the participants' accounts of their experiences of weight management. During the interviews I used probing and follow-up questions to clarify and reflect back on what was being discussed by the participants. I kept notes of anything that I felt needed clarity to not disrupt the flow of the interview. I also interviewed those providing support to participants. There was a clear similarity between the emergent themes expressed by those providing support and those raised by people diagnosed with bipolar disorder, which allowed some 'triangulation' of the data to a limited extent.

7.3.2 Consistency and neutrality

According to Noble and Smith(174) consistency and neutrality relate to 'trustworthiness' and clear decision making. Transparency of the decisions and methods used to gather data must be clearly recorded. Noble and Smith highlighted that ideally an independent researcher should be able to arrive at similar or comparable findings.(174)

Neutrality according to Noble and Smith(174) is achieved only when truth value, consistency and applicability were addressed. The problem Noble and Smith identified in their research was that although the researcher has prolonged engagement with participants, both methods and findings are fundamentally linked to the researcher's philosophical position, experiences and perspectives. Ideally the experiences of the researcher need to be accounted for.

Achieving auditability is a way of improving consistency. In order to achieve this a study protocol was developed from the beginning of the study (see Appendix 5). This provided a clear outline of the initial research questions, methods and analysis of the data. The study also has NHS ethics and R&D approval. Any amendments to the study must be approved by NHS ethics and R&D. All changes are documented clearly in the documents.

Further auditability was achieved through an examination of the emergent themes. All themes were discussed with my supervisors, two of whom have had significant experience with qualitative research. Three transcripts were used to identify the initial key themes and subthemes. Any discrepancies were discussed and a consensus reached on an initial coding framework. Furthermore, three of the transcriptions were double coded by another PhD student with expertise in qualitative research, to check the reliability of the coding framework. If there were discrepancies these were discussed and resolved and the themes were revisited where discrepancies surfaced. I then reflected on previous decisions and coding in light of these discrepancies and made adjustments to the coding framework and coding where needed.

Neutrality was another important consideration. The findings from previous chapters show evidence of rich and informative data being attained as a result of the methods used. However, the analyses and interpretation of the data are potentially influenced by my age, gender, background and experience in mental health. It is important that I am not only aware of the impact that I may have on the research but that, through reflection on my background and my role as a research student, I am able to consider how this may have biased my study findings. In order to minimise my biases, I considered these issues through my reflective journal and discussion with my supervisors. By working closely with my

supervisors I hoped to reduce my own biases and through discussion were able to identify any impact that my own biases had on the analysis of the data. The transcripts were also double coded by another PhD student who had a different background and therefore different biases. The analysis of the data was supported and discussed in detail with my supervisors. We each bring a different background and a different set of experiences to the study. Through these support and discussion sessions I hope to have minimised the impact of my own background on the interpretation of the experiences of my participants.

7.3.3 Applicability

Noble and Smith (174) stated that applicability means that the researcher should contemplate whether the findings can be applied to other contexts, settings or groups. The data gathered from this study were collected from a relatively small number of participants with bipolar disorder and from people who support them. I attempted to recruit a broad range of participants, from bipolar disorder support groups and the NHS to gain a variety of participants. For example those who wanted to attend support groups and those who did not. The majority of my participants were from bipolar disorder support groups, these groups were mostly attended by females. I also attended different bipolar disorder support groups in different locations across Scotland to vary sociodemographic areas. It is unlikely that I can conclude that the barriers and facilitators for behaviour change that were expressed by my participants are necessarily the same as other people with bipolar disorder and their supporters across the UK, but there are likely to be overlaps.

7.4 Discussion and conclusions

As highlighted above, there are procedures that have been established in this study to improve auditability, reflexivity and representativeness of the data. Transparency and keeping a paper trail is crucial for supporting decision making processes. While reflection is crucial to qualitative research, it also encouraged me to consider my own background and philosophical position and how this influenced the findings. Ultimately the findings should represent as closely as possible the participants' experiences. This approach is one way to employ

rigorous methodology when collecting and analysing qualitative data. Although I have put in place methods to minimise different sources of bias influencing the study findings, there remain a number of limitations.

The next chapter will discuss the study findings in relation to other research and consider the implications of the findings.

8 Discussion

8.1 Introduction

The overarching aim of the thesis was to undertake the initial groundwork needed to inform a future weight management intervention for adults with bipolar disorder by gaining an understanding of weight management, physical activity and healthy eating in this population. Weight management is a challenge for adults with bipolar disorder and overweight and obesity can lead to health problems and a shorter life expectancy. (8) 68% of people who are in treatment for bipolar disorder are overweight or obese and these people are often excluded from trials testing weight loss interventions.(20) To date there is limited evidence of effective long term weight loss interventions for adults with bipolar disorder. There is, therefore, a need to develop an intervention that can improve weight management and increase physical activity and healthy eating, thereby improving quality of life, minimising the health complications associated with obesity and improving life expectancy.

This chapter draws together the findings of this mixed methods thesis. The overall purpose of the chapter is to discuss how the findings from this research may provide insights into issues that might be important to consider in the development of a weight loss intervention for this population. In order to achieve this, I will draw together the findings using a conceptual model and develop a logic model for a potential intervention. This chapter will also examine the strengths and limitations of the work completed in this thesis, compare the findings to previous research evidence and consider how these

findings could contribute to future research – specifically, intervention development, as well as policy and practice.

8.2 Systematic review findings

A mixed methods systematic review was completed as the first stage of this thesis. The review included participants labelled with the umbrella term 'SMI' as this included participants with bipolar disorder. Conducting a review limiting the studies to include only bipolar disorder participants would have missed a lot of intervention studies that had bipolar disorder participants. Only two studies (one qualitative and one trial) included only bipolar patients not the broader SMI.

Only nine trials (both randomised controlled trials and non-randomised trials with a control group) of weight loss interventions were identified. Although some of the interventions did produce a reduction in weight at the first outcome measurement usually at the end of the intervention, there was very little evidence of sustained benefit. Only four of the studies found a significant difference between the intervention group and the control group. Some of the studies also identified weight loss in the control groups. This may be due to the control groups being more active or restricting their diet, if the participants are aware they are involved in an intervention focusing on weight management. Overall it appears that the more successful interventions included both physical activity and diet components, as well as behavioural strategies, but additional components may be needed to support longer-term weight management for adults with SMI.

In the review I also sought to identify the BCTs associated with the successful interventions. The BCTs used in the interventions where weight loss was achieved were: provide information about behaviour health link; provide information on consequences; prompt intention formation; provide instructions; model or demonstrate the behaviour; prompt specific goal setting; prompt review of behaviour goals; prompt self-monitoring of behaviour; provide feedback on performance; prompt practice; and use follow-up prompts.

Social cognitive theory and control theory are the theories most strongly represented in the BCTs present in the four successful trials. When comparing the successful and unsuccessful interventions there were no obvious patterns of BCTs used in the more successful interventions versus those used in unsuccessful interventions as they overlapped considerably. Although the qualitative studies suggested that social support is very important for facilitating behaviour change only two successful intervention include social support.

The results from the ten qualitative studies included in the review provided evidence that people with SMI want interventions to address weight management. The review identified that people with SMI face the same barriers as the general population but also additional factors related to their mental illness. The barriers and facilitators to behaviour change described in the included studies were grouped into four overarching themes: physical health, mental health, social support and contextual factors. These were the main areas that people with SMI focused on when they discussed weight management. Interventions could potentially include methods to improve physical health symptoms, improve mental health symptoms, improve contextual factors and increase social support. When physical health and mental health symptoms were improved then people reported that they found taking part in physical activity and eating healthy easier. The participants also reported contextual factors such as weather and finances being important for taking part in physical activity and eating healthily. Social support was also considered an important factor for healthy eating and having support around them that encouraged them to take part in physical activity and healthy eating would make it easier for people with bipolar disorder to continue with healthy behaviours.

8.3 Qualitative findings

A total of 26 semi structured interviews were conducted, 16 with people diagnosed with bipolar disorder, and ten with people who provide support to someone with bipolar disorder. The two different participant groups (people with bipolar disorder and people who provide support) were asked similar questions around weight management, physical activity and diet (see Appendix 15, 17 and 19). The key themes identified in the analyses were: living with

bipolar disorder; lifestyle; social support and social influences; and intervention ideas. The themes identified largely followed the topics in the semi-structured interview schedule.

8.3.1 Living with bipolar disorder

Interview results indicated that living with bipolar disorder was one of the main themes which impacted on weight management. Participants with bipolar disorder identified that mood, medication, motivation, sleep and alcohol were all important factors when considering weight management. Mood impacts every aspect of their lives, due to the fast cycling mood swings from feeling very low to mania. People found they had difficulty dealing with their mood and managing their weight as mood affects food choices and physical activity levels. Mood affected the person psychologically (such as mood and motivation) but there was also the potential for a physiological aspect to impact mood and motivation. Both professional support and informal support identified that mood changes stopped people with bipolar taking part in physical activities and impacted on food choices.

Although people diagnosed with bipolar disorder are usually on medication to help manage their symptoms, not all the participants in this study were taking medication regularly. For those taking medication, it was found to affect all aspects of their lives. Additionally, medication was reported to affect food choices and physical activity levels. Informal support also identified these findings by indicating they were aware of changes to diet and physical activity levels due to medication. Moreover, some medication can have negative side effects which can impact on the individual's physical health and ultimately result in a negative impact on weight management. According to those providing professional support medication is a barrier to weight management and identified that medication could potentially impact negatively on weight.

Motivation can also have an impact on people's attempts to manage their weight. One of the hurdles identified by participants to losing weight is maintaining motivation. Motivation can be affected by the mood changes experienced by people with bipolar disorder but, in addition, motivation can also

be affected by the environment. For example the weather and daylight hours can affect people's motivation to take part in physical activity. The more health gains that participants experience the more motivated they are to make behaviour changes. Professional support participants reported that often people with bipolar disorder are motivated at different stages of their mood cycle but, in comparison to other mental health disorders, it is difficult for bipolar sufferers to maintain this motivation. It was recognised, however, that by having small achievable goals motivation can be increased and maintained.

Likewise sleep can impact on weight management (162) but people with bipolar disorder interviewed in this study did not discuss the fact that sleep may affect their weight. Both people with bipolar disorder and informal support indicated they were aware that sleep may be affected by mood and at times they reported doing very little physical activity when they were sleeping a lot. Participants did not however, provided any insights as to how this can impact on their weight.

Finally, a small number of participants with bipolar disorder indicated they were using alcohol to help manage their symptoms or to cope with life. Informal support also identified that some of the people they supported used alcohol to help manage their symptoms. Little consideration, however, was given to the impact of alcohol on weight management. While some of the participants who were consuming alcohol were overweight or obese others were normal weight. Very few of the participants offered insights into the possibility that alcohol consumption could impact on their weight management through an increase in calorie intake or the stimulation of additional food cravings.

Developers of weight management interventions for this group would need to consider the above factors and the importance of mood for weight management. Since the mood of people with bipolar disorder can swing from very low to mania the intervention must be adaptable enough to adjust to such varying symptoms. The intervention must also provide knowledge and information about how certain behaviours such as altered sleeping patterns and alcohol use can lead to weight management issues.

8.3.2 Lifestyle

Lifestyle is another main theme that emerged from the interviews with both people who have bipolar disorder and people who support those with bipolar disorder. Most participants reported taking part in some level of physical activity, whether that be walking, taking part in exercise classes or attending the gym. People were aware of the benefits of physical activity but did not indicate participating in physical activity when experiencing low mood. While people were aware of using physical activity as part of their weight management due to mood changes they felt it was difficult to establish and maintain a routine of regular physical activity. People would benefit from knowing how to continue to take part in physical activity during lower mood even if they cannot sustain it during periods of very low mood. Professional support participants were aware that physical activity can help with symptom management as well as weight. Most focused on the additional health benefits of physical activity and not just weight management.

On its own, an increase in physical activity is unlikely to be enough for people to reduce their weight and to keep it stable. It is important that diet is also considered. It was clear during the interviews that people with bipolar disorder understood what they should be eating but that they often did not stick to healthy food choices. A few participants indicated that portion control was also difficult. Not only did people with bipolar disorder experience diet variation similar to the general population but also changes in what they would eat due to extreme mood changes. Professional support comprised both inpatient and outpatient staff. Inpatient staff were very aware of the poor food choices that patients had available to them and also that patients did not have a good understanding of portion control.

8.3.3 Coping strategies

Many of the participants highlighted coping strategies for weight management such as attending groups and using apps and technology. Technology allows people to record and monitor their exercise, diet and mood patterns. People also developed habits and routines as coping strategies. These were methods

that people had previously tried to manage their weight. Providers of professional support spoke at length of the benefits of establishing a routine for physical activity and about goal setting. They were aware that the impact of the individual's mood can lead to routines being broken and subsequent issues in establishing a return to physical activity habits. There was varying degrees of success in the use of different strategies with people at times reporting a loss of interest in the app or the routine activities.

Any future intervention should provide information about physical activity and diet and relevant coping strategies. There should also be more focus on self-monitoring to make people aware of how things change during mood cycles. Planning and monitoring would also help people to manage their eating during mania episodes. Technology and apps can help with monitoring but these need to be both easy to use and engaging. Future interventions must also include opportunities for people to access support to re-establish routine after a period of low mood. Setting achievable goals would also be beneficial but people would need to be aware as to how their mood may impact on achieving goals.

8.3.4 Support

Social support and influence was discussed at great length by all participants who took part in this study. Participants highlighted the importance of social support for weight management. Even when participants had social support, people with bipolar disorder often reported feeling isolated. They also felt that their support did not understand what they were experiencing and did not provide the support that they wanted. Informal support participants provided further insight into this issue indicating they often felt that they were not able to provide enough support or the correct type of support. They felt they were just trying to support the person as best as they could with healthy lifestyle choices.

People with bipolar disorder identified that they experienced different levels of both informal and professional support. Informal support varied from individual to individual. Informal support participants reported struggling to provide information and were not sure how to encourage people to take part in healthy

eating or physical activity. There was evidence that the social support could have both a positive and negative influence with regard to physical activity and diet. Social support also varied depending on the individual's mood and the symptoms of bipolar disorder that they were experiencing. Some people identified that professional support was very beneficial while others felt that they received little support. Even though professional support participants reported having received training there was still a feeling that more could be done to help staff to understand more about key information related to diet and physical activity thus enabling them to better support patients.

The findings indicated the importance of positive social support and this would likely be an important component of any future intervention. Informal support such as family and friends may need some advice as to how best to provide support. Of particular importance is that informal positive support should be encouraged during periods of low mood.

8.3.5 Intervention ideas

One main finding from the interviews was that participants who had bipolar disorder wanted a bipolar-specific or tailored intervention to help with their weight management. Participants who support those with bipolar disorder also highlighted the need for a weight management intervention for adults with bipolar disorder. Also although the participants who had bipolar disorder were "stable", they were still having difficulty managing the symptoms of their disorder and, at times, any attempts at weight management could be compromised due to the severity of changes in their mood.

As this thesis aims to gain an understanding of issues of relevance with regards to developing an intervention for weight management, participants were asked about their ideas on interventions. Participants spoke positively about some of the previous interventions that they had used, for example, using diaries for reflection or pop up reminder messages. Both of these could be incorporated into future interventions. Professional support were aware of a few interventions that were currently available for people with mental health problems. These included an intervention to increase understanding of food labelling so that food

choices could be healthier and the possibility of reduced costs for attending the gym. Professional support, however, thought that there should be a more practical intervention to help people choose and prepare more healthy food.

Bipolar participants also had criticisms of previous interventions they had used. Not feeling confident in the use of an app, lack of accuracy in measuring activities and not liking images on the app were all identified as reasons why they did not like previous interventions. In order to maintain people's use of the intervention they must find it engaging. Consequently, addressing these issues would be key in the development of any future intervention. Informal support found that interventions were not always well received by the person they were supporting due to the stage of their disorder and at times they felt they negatively impacted on the person's symptoms.

Future interventions must be adaptable to both mania and low mood. Increasing motivation and providing support would also be vital to support weight management. According to both professional and informal support, technology is something that could have potential. However, digital interventions would need to be tailored to current mood state and the day-to-day instability of mood. Digital interventions would have to be easy to use and engaging and could also use methods to enable the person to reflect on their own behaviour and include helpful reminders. Overall future interventions should provide social support, increase motivation and most importantly take cognisance of mood changes.

8.4 Social network findings

To the best of my knowledge this is the first time that social network data in the form of sociograms have been collected for people with bipolar disorder focussed on lifestyle and weight management. Due to the small number of participants taking part in this aspect of the study the analyses were only descriptive. The majority of participants were able to identify at least 5 people in their support network although some struggled to do this. This may have been due to having very few people in their social network or it may have been due to them not thinking that people in their social network provide support. This may reflect the findings from the interviews where some people thought that the

support they received was not "good enough". Every sociogram consisted of a mix of both support who were healthy and unhealthy, males and females, and at least someone who could offer support with weight management (if needed).

I explored if there were differences in the sociograms according to weight categories of the egos. Most participants were overweight or obese but there were some participants who were normal weight. The networks of those people that were both overweight and obese were varied but did not seem to differ to those who were normal weight. Some of the social networks had much higher density than others. Weight did not seem to explain these differences. There were differences between sociograms in terms of number of healthy, neutral or unhealthy alters but again this was not associated with being overweight or obese. Regardless of the weight of the egos (participants) they had a mix of healthy, neutral and unhealthy alters (people who provide support).

These exploratory analyses do not suggest that there are any clear patterns to be observed in the structure and size of the sociograms drawn in this study for the different gender or weight groups. The small sample size and unbalanced male to female ratio means that few conclusions can be drawn. Future research with larger sample sizes and a more balanced participant cohort could identify possible differences in social networks of males and females and those who were overweight or normal weight.

8.5 Main thesis findings: combining systematic review, qualitative interviews and social network data

Using the findings from the systematic review of previous research and the analysis of qualitative interviews with people with bipolar disorder and their social networks (step one of the six SQuID intervention development theory(106)), I have developed a conceptual framework of factors influencing weight management in people with bipolar disorder. This is in line with step 2 of the six SQuID theory of intervention development.(106)
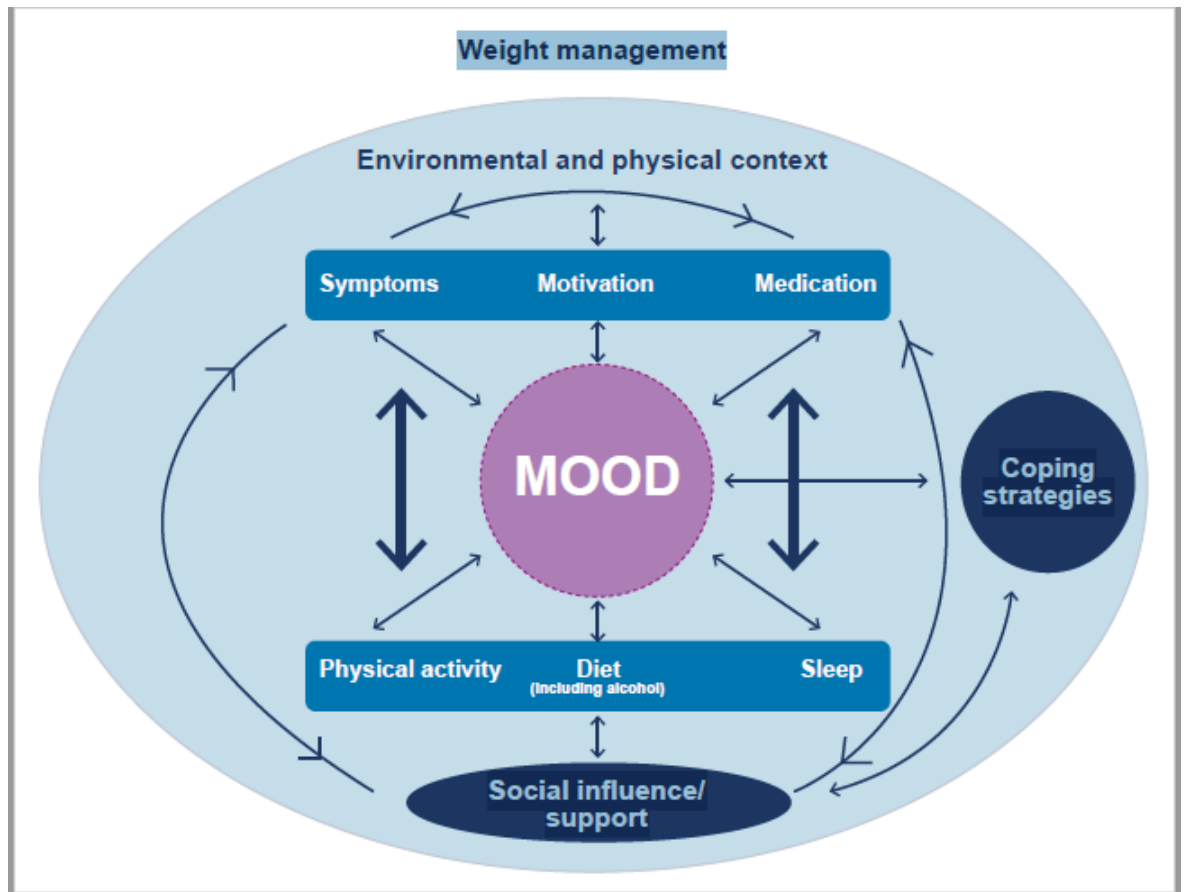
Figure 11. Conceptual framework

It is evident from the systematic review and interviews that there are many factors that need to be considered for weight management for adults with bipolar disorder. The above diagram (Figure 11) highlights the factors that were identified in the review and interviews as being relevant for weight management in this population and illustrates the complex relationship between them. People with bipolar disorder not only face the usual barriers and facilitators to weight management that the general population report, but they also have additional barriers and facilitators when addressing weight management.

As shown in the diagram (Figure 11) the environment and physical context have a huge impact on every aspect of the person's weight management experiences. For example, the weather can impact on people going out to exercise or lack of access to safe places to exercise can limit exercise opportunities.

Interviewees identified both psychological factors (symptoms and motivation) and physiological factors (physical activity, diet and sleep) and medication,

which has both a physiological and psychological component, as important. These interact with external factors such as environment and physical context and in the case of the latter two with internal factors such as mood and motivation. Each of these physiological and psychological factors interact with and affect each other. When the person experiences symptoms such as extreme lethargy, this could decrease motivation to take part in physical activity or healthy eating and make a person less likely to take their medication, which in turn could make their symptoms worse. When the person experiences symptoms of extreme energy, this could decrease their motivation to eat healthily but could lead them to taking part in extreme activity levels (that are not always healthy). In turn this could lead to not taking their medication and increasing their symptoms.

Figure 11 also identifies lifestyle factors such as physical activity, diet and sleep. When a person does not take part in enough physical activity and makes unhealthy food choices this can impact on sleep quality and quantity. Again, each of these lifestyle factors interacts with each other: physical activity affects diet and sleep; diet affects physical activity and sleep; sleep affects physical activity and diet. Consequently, each of the physiological and psychological factors affects each of the lifestyle factors. For example symptoms such as lethargy, effect physical activity levels, food choices and sleep. Each lifestyle factor also affects the physiological and psychological factors. For example taking part in physical activity can impact symptoms and motivation to maintain physical activity.

These physiological and psychological factors are also affected by coping strategies and the factors affect coping strategies. Examples of coping strategies include taking part in weight management groups or food and physical activity diaries. The physiological, psychological and lifestyle factors and the coping strategies affect how social support and social influence is perceived and received. Depending on symptoms, motivation, and medication, the person may interpret social support and social influences in a different way. If a person is taking part in healthy eating it could impact on how they view social support. For example the person could view their social support as negative for their

healthy eating plan if they are being encouraged to eat unhealthy food. Social support could also encourage healthy eating.

During the process of exploring weight management with people with bipolar disorder, it became clear that the most prominent factor that people with bipolar disorder deal with is mood. From the diagram it is clear that mood is a central influence on weight management and interacts with every aspect of life. People with bipolar disorder have mood swings that go from one extreme to the other. These mood fluctuations impact on the way each of the factors interacts with the others. For example if the person has physical symptoms and low mood, this effects how likely they are to take part in physical activity, or if they are experiencing mania then they may be unlikely to take their medication and engage with a healthy lifestyle. Mood affects how individuals make choices about food and physical activity and sleep. It is these complex interactions and the impact that mood shifting from low to mania has which make weight management particularly complex for people with bipolar disorder. Mood instability is therefore central to perpetuating weight gain in people with bipolar disorder.

It is clear from the diagram above (Figure 11) that there are many influences on weight management for people with bipolar disorder and these interact in complex ways which makes developing a weight management intervention challenging.

8.6 Implications for a weight management intervention

The findings of this thesis indicate that people with bipolar disorder are interested in weight management interventions. People with bipolar disorder have to live with fluctuating mood and any future interventions that are developed must be flexible and adaptable enough to be used at different stages of the mood cycle. Due to the individual nature of mood changes and cycling patterns it is difficult to have a one size fits all weight management intervention. Some people have fast cycling patterns while for others it is much slower with longer periods of low mood and mania. The intervention must be able to be used during periods of low mood and mania as well as when the

person is feeling stable. Mood is centrally located within the logic model below (Figure 12).

Based on the findings here and other research(123), future interventions should include a social support component. Greater access to social support and support during all stages of their mood cycle could impact on weight management barriers positively. People participating in the intervention could perhaps attend a group, structured course/programme or use social media/technology. It is possible that combining different ways of delivering the intervention would be helpful. The aim would be to engage as many individuals as possible and give them access to various resources. This is particularly relevant when people are experiencing very low mood, when support is really important. Social support could be from a specific person from their current support network or persons who could provide a more advanced level of support, for example from trained peer supporters (i.e. from those who have bipolar disorder).
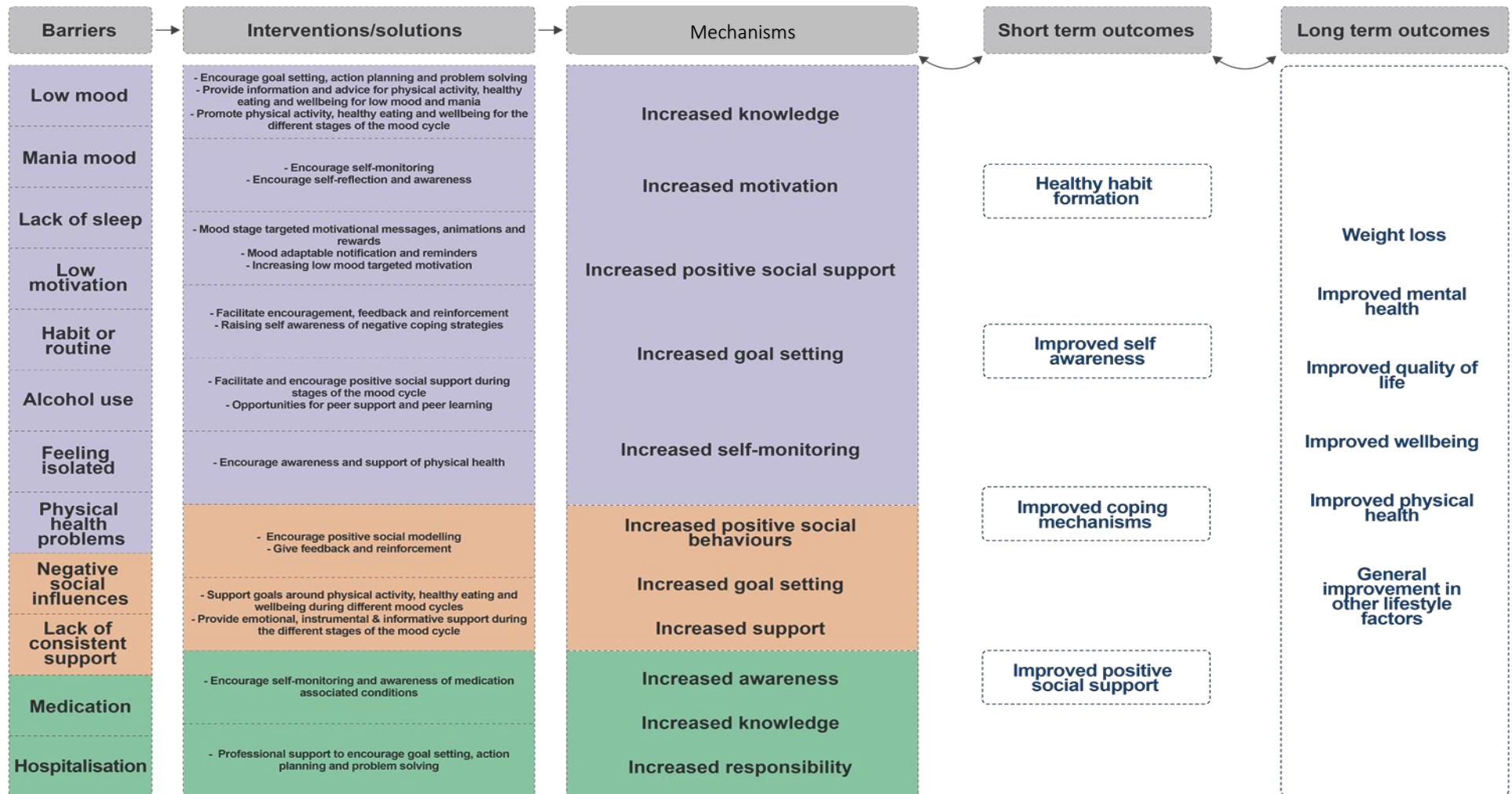
Figure 12- Logic model

The above logic model was developed using the information gathered from: the review of literature; the systematic review; the interviews with both people with bipolar disorder and those who provide support; and the social network analysis. The logic model is based on the Wisconsin model framework.(175) The model consists of the barriers, the intervention/solutions, behaviour change mechanisms, short term outcomes and long term outcomes. This logic model (Figure 12) identifies how to bring about change in the form of change mechanisms. This is step three of the six SQuID development of interventions.(106)

The barriers described in the logic model include intrapersonal barriers (identified in purple), interpersonal barriers (identified in peach) and other barriers (identified in green). The intervention could potentially help to support and address these barriers in order to improve weight management. The intervention could usefully deliver information to participants related to physical activity, health eating, wellbeing and sleep, specifically how these things are different during the stages of their mood cycle and how they affect weight. People that were interviewed did not seem have insight into how their behaviours during the mood cycles may affect their weight management. There was also a lack of insight into the relationship between sleep and weight.

Goal setting, action planning and problem solving could also be included but taking into consideration mood changes. This was key to what professional support felt would be most beneficial. Knowledge of how mood can alter not just their day to day lives but also their behaviours could be vital to weight management. This could include information on the effect mood can have on levels of physical activity, diet, and wellbeing choices. Raising awareness of how small changes can be more achievable and maintainable should also feature. Nearly all participants talked about taking part in physical activity (even those that were overweight or obese), so a greater focus on how small achievable improvements can lead to improvements in weight management should be included.

Being able to self-monitor diet and physical activity behaviours as well as having the opportunity and encouragement to self-regulate and monitor their experiences of behaviour change could also be key features. Likewise, encouragement to reflect on mood and how mood affects behaviour change could potentially be important for weight management. Very few participants spoke about reflecting on their mood and how it impacts on their lifestyle. Only a small number actually used a mood diary, let alone a food diary. Such activities could help people understand what happens during the mood cycle and how to cope with their symptoms. Providing people with the skills to enable and encourage them to take part in self-reflection and the self-monitoring of their own behaviour and allowing them the time and opportunity to regulate how their behaviours change depending on where their mood is within the cycle would be an important part of an intervention.

Key to an intervention would be social support, identified as important in the review, interviews and social network analysis. This could be in the form of professional support or informal support or both. It would be essential that the support that is delivered is positive social support. Support is particularly important during periods of low mood as this is when participants felt that they lacked support. During the mania phase participants felt that although they had social support around them that it encouraged manic behaviours and was not always positive. It is not, therefore, simply about increasing social support but increasing positive social support. As people who are experiencing low mood tend to remove themselves from their social support, the intervention could potentially benefit from using digital technology to encourage support contact during the different phases of the mood cycle. Attending support groups or using social media could also offer the opportunity for people to have peer support and benefit from peer learning. This could help dissipate the feelings that people with bipolar disorder often express that they are not getting the support that they want as the people who try to support them do not understand what they need.

Those that provide support could potentially raise awareness of behaviours that could be changed, model good behaviours and encourage motivation to change.

Additionally, those providing social support could help with the setting of goals that are manageable and achievable and not too ambitious as these can lead to failure and loss of motivation. While professionals were aware of how important it is to set achievable goals, informal support often felt that they did not know how to encourage the person that they support, so elements for informal supporters to show the best way to support people with bipolar could be included. Both professional and informal support felt that they were able to give feedback to the person they supported and could help with reinforcement but at times had problems due to the mood stage of the person that they supported.

Implementing the suggested content and use of the BCTs in the intervention could lead to the person with bipolar disorder displaying increased knowledge about how their mood and current behaviours impact on their weight management and their awareness of the changes that need to occur. The person could also become more motivated to change their current negative behaviours; to increase their pro-social support and decrease any negative support; to increase their goal setting while making sure that these goals are achievable and not unrealistic to minimise drop out; to increase the self-monitoring of their own behaviour; and to make them more aware of how their behaviours impact on weight management.

The process is not necessarily linear, short term changes or outcomes do not necessarily lead directly to long term outcomes. For example if a person has low motivation as a barrier and they take part in the intervention where they receive encouragement, feedback and reinforcement, this can lead to increased motivation, which may lead to greater likelihood of healthy behaviours which might lead to healthy habit formation and weight loss. However the increased motivation may be temporary and not lead to healthy habit formation, so further support and encouragement may be needed before the above steps can happen.

A few participants suggested an app might be useful and indicated that it must be engaging and people must want to use it during both mania and low mood (although unlikely to use it when experiencing very low mood). Bipolar disorder affects adults of all ages and consequently an app must be straightforward to

use. If the intervention were to have an mhealth component, then a website or app could have motivational messages that are targeted to mood to supplement the intervention. Some participants reported liking pop ups or messages, notifications or rewards from apps and felt that these were helpful; others opinions were more negative towards this, particularly when in the low mood cycle. Because people often switched off their phones during periods of low mood there needs to be some form of notifications that could encourage people to return to the app when they switch their phone on again after the period of very low mood has passed. Although not everyone in the study had access to a phone, most did have access to the internet so either delivering an online intervention or supplementing an intervention with a digital component might be a possibility. Any online component of the intervention should be private and should only allow people to nominate others to have access to the information that the user wants other to see.

Finally, the environment and context should be considered in the design of any future intervention. People must have access to physical activity opportunities and healthy food otherwise this intervention will not be possible. In addition, consideration needs to be given to family and work commitments that can place constraints on physical activity, healthy eating, sleep patterns and time to actually be involved in an intervention. Consideration should also be given as to how the intervention fits into current treatment and if it could be integrated into other treatment programs.

8.7 Strengths and limitations

The thesis has a number of key strengths and limitations related to each of the different phases of this thesis, which will now be discussed.

8.7.1 Strengths

The first phase of the work was the systematic review of current research (Chapter 2). To the authors knowledge this is the first review to use a mixed

methods approach including both qualitative studies and trials of weight management interventions that also included analysis of BCTs used in the interventions, for adults with bipolar disorder. Although this review also includes SMI the focus was looking at studies that had participants with bipolar disorder. There are a number of key strengths including rigorous search strategy across a number of databases; double review of papers; combining qualitative and quantitative data; double review of behaviour change tables; and using a standardised behaviour change taxonomy to identify BCTs in interventions. (112)

The second phase of the work was the qualitative interviews. This phase had a number of strengths. The majority of previous studies used focus groups rather than one to one interviews. The two methods have benefits and disadvantages. The main benefit of one to one interviews over focus groups is that they allow for more discussion of sensitive topics.(176) This can be said to be true for the participants in this study. One to one interviews were ideal due to the sensitive nature of the topics covered in the interview.

I collected data from a range of participants and was able to triangulate data from both patients, professionals and those who provide social support to people with bipolar disorder. The interviews were conducted and analysed rigorously using double coding to increase reliability. During the interviews I worked on the coding structure and discussed the coding with my supervisors as I completed interviews, thereby enhancing reliability. The number of participants recruited for the qualitative interviews was: 16 people with bipolar disorder, five family members and five professional support. To the best of my knowledge this is one of the largest studies of one to one interviews involving these groups. Due to thesis time constraints and a limited numbers of volunteers 26 interviews were conducted overall, slightly fewer than planned.

The participants were recruited across Scotland. There was a good spread of participants with different socioeconomic backgrounds. Having a diverse sample enabled me to explore a variety of experiences. The participants were a mix of overweight, obese and normal weight participants. So I was able to compare the weight management experiences of these groups.

This was the first time social network analysis has been conducted for adults with bipolar disorder related to weight management. This facilitated an exploration of the social networks for people diagnosed with bipolar disorder including the nature of the networks, the frequency of the support, and types of support. Although this work is exploratory due to small numbers it provided some useful insights. During the process of drawing their sociogram it helped participants to clarify and recall specific details about social support which was supplemented with the social network questionnaire about the people identified in the diagram. This provided a greater depth and understanding about the social networks and the support they provide.

8.7.2 Limitations

There was also a number of limitations in both phases of this study. The limitations of the systematic review are discussed in chapter 3, however the key limitations include that the review was limited to published literature, the grey literature was not explored so relevant findings may have been missed; data extraction was checked by a second reviewer rather than being double data extracted; the number of databases searched was limited and a final issue related to the limited ability to draw conclusions as included studies had methodological shortcomings.

Although valuable insights were obtained which will be useful for future interventions, the review did not focus solely on bipolar disorder and included studies of both interventions and qualitative studies for adults with SMI (which included participants with bipolar), due to the lack of previous research articles solely focused on bipolar disorder. It was not ideal to group these disorders together for evidence of the effectiveness of interventions and experiences of weight management. However, it was the best evidence available and if the studies with participants diagnosed with SMI were not included then this could miss important evidence, as these studies did include bipolar patients. It is likely given the nature of these two disorders that different weight loss interventions may be needed, as the people with these disorders present with different symptoms, receive different medication and therefore different side effect profiles and they have different levels of cognitive functioning.

One limitation with the interviews was that the majority of the participants with bipolar disorder and their family were recruited from Bipolar Scotland, a support charity. I did attempt to recruit people with bipolar disorder from the NHS supported by one of my supervisors who is a consultant with the NHS Greater Glasgow and Clyde. However, this proved unsuccessful and no participants with bipolar disorder were recruited from the NHS. The number of participants that were recruited was 16 rather than my target of 20, this was due to the availability of participants and also due to the timescale of the PhD.

The motivations of participants to take part in a research study must be considered. The findings are likely to be skewed since the majority were recruited from a support group, most of these participants were people who were actively looking for support, and may therefore have been more likely to be willing to take part in interventions to improve their quality of life. Such participants may have been more likely to be interested in weight management having perhaps attempted to make changes and more likely to be willing to try new interventions. However, it would have been difficult to recruit participants who were not interested in weight management into the study.

The bipolar participants were all living in the community and were "stabilised". However, all participants presented with a slightly elevated mood during the interviews and none of them were experiencing low mood. This may have been due to their bipolar disorder or it may have been due to the participants being keen to contribute their ideas and thoroughly answer the questions. Thus a limitation of this study is that all participants were probably in a similar stage of their mood cycle (I did not assess their mood) but it is unlikely that the participants would have been prepared to meet with me if they had been feeling low. If I had been able to recruit participants who were in different stages of their mood cycle I may have had different findings.

The gender balance in the study was unequal, more females agreed to take part. This is not unusual in research studies.(177) Unfortunately only two of the participants with bipolar disorder were male and two of the support participants

were male. The majority of the participants were of a similar age range clustering around the forties. This is likely to have impacted on the findings.

On reflection I think it would have been more beneficial to have structured my interviews slightly differently. Participants were asked to complete their social network diagram at the end of the interview. I think it would have been easier to have asked participants to complete this at the beginning of the interviews for a number of reasons. Firstly, it would have helped clarify who the participants were discussing during the interviews as all participants discussed their social networks during the interview process and we could have referred back to their diagram during the interview process. Secondly, it would have stopped the duplication of information about their support network. I felt there was a lot of repetition from the participants about the support that they receive, and thirdly the participants would not have been as tired by the time it came to complete the social network diagram.

The key limitation of the social network analyses was the small sample size which limited my ability to complete more informative analyses and to draw conclusions. There were also some issues with regard to the methods used to collect the social network data. Participants were asked to self-report on the lifestyle of the alters, which might raise a question about what they were using as a benchmark for healthy lifestyle or unhealthy lifestyle. So the quality of this data may be questioned as it is purely based on the participants' views, no network members were interviewed. Additionally, by the time I was asking participants to draw their network diagram, I had already been discussing healthy lifestyle. It is possible that participants' identification of social support (the alters) was skewed to identify only those whom they saw as healthy. Furthermore, I only asked participants to identify five to ten alters not their whole network. If I had asked for the whole network this may have been more informative, e.g. by giving information about the size of the whole network and links between alters.

8.8 Comparison to previous research

The findings from the systematic review were compared to previous research in section 2.13. The main conclusions from the current systematic review and previous systematic reviews were that successful weight management interventions needed to include both physical activity and diet components and not just one or the other.(98) The importance of social support for weight management; motivation(118); and the impact symptoms can have on lifestyle (118) were identified in this review as vital for weight management.

As the review of literature and systematic review were initially conducted in 2015/16, additional research studies since the initial review are included. The majority of previous qualitative studies focused on the impact that exercise can have on the disorder.(178-180) However there is limited evidence that exercise can improve symptoms of bipolar disorder.(178, 180) The current thesis focussed on the impact of physical activity on weight management rather than disorder management. Similarly, the focus in previous healthy eating studies has been on symptom management(181) and not weight management.

Research shows that physical activity can be an important factor for weight management.(182) Most of the participants interviewed as part of this thesis said that they took part in some level of physical activity but indicated that their mood could affect physical activity and physical activity could affect their mood. Whereas, previous evidence found that the majority of their sample did not exercise regularly.(183, 184) Mood has been seen in this study and other studies to influences exercise, Wright et al (2012) who titled exercise as a "double edged sword", (121) suggesting exercise can be both, positive and negative depending on the individual's mood.(185) But this in turn can make it difficult to use physical activity as part of a weight management intervention. Careful monitoring and raising awareness of the impact physical activity can have on symptoms of bipolar disorder, could be helpful for an intervention.

Participants in this study reported that they felt they knew what a healthy diet was but due to various issues including mood, handiness and availability, they tended not to eat healthy food and often relied on convenience food. However,

previous research by Cabassa et al (2014) found that people in their study, with a SMI, were not aware of how to eat healthily, and had a feeling of helplessness when it came to changing eating habits.(56) This issue was not raised in the present work. However, that is not to say that the participants did not feel a sense of helplessness about changing eating habits.

This thesis identified both barriers and facilitators to weight management. The findings from the qualitative interviews highlighted that the symptoms of bipolar disorder had an important impact on weight management. Yarborough et al (2016) also found that mental health symptoms were a barrier for both healthy eating and physical activity.(118) Symptom management is important for weight loss interventions as severe symptoms can reduce the amount of physical activity that someone takes part in.(183, 186) Specifically, the impact mood can have on weight management.

Mood can impact on the food choices. The participants in the current study expressed times when low mood or mania led to making unhealthy food choices. Research evidence supports that people diagnosed with bipolar disorder are more likely to binge eat, night eat and have eating disorders. (187) The participants in this study did not comment on how the eating behaviours that resulted from their mood impacted on weight. There is also a lack of evidence about the impact diet has on bipolar disorder.(188)

Medication and associated side effects were also identified as a barrier to taking part in exercise and healthy eating in this thesis. This was supported by Cullen et al (2015) who found that medication side effects were a challenge to participating in exercise.(117) They specifically identified the side effects as being: feeling sleepy, stiff muscles, lack of motivation and poor fitness levels.(117) Some of these symptoms of medication were also identified by participants in this study as being important for weight management.(117) In the Cullen et al (2015) study participants were diagnosed with a SMI, not just bipolar disorder, so participants could be taking different medication and consequently the side effects could be somewhat different.(117)

Motivation was discussed as a barrier during the interviews with people with bipolar disorder, family, and health professionals. Browne et al (2016) found motivation to be one of the most important barriers to exercise highlighted by people with SMI.(116) In this thesis low motivation was a barrier for weight management according to both people with bipolar disorder and health professionals. The importance of lack of motivation identified in this thesis was not just about engaging in starting a new behaviour, but its potential impact on the individual's ability to follow a behaviour change plan in the longer term due to fluctuation in mood. Other studies have also found that motivation can fluctuate as a result of mood and that this is important to consider for future interventions.(118)

In the present study there was discussion around sleep and difficulty with sleep routines; sometimes sleeping too much and at other times sleeping too little. It is well noted that people with bipolar disorder have sleep problems (189) and there is evidence that sleep can have an impact on weight management.(162) Physical activity is impacted by sleep and should be addressed together.(190) Yet it appeared that participants had little insight into the impact their sleep patterns potentially had on their weight management, whether through physical activity changes or food choices. None of the previous research that I identified highlighted the importance of sleep patterns and weight management for adults with bipolar disorder.

Alcohol was discussed as a method of managing bipolar disorder. The participants included in this thesis did not highlight the impact that alcohol could have on lifestyle choices such as diet and physical activity. Alcohol use is highly prevalent for people with bipolar disorder.(191) Alcohol increases risk of obesity due to increased energy consumption from alcohol in the general population. (192) Therefore, it is possible that due to the increased alcohol consumption that results in an increased energy consumption, this may lead to weight management problems.

The majority of participants in this study reported physical health problems as well as bipolar disorder. Physical health could lead to a decrease in physical

activity (1) and there is evidence from previous research studies that pain from physical health is more likely to be experienced by people with bipolar disorder than the general population.(193) Therefore, physical health improvements and a whole person approach to managing mental health disorders could improve health outcomes and lifestyle.

Another key issue raised during the qualitative interviews and social network analysis was the importance of social support and social influence for weight management. Social support was also identified as important in studies included in the systematic review. For example, involving social support in a healthy lifestyle intervention was investigated as part of the InSHAPE intervention.(123) Aschbrenner et al (2012) found that interventions aimed at making lifestyle changes for adults with SMI, may increase the effectiveness of the program by involving a significant other.(123) This was also supported by Carless et al (2007) who found that social support helped with initiating and maintaining physical activity for men with SMI. (119) Providing support (and receiving support) during the different phases of the disorder can be challenging. The participants in this thesis highlighted that using alternative methods of communication such as phoning, texting and email may help during low mood. Social media may increase social support for people diagnosed with bipolar disorder.(194) There was no previous research that has looked at the relationship between healthy lifestyle (physical activity and diet) and social networks for adults with bipolar disorder.

One of the observations of this thesis is that everyone had different experiences and a 'one size fits all' intervention may not be ideal and that the individual must be considered. A recent study also identified that a manualised lifestyle intervention may not be ideal for people with bipolar disorder and a more personalised approach may be more effective.(195)

8.9 Future research

This research represents the early stage development work which will contribute to development of a weight management intervention for adults with bipolar disorder. Further research is required to develop the intervention prior to

feasibility testing. This could involve co-production workshops with patients, informal support, health professionals and more collaborative work with Bipolar Scotland. There may be the opportunity to explore the potential of delivering an intervention via support groups already existing within Bipolar Scotland.

The Medical Research Council has developed guidance to support the development and evaluation of complex interventions.(137) I have used this guidance to help shape the completed work, following the initial stages of the guidance, including establishing the evidence based and completing qualitative research. The process of developing and evaluating an intervention can take a long time, including the four stages of development, piloting, evaluation, and implementation, but each of these stages must be completed and given time and careful consideration.(137) Funding would be required for the next stages of this work.

Further development of the intervention is required as many questions remain. For example, what method of delivery should the intervention adopt? How can positive social support be delivered most effectively to the individual? How can the individual be engaged during periods of low and mania mood? As discussed previously there are different directions that the weight management intervention could take. Given the identified importance of social support, peer support is a possibility for a weight management intervention as are group sessions, one to one sessions with professional support, the use of friends and family who have attended training, and the possibility of exploring e-health and m-health. The intervention would perhaps need to be a combination of these. However, it does need to be accessible and adaptable to mood changes. Taking the logic model as a starting point (discussed in previous section, Figure 1.2), co-production workshops could clarify whether what I have developed represents the experiences of weight management for adults with bipolar disorder and whether the intervention content ideas have potential.

Once the co-production work is complete and these questions have been answered and if indications are that a strong intervention has been developed, it would then be time to start piloting. The piloting and a feasibility study could be

done through pre-existing support groups or by recruitment via other sources like social media. The piloting and feasibility stage would enable the intervention to be thoroughly tested to check the feasibility and acceptability of the intervention as well as the evaluation design including outcome measures, recruitment etc.(196)

Many different designs exist for the evaluation of an intervention. Depending on the outcomes from the pilot and feasibility stage, time constraints, and budget constraints, a number of different designs could be used for the evaluation: randomised controlled trial; controlled before-after study as well as qualitative work.(197) The research questions will drive the method chosen. Ideally, however a randomised controlled trial would test the effectiveness and cost effectiveness of the intervention with a built in process evaluation.

Further research exploring social networks for this population would be beneficial. This could include further social network data collection to characterise the impact of the structure and function of social networks in relation to weight management style.

9 Conclusion

This study found that people with bipolar disorder have a lack of understanding about how weight management can be impacted by physical health, mental health and wellbeing. Every person in this study has had different experiences and any future intervention must be adaptable to the individual. Future interventions need to be modifiable to cater for the person's experiences and stage of their mood disorder.

The studies presented in this thesis included: a systematic review, interviews with people with bipolar disorder, interviews with people who provide support and exploratory social network analysis. The systematic review results indicated that few trials of weight loss interventions for SMI achieved significant improvements in weight loss, particularly in the longer term. Only four of the studies identified showed statistically significant weight loss between the intervention group and the control group. The trials that resulted in significant

weight loss between the intervention group and the control group had physical activity, diet and behavioural components. The themes drawn out from the qualitative evidence included in the systematic review were: physical health, mental health, contextual factors and social support. Social support was clearly identified as important in the qualitative studies in the systematic review.

As with the population at large, people with bipolar disorder have difficulties managing their weight. They face many of the same barriers to weight management as the general population, but they also have to deal with their symptoms, medication, and the physiological and psychological aspects of their disorder. People with bipolar disorder must balance weight management with managing their symptoms.

Participants in this study often did not take into consideration how their symptom management might impact negatively on their weight management. Behaviours that people demonstrated when they experienced low or manic mood could lead to weight gain or weight loss. This is depending on what food choices are made and the quantity. The main differences were observed in food consumption, some consuming high quantity of unhealthy food and others consuming very little food during periods of low mood. During mania phases, some reported consuming high quantity of unhealthy food and others consumed very little. However, when discussing bipolar disorder symptoms and food habits during the different phases, the participants did not reflect on how these times might affect their weight. Instead, weight management attempts were only discussed by these participants during times when the person's mood was "fairly stable". This should be explored further.

Given the nature of the symptoms that people with bipolar disorder experience, currently available weight management interventions may not be suitable. This is due to the fluctuation of mood and how this can impact on food choices and physical activity levels. These mood fluctuations can be rapid and this would be an added complication for weight management. Raising awareness about how managing their symptoms using food can impact on weight management for people with a diagnosis of bipolar disorder would be beneficial.

Future weight management interventions for adults with bipolar disorder must take into consideration individuals' symptoms, how they manage these symptoms, and the frequency and severity of symptoms. Interventions should include knowledge acquisition, encouragement to take part in physical activity and healthy eating, goal setting, self-monitoring, motivation, and positive social support whilst also taking into consideration the individual's mood.

9.1 Recommendations for policy and practice

Weight management interventions for people diagnosed with bipolar disorder would benefit from focusing on addressing the complex relationship between mental health and physical health. This could be achieved by incorporating support from multidisciplinary teams providing care for mental health and physical health. One approach might be to have multidisciplinary appointments at the clinics where patients would meet with health professionals that provide care for mental health and also those that provide care for physical health, during the same appointment. The focus should be about treating the person as a "whole" not just individual components. Additionally, support could be provided from social networks of family, friends and work colleagues to help to reinforce and maintain behaviour change. People in these social networks could be trained to more effectively offer support on weight management.

Health professionals should continue to support people with bipolar disorder to assist with weight management and raise awareness of the importance of physical activity and diet. Mental health professionals could have a greater focus on the relationship between mental health and physical health. Health professionals' knowledge, skills and confidence regarding health behaviour change may also need to be improved. A possible solution would be additional training courses and cross discipline working. Regulating physical activity levels and diet, particularly during mood fluctuation, may be beneficial for this population. Funding and availability of staff could be a limitation for implementation of the above, however, when considering future weight management interventions it is essential that both cost and outcomes are taken into consideration as benefits of successful weight loss are likely to have an impact on both the individual and the NHS.

Future interventions that focus on changing behaviour must address the different needs of the individual. This could be achieved by making sessions relevant to those attending by considering the individuals' priorities and availability of resources such as family, as well as cultural or socio-economic barriers. The relationship between mood phases and diet and physical activity must be taken into consideration for future interventions. Also due to the changes in mood alternative methods of delivery of the intervention could be considered to provide support at all stages of their disorder. One approach might be to use technology to support this.

Family and friends already provide informal support for both mental health and physical health. Family members could benefit from more knowledge and skills about weight management. This could enable them to provide more relevant and appropriate support to their family member with bipolar disorder. At present, family are allowed to attend Bipolar Scotland support groups; however these sessions are not focused on family support. Providing sessions for informal support that are in the community could be trialled to assess practicalities and impact. Again costs need to be considered for this kind of intervention.

Overall, further research is required to help support this underserved group and research funders should be encouraged to support work in this area. Health policy makers should focus on the importance of physical health for adults with bipolar disorder and to work on standardising physical activity and diet support to improve health and reduce mortality in this population.

9.2 Concluding remarks

The results of this thesis contribute to the limited body of research investigating weight management for adults with bipolar disorder. The findings enhance our current understanding of bipolar disorder and weight management and demonstrate the complex relationship between weight management and bipolar disorder. The findings from the systematic review, the qualitative interviews, and social network analysis and the development of the conceptual framework and logic model represent a significant addition to the existing evidence base for weight management for people diagnosed with bipolar disorder.

Recommendations generated from this work could improve current weight management provision and the findings will inform research in this area. There remains a dearth of research addressing obesity and overweight in this population and few weight management services designed for individuals with bipolar disorder. Obesity and overweight are significant risk factors for the development of chronic diseases including diabetes, heart disease and cancer. Treating obesity related disease represents a massive burden on the NHS. Only by addressing obesity and overweight effectively in this group will we reduce inequalities and improve quality of life for this population as well as reduce future NHS care costs.

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11 Appendices

Appendix 1

PROSPERO International prospective register of systematic reviews

Review title and timescale

12 1 13 Review title

14   Give the working title of the review. This must be in English. Ideally it should state succinctly the interventions or exposures being reviewed and the associated health or social problem being addressed in the review.

Barriers and facilitators to behaviour change: a mixed method systematic review of lifestyle interventions for adults with serious mental illness, exploring change in physical activity, diet and weight management.

15 2 16 Original language title

17   For reviews in languages other than English, this field should be used to enter the title in the language of the review. This will be displayed together with the English language title.

18 3 19 Anticipated or actual start date

20   Give the date when the systematic review commenced, or is expected to commence.

03/10/2016

21 4 22 Anticipated completion date

23   Give the date by which the review is expected to be completed.

31/08/2018

24 5 25 Stage of review at time of this submission

26   Indicate the stage of progress of the review by ticking the relevant boxes. Reviews that have progressed beyond the point of completing data extraction at the time of initial registration are not eligible for inclusion in PROSPERO. This field should be updated when any amendments are made to a published record.

The review has not yet   √
started

Review stage	Started	Completed
Preliminary searches	Yes	No
Piloting of the study selection process	Yes	No
Formal screening of search results against eligibility criteria	Yes	No
Data extraction	No	No
Risk of bias (quality) assessment	No	No
Data analysis	No	No

27   Provide any other relevant information about the stage of the review here.

Review team details

28 6 29 Named contact

30   The named contact acts as the guarantor for the accuracy of the information presented in the register record.

Natalie Chalmers

31 7 32 Named contact email

33   Enter the electronic mail address of the named contact.

n.chalmers.1@research.gla.ac.uk

34 8 35 Named contact address

36   Enter the full postal address for the named contact.

MRC|CSO Social and Public Health Science Unit University of Glasgow Top Floor 200 Renfield Street Glasgow G2 3QB

37 9 38 Named contact phone number

39   Enter the telephone number for the named contact, including international dialing code.

0141 535 7500

40 10 41 Organisational affiliation of the review

42   Full title of the organisational affiliations for this review, and website address if available. This field may be completed as 'None' if the review is not affiliated to any organisation.

Medical Research Council

43   Website address:

44 11 45 Review team members and their organisational affiliations

46   Give the title, first name and last name of all members of the team working directly on the review. Give the organisational affiliations of each member of the review team.

Title	First name	Last name	Affiliation
Miss	Natalie	Chalmers	University of Glasgow
Professor	Sharon	Simpson	University of Glasgow
Dr	Juliana	Pugmire	University of Glasgow
Professor	Daniel	Smith	University of Glasgow

47 12 48 Funding sources/sponsors

49 Give details of the individuals, organizations, groups or other legal entities who take responsibility for initiating, managing, sponsoring and/or financing the review. Any unique identification numbers assigned to the review by the individuals or bodies listed should be included.

Medical Research Council

50 13 51 Conflicts of interest

52 List any conditions that could lead to actual or perceived undue influence on judgements concerning the main topic investigated in the review.

53 Are there any actual or potential conflicts of interest?

None known

54 14 55 Collaborators

56 Give the name, affiliation and role of any individuals or organisations who are working on the review but who are not listed as review team members.

Title	First name	Last name	Organisation details

Review methods

57 15 58 Review question(s)

59 State the question(s) to be addressed / review objectives. Please complete a separate box for each question.

The purpose of this review is to evaluate the effect of lifestyle behaviour change interventions in managing and controlling obesity for people with bipolar disorder

The purpose of the review will also explore the barriers and facilitators to behaviour change around weight management.

60 16 61 Searches

62 Give details of the sources to be searched, and any restrictions (e.g. language or publication period). The full search strategy is not required, but may be supplied as a link or attachment.

For the purpose of this review relevant multiple databases will be searched using a highly sensitive search strategy. The search strategy will be tailored for each of the relevant databases. In the month prior to submission of the review, all the relevant databases with the most pertinent studies will be searched again for newly published studies. The language will be restricted to English due to time constraints and the following databases will be searched for studies: PsycINFO; MEDLINE; EMBASE; CINAHL; and Web of Science. In addition to the database searches, other resources will be searched for both published and unpublished studies. The reference lists for all relevant articles will be reviewed for relevant additional studies not identified from the database search. Further to this, Google Scholar will be searched. Finally, subject experts will be contacted.

63 17 64 URL to search strategy

65 If you have one, give the link to your search strategy here. Alternatively you can e-mail this to PROSPERO and we will store and link to it.

66 I give permission for this file to be made publicly available

No

67 18 68 Condition or domain being studied

69 Give a short description of the disease, condition or healthcare domain being studied. This could include health and wellbeing outcomes.

Serious Mental Illness. Physical activity and diet in adults

70 19 71 Participants/population

72 Give summary criteria for the participants or populations being studied by the review. The preferred format includes details of both inclusion and exclusion criteria.

Inclusion: Adults with Serious Mental Illness including schizophrenia and bipolar disorder (as diagnosed using any recognisd diagnostic criteria). Exclusion:Children and Adolescents (under 18 years of age) . People diagnosed with major depression

73 20 74 Intervention(s), exposure(s)

75 Give full and clear descriptions of the nature of the interventions or the exposures to be reviewed

The review will include lifestyle interventions that promote physical activity and/or healthy eating/diet. Studies that will be excluded from the review will be those that target medicatio, smoking, alcohol or drug use unless such studies have considered healthy eating/diet, and/or physical activity related outcomes.

76 21 77 Comparator(s)/control

78 Where relevant, give details of the alternatives against which the main subject/topic of the review will be compared (e.g. another intervention or a non-exposed control group).

Where the participants are exposed to no intervention or where they are exposed to an alternative intervention. The inclusion criteria for the alternative interventions may include educational information, booklets or information sheets. The exclusion criteria is where the control group receives an intervention similar to the trial group.

79 22 80 Types of study to be included

81 Give details of the study designs to be included in the review. If there are no restrictions on the types of study design eligible for inclusion, this should be stated.

This review will include both randomised controlled trials, trials with a control group and qualitative studies. Randomised controlled trials (RCTs) are an effective way of determining whether an intervention has been effective.They are not particularly generalisable and can be impracticable due to the intended population for the intervention. Therefore in this systematic review, trials with control group studies will also be included. Qualitative study designs are also included as they will offer insights into why interventions did or didn't work as well as barriers and facilitators to weight management in this group.

82 23 83 Context

84 Give summary details of the setting and other relevant characteristics which help define the inclusion or exclusion criteria.

The weight management interventions developed for people with serious mental illness have resulted in mixed outcomes. This research will help to add to the existing intervention research to produce a better understanding of the barriers and facilitators to weight management.

85 24 86 Primary outcome(s)

87 Give the most important outcomes.

Primary outcomes will include: 1) measures of obesity such as waist-hip ratio, body mass index (BMI), weight change, weight gain, weight loss and waist circumference; 2) measures of diet such as food diaries, food preferences and food habits and 3) measures of physical activity such as walking, exercise and fitness.

88 Give information on timing and effect measures, as appropriate.

89 25 90 Secondary outcomes

91 List any additional outcomes that will be addressed. If there are no secondary outcomes enter None.

The secondary outcomes will include 1) changes in knowledge regarding obesity, diet and physical activity, 2) changes in expressed motivation to modify weight, diet or physical activity, and 3) reported adverse outcomes/ harms and unintended consequences of the intervention.

92 Give information on timing and effect measures, as appropriate.

93 26 94 Data extraction (selection and coding)

95 Give the procedure for selecting studies for the review and extracting data, including the number of researchers involved and how discrepancies will be resolved. List the data to be extracted.

The data extraction process will involve four review authors. The main review author will independently review all the titles and/or abstracts of studies retrieved using the search strategy and those from additional sources. The other three review authors will independently review one third each of all the identified studies. Therefore all identified studies, that potentially meet the inclusion criteria outlined above, will be reviewed by two independent reviewers. The full text of these potentially eligible studies will be retrieved and independently assessed for eligibility by main review authors and one additional author. Where there is any disagreement over the eligibility of any study, it will be resolved through discussion between the two authors and a third author should there be any queries. The included studies will be assessed using the Critical Appraisal Skills Programme (CASP) checklist to evaluate the quality of the studies. There are versions for qualitative studies and trials. Each version of the tool allows for judgements to be made about the: methodological quality of the study; clinical importance; uncertainty in results; and if the study characteristics are relevant. A data extraction tool will be developed based on a standard template provided by the Cochrane Public Health Review Group. Also included will be the quality assessment criteria that corresponds to the RE-AIM (Glasgow 1999) public health intervention evaluation framework within the modified template. The authors will independently process and summarise the data and complete the data extraction forms. The data will be recorded electronically on all forms. The data will include: descriptors (such as authors, year of publication, year of study and location); study design; intervention; setting; outcomes (primary and secondary) participants and analysis. Any missing data will be requested from the study authors. The data extraction forms will be piloted randomly on four studies, both qualitative and quantitative. The forms will be evaluated for efficiency and capturing all the necessary data. The two authors will complete electronic copies of the data extraction forms. For auditing purpose all the paper copies will be stored in a locked filing cabinet and electronic copied will be in a secure file on the University of Glasgow network.

96 27 97 Risk of bias (quality) assessment

98 State whether and how risk of bias will be assessed, how the quality of individual studies will be assessed, and whether and how this will influence the planned synthesis.

The full articles will be reviewed by two authors independently to recheck that each study fulfils the inclusion criteria. The two authors will review all the research that meets the inclusion approval process, they will summarise the data on extraction forms. The articles will then be assessed using standardised quality assessment templates, and any disagreements discussed. The data extraction will be completed using the critical appraisal skills programme (CASP) checklist. There are versions for qualitative studies and trials. Each version of the tool allows for judgements to be made about the: methodological quality of the study; clinical importance; uncertainty in results; and if the study characteristics are relevant.

99 28 100 Strategy for data synthesis

101 Give the planned general approach to be used, for example whether the data to be used will be aggregate or at the level of individual participants, and whether a quantitative or narrative (descriptive) synthesis is planned. Where appropriate a brief outline of analytic approach should be given.

We will synthesise studies of a bipolar disorder population views using framework analysis used in previous (EPPI-Centre reviews) A framework synthesis accommodates a range of different types of studies and can be conducted relatively quickly by a team of review authors. We shall read the abstracts from search outputs, then the full texts, to confirm, extend or disprove key issues and recurrent themes. We will code the included studies according to the framework, revisiting studies as the framework is refined. The codes will then act as an index to navigate the data and allow the research studies to be sub-divided into sections that are more manageable for in-depth analysis. If necessary, we shall work through a series of frameworks that will accommodate more data with increasing coherence. Each element of the framework will be interrogated in turn, organising the data under key themes in order to present summaries. Then we will draw together what can be learnt from the tables, summaries and findings associated between themes and providing explanation for those findings across the studies to illustrate people with bipolar disorder responses to aspects of weight management, physical activity and healthy eating. This approach will provide a clear path from the original research data, to individual study author's description and analysis to the findings of the qualitative review synthesis. This will then be used to inform the final cross-study synthesis.

102 29 103 Analysis of subgroups or subsets

104 Give any planned exploration of subgroups or subsets within the review. 'None planned' is a valid response if no subgroup analyses are planned.

no subgroup analyses planned

Review general information

105 30 106 Type and method of review

107 Select the type of review and the review method from the drop down list.

Systematic review

108 31 109 Language

110 Select the language(s) in which the review is being written and will be made available, from the drop down list. Use the control key to select more than one language.

English

111 Will a summary/abstract be made available in English?

Yes

112 32 113 Country

114 Select the country in which the review is being carried out from the drop down list. For multi-national collaborations select all the countries involved. Use the control key to select more than one country.

Scotland

115 33 116 Other registration details

117 Give the name of any organisation where the systematic review title or protocol is registered together with any unique identification number assigned. If extracted data will be stored and made available through a repository such as the Systematic Review Data Repository (SRDR), details and a link should be included here.

University of Glasgow

118 34 119 Reference and/or URL for published protocol

120 Give the citation for the published protocol, if there is one.

121 Give the link to the published protocol, if there is one. This may be to an external site or to a protocol deposited with CRD in pdf format.

122 I give permission for this file to be made publicly available

Yes

123 35 124 Dissemination plans

125 Give brief details of plans for communicating essential messages from the review to the appropriate audiences.

In addition to being included as a chapter of the main review authors PhD thesis, a paper will be submitted to a journal in this field. Furthermore, the findings from this review will be presented at relevant conferences.

126 Do you intend to publish the review on completion?

Yes

127 36 128 Keywords

129 Give words or phrases that best describe the review. (One word per box, create a new box for each term)

130 37 131 Details of any existing review of the same topic by the same authors

132 Give details of earlier versions of the systematic review if an update of an existing review is being registered, including full bibliographic reference if possible.

133 38 134 Current review status

135 Review status should be updated when the review is completed and when it is published.

Ongoing

136 39 137 Any additional information

138 Provide any further information the review team consider relevant to the registration of the review.

139 40 140 Details of final report/publication(s)

141 This field should be left empty until details of the completed review are available.
Give the full citation for the final report or publication of the systematic review.

142 Give the URL where available.

Appendix 2

CASP Checklist: 11 questions to help you make sense of a Randomised Controlled Trial

How to use this appraisal tool: Three broad issues need to be considered when appraising a trial:

- Are the results of the study valid? (Section A)
- What are the results? (Section B)
- Will the results help locally? (Section C)

The 11 questions on the following pages are designed to help you think about these issues systematically. The first three questions are screening questions and can be answered quickly. If the answer to both is "yes", it is worth proceeding with the remaining questions. There is some degree of overlap between the questions, you are asked to record a "yes", "no" or "can't tell" to most of the questions. A number of italicised prompts are given after each question. These are designed to remind you why the question is important. Record your reasons for your answers in the spaces provided.

About: These checklists were designed to be used as educational pedagogic tools, as part of a workshop setting, therefore we do not suggest a scoring system. The core CASP checklists (randomised controlled trial & systematic review) were based on JAMA 'Users' guides to the medical literature 1994 (adapted from Guyatt GH, Sackett DL, and Cook DJ), and piloted with health care practitioners.

For each new checklist, a group of experts were assembled to develop and pilot the checklist and the workshop format with which it would be used. Over the years overall adjustments have been made to the format, but a recent survey of checklist users reiterated that the basic format continues to be useful and appropriate.

Referencing: we recommend using the Harvard style citation, i.e.: *Critical Appraisal Skills Programme (2018). CASP (insert name of checklist i.e. Randomised Controlled Trial) Checklist. [online] Available at: URL. Accessed: Date Accessed.*

CASP
Critical Appraisal
Skills Programme

Paper for appraisal and reference:...

Section A: Are the results of the trial valid?

1. Did the trial address a clearly focused issue?

Yes

Can't Tell

No

HINT: An issue can be 'focused' In terms of
- the population studied
- the intervention given
- the comparator given
- the outcomes considered

Comments:

2. Was the assignment of patients to treatments randomised?

Yes

Can't Tell

No

HINT: Consider
- how this was carried out
- was the allocation sequence concealed from researchers and patients

Comments:

3. Were all of the patients who entered the trial properly accounted for at its conclusion?

Yes

Can't Tell

No

HINT: Consider
- was the trial stopped early
- were patients analysed in the groups to which they were randomised

Comments:

Is it worth continuing?

4. Were patients, health workers and study personnel 'blind' to treatment?

Yes ☐

Can't Tell ☐

No ☐

Comments:

5. Were the groups similar at the start of the trial

Yes ☐

Can't Tell ☐

No ☐

HINT: Consider
• other factors that might affect the outcome, such as; age, sex, social class

Comments:

6. Aside from the experimental intervention, were the groups treated equally?

Yes ☐

Can't Tell ☐

No ☐

Comments:

Section B: What are the results?

7. How large was the treatment effect?

HINT: Consider
• what outcomes were measured
• Is the primary outcome clearly specified
• what results were found for each outcome

Comments:

8. How precise was the estimate of the treatment effect?

HINT: Consider
- what are the confidence limits

Comments:

Section C: Will the results help locally?

9. Can the results be applied to the local population, or in your context?

Yes ☐
Can't Tell ☐
No ☐

HINT: Consider whether
- the patients covered by the trial are similar enough to the patients to whom you will apply this
- how they differ

Comments:

10. Were all clinically important outcomes considered?

Yes ☐
Can't Tell ☐
No ☐

HINT: Consider whether
- there is other information you would like to have seen
- if not, does this affect the decision

Comments:

CASP
Critical Appraisal
Skills Programme

11. Are the benefits worth the harms and costs?

Yes ☐
Can't Tell ☐
No ☐

HINT: Consider
- even if this is not addressed by the trial, what do you think?

Comments:

Appendix 3

CASP
Critical Appraisal
Skills Programme

CASP Checklist: 10 questions to help you make sense of a **Qualitative** research

How to use this appraisal tool: Three broad issues need to be considered when appraising a qualitative study:

- Are the results of the study valid? (Section A)
- What are the results? (Section B)
- Will the results help locally? (Section C)

The 10 questions on the following pages are designed to help you think about these issues systematically. The first two questions are screening questions and can be answered quickly. If the answer to both is "yes", it is worth proceeding with the remaining questions. There is some degree of overlap between the questions, you are asked to record a "yes", "no" or "can't tell" to most of the questions. A number of italicised prompts are given after each question. These are designed to remind you why the question is important. Record your reasons for your answers in the spaces provided.

About: These checklists were designed to be used as educational pedagogic tools, as part of a workshop setting, therefore we do not suggest a scoring system. The core CASP checklists (randomised controlled trial & systematic review) were based on JAMA 'Users' guides to the medical literature 1994 (adapted from Guyatt GH, Sackett DL, and Cook DJ), and piloted with health care practitioners.

For each new checklist, a group of experts were assembled to develop and pilot the checklist and the workshop format with which it would be used. Over the years overall adjustments have been made to the format, but a recent survey of checklist users reiterated that the basic format continues to be useful and appropriate.

Referencing: we recommend using the Harvard style citation, i.e.: *Critical Appraisal Skills Programme (2018). CASP (insert name of checklist i.e. Qualitative) Checklist. [online] Available at: URL. Accessed: Date Accessed.*

CASP
Critical Appraisal
Skills Programme

Paper for appraisal and reference: ....

Section A: Are the results valid?

1. Was there a clear statement of the aims of the research?

Yes ☐
Can't Tell ☐
No ☐

HINT: Consider
• what was the goal of the research
• why it was thought important
• its relevance

Comments:

2. Is a qualitative methodology appropriate?

Yes ☐
Can't Tell ☐
No ☐

HINT: Consider
• If the research seeks to interpret or illuminate the actions and/or subjective experiences of research participants
• Is qualitative research the right methodology for addressing the research goal

Comments:

Is it worth continuing?

3. Was the research design appropriate to address the aims of the research?

Yes ☐
Can't Tell ☐
No ☐

HINT: Consider
• if the researcher has justified the research design (e.g. have they discussed how they decided which method to use)

Comments:

CASP
Critical Appraisal
Skills Programme

4. Was the recruitment strategy appropriate to the aims of the research?

Yes ☐
Can't Tell ☐
No ☐

HINT: Consider
- If the researcher has explained how the participants were selected
- If they explained why the participants they selected were the most appropriate to provide access to the type of knowledge sought by the study
- If there are any discussions around recruitment (e.g. why some people chose not to take part)

Comments:

5. Was the data collected in a way that addressed the research issue?

Yes ☐
Can't Tell ☐
No ☐

HINT: Consider
- If the setting for the data collection was justified
- If it is clear how data were collected (e.g. focus group, semi-structured interview etc.)
- If the researcher has justified the methods chosen
- If the researcher has made the methods explicit (e.g. for interview method, is there an indication of how interviews are conducted, or did they use a topic guide)
- If methods were modified during the study. If so, has the researcher explained how and why
- If the form of data is clear (e.g. tape recordings, video material, notes etc.)
- If the researcher has discussed saturation of data

Comments:

6. Has the relationship between researcher and participants been adequately considered?

Yes ☐
Can't Tell ☐
No ☐

HINT: Consider
- If the researcher critically examined their own role, potential bias and influence during (a) formulation of the research questions (b) data collection, including sample recruitment and choice of location
- How the researcher responded to events during the study and whether they considered the implications of any changes in the research design

Comments:

Section B: What are the results?

7. Have ethical issues been taken into consideration?

Yes ☐
Can't Tell ☐
No ☐

HINT: Consider
- If there are sufficient details of how the research was explained to participants for the reader to assess whether ethical standards were maintained
- If the researcher has discussed issues raised by the study (e.g. issues around informed consent or confidentiality or how they have handled the effects of the study on the participants during and after the study)
- If approval has been sought from the ethics committee

Comments:

8. Was the data analysis sufficiently rigorous?

Yes ☐
Can't Tell ☐
No ☐

HINT: Consider
- If there is an in-depth description of the analysis process
- If thematic analysis is used. If so, is it clear how the categories/themes were derived from the data
- Whether the researcher explains how the data presented were selected from the original sample to demonstrate the analysis process
- If sufficient data are presented to support the findings
- To what extent contradictory data are taken into account
- Whether the researcher critically examined their own role, potential bias and influence during analysis and selection of data for presentation

Comments:

9. Is there a clear statement of findings?

Yes ☐
Can't Tell ☐
No ☐

HINT: Consider whether
- If the findings are explicit
- If there is adequate discussion of the evidence both for and against the researcher's arguments
- If the researcher has discussed the credibility of their findings (e.g. triangulation, respondent validation, more than one analyst)
- If the findings are discussed in relation to the original research question

Comments:

Section C: Will the results help locally?

10. How valuable is the research?	HINT: Consider
	• If the researcher discusses the contribution the study makes to existing knowledge or understanding (e.g. do they consider the findings in relation to current practice or policy, or relevant research-based literature
	• If they identify new areas where research is necessary
	• If the researchers have discussed whether or how the findings can be transferred to other populations or considered other ways the research may be used

Comments:

Appendix 4

Development of a weight management intervention using social support and digital technology for individuals with bipolar disorder

University of Glasgow

CHIEF SCIENTIST OFFICE

MRC Medical Research Council

Social Networking

Participant ID:

V1.0 11/10/16

Who in your social network do you have the most contact with?

INSTRUCTIONS

On the blank page opposite, draw out your social network using the following steps. Draw the first 5 – 10 people who come to mind. Don't worry if you can't think of any more. Think about your friends, family, work colleagues or other people.

1. Draw a **square for males** and a **circle for females**, and write the person's initials inside the shape.

2. Add their age decade (20's, 30's, 40's and so on) next to the square or circle.

3. Who knows each other well enough to have a conversation? For example, if A and B met in the street, would they recognise each other and start a short conversation? Draw lines between their circles and squares to connect them.

4. Which of them would you say has a healthy lifestyle, and which an unhealthy one? Outline each shape in **red for unhealthy**, or **green for healthy**. **If it's neither or you don't know, don't outline them**.

5. What are the positive and negative influences in your network? So if you were trying to make a healthy lifestyle change, who would support you and who would make it hard for you? Use **+** for positive and **–** for negative.

6. Who are you closest to? Who you confide in the most? Give them a star ★

Who in your social network do you have regular contact with?

INSTRUCTIONS

Over the next five pages, write the initials of each person in the white box at the top of each page. This is to help you complete the survey. We will not be able to identify the people from this information.

Don't worry if you can't think of five people – consider friends, family work colleagues or others.

Person 1

Are they male or female?

Male	☐
Female	☐
Transgender	☐
Other	☐

How old are they?

Under 20	☐
20 - 40	☐
41 - 60	☐
61 +	☐

How do you know them?

Spouse	☐
Family	☐
Friend	☐
Neighbour	☐
Workmate	☐
Other	☐

How often are you in contact with them? (phone, email or face to face)

Daily	☐
At least once a week	☐
At least once a month	☐
Less than once a month	☐

How far do they live from your home?

We live together	☐
Less than a mile	☐
Less than 10 miles	☐
10 – 50 miles	☐
More than 50 miles	☐

Do they eat healthily?

Never	☐
Sometimes	☐
Usually	☐
Always	☐
Don't know	☐

Are they physically active?

Never	☐
Sometimes	☐
Usually	☐
Always	☐
Don't know	☐

Are they trying to lose weight?

Yes	☐
No	☐
Don't know	☐

Would they support you if you were trying to lose weight, up your physical activity or eat more healthily?

Yes	☐
No	☐
Don't know	☐

Have they ever had a mental health condition like anxiety, depression, bipolar, schizophrenia?

Yes	☐
No	☐
Don't know	☐

3

Person 2

Are they male or female?

- Male ☐
- Female ☐
- Transgender ☐
- Other ☐

How old are they?

- Under 20 ☐
- 20 - 40 ☐
- 41 - 60 ☐
- 61 + ☐

How do you know them?

- Spouse ☐
- Family ☐
- Friend ☐
- Neighbour ☐
- Workmate ☐
- Other ☐

How often are you in contact with them? (phone, email or face to face)

- Daily ☐
- At least once a week ☐
- At least once a month ☐
- Less than once a month ☐

How far do they live from your home?

- We live together ☐
- Less than a mile ☐
- Less than 10 miles ☐
- 10 – 50 miles ☐
- More than 50 miles ☐

Do they eat healthily?

- Never ☐
- Sometimes ☐
- Usually ☐
- Always ☐
- Don't know ☐

Are they physically active?

- Never ☐
- Sometimes ☐
- Usually ☐
- Always ☐
- Don't know ☐

Are they trying to lose weight?

- Yes ☐
- No ☐
- Don't know ☐

Would they support you if you were trying to lose weight, up your physical

- Yes ☐
- No ☐
- Don't know ☐

Have they ever had a mental health condition like anxiety, depression, bipolar, schizophrenia?

- Yes ☐
- No ☐
- Don't know ☐

activity or eat more healthily? ☐

☐

Person 3

Are they male or female?	Male ☐ Female ☐ Transgender ☐ Other ☐	**How old are they?**	Under 20 ☐ 20 - 40 ☐ 41 - 60 ☐ 61 + ☐
How do you know them?	Spouse ☐ Family ☐ Friend ☐ Neighbour ☐ Workmate ☐ Other ☐	**How often are you in contact with them? (phone, email or face to face)**	Daily ☐ At least once a week ☐ At least once a month ☐ Less than once a month ☐
How far do they live from your home?	We live together ☐ Less than a mile ☐ Less than 10 miles ☐ 10 – 50 miles ☐ More than 50 miles ☐	**Do they eat healthily?**	Never ☐ Sometimes ☐ Usually ☐ Always ☐ Don't know ☐
Are they physically active?	Never ☐ Sometimes ☐ Usually ☐ Always ☐ Don't know ☐	**Are they trying to lose weight?**	Yes ☐ No ☐ Don't know ☐
	Yes ☐		Yes ☐

| Would they support you if you were trying to lose weight, up your physical activity or eat more healthily? | No | ☐ | Have they ever had a mental health condition like anxiety, depression, bipolar, schizophrenia? | No | ☐ |
| | Don't know | ☐ | | Don't know | ☐ |

Person 4

☐

Are they male or female?	Male	☐	How old are they?	Under 20	☐
	Female	☐		20 - 40	☐
	Transgender	☐		41 - 60	☐
	Other	☐		61 +	☐

How do you know them?	Spouse	☐	How often are you in contact with them? (phone, email or face to face)	Daily	☐
	Family	☐		At least once a week	☐
	Friend	☐		At least once a month	☐
	Neighbour	☐		Less than once a month	☐
	Workmate	☐			
	Other	☐			

How far do they live from your home?	We live together	☐	Do they eat healthily?	Never	☐
	Less than a mile	☐		Sometimes	☐
	Less than 10 miles	☐		Usually	☐
	10 – 50 miles	☐		Always	☐
	More than 50 miles	☐		Don't know	☐

Are they physically active?	Never	☐	Are they trying to lose weight?	Yes	☐
	Sometimes	☐		No	☐
	Usually	☐		Don't know	☐
	Always	☐			
	Don't know	☐			

Social Network Analysis v1.0 11.10.16

Would they support you if you were trying to lose weight, up your physical activity or eat more healthily?	Yes	
	No	
	Don't know	

Have they ever had a mental health condition like anxiety, depression, bipolar, schizophrenia?	Yes	
	No	
	Don't know	

Person 5

Are they male or female?	Male	
	Female	
	Transgender	
	Other	

How old are they?	Under 20	
	20 - 40	
	41 - 60	
	61 +	

How do you know them?	Spouse	
	Family	
	Friend	
	Neighbour	
	Workmate	
	Other	

How often are you in contact with them? (phone, email or face to face)	Daily	
	At least once a week	
	At least once a month	
	Less than once a month	

How far do they live from your home?	We live together	
	Less than a mile	
	Less than 10 miles	
	10 – 50 miles	
	More than 50 miles	

Do they eat healthily?	Never	
	Sometimes	
	Usually	
	Always	
	Don't know	

Are they physically active?	Never	
	Sometimes	
	Usually	
	Always	

Are they trying to lose weight?	Yes	
	No	
	Don't know	

Social Network Analysis v1.0 11.10.16

	Don't know	

Would they support you if you were trying to lose weight, up your physical activity or eat more healthily?	Yes	
	No	
	Don't know	

Have they ever had a mental health condition like anxiety, depression, bipolar, schizophrenia?	Yes	
	No	
	Don't know	

Do each of your social support identified above know each other?

	Person 1	Person 2	Person 3	Person 4	Person 5
Person 1					
Person 2					
Person 3					
Person 4					
Person 5					

Appendix 5

MRC/CSO Social and Public Health Sciences Unit Study Protocol Template and Guidance

V1.1 10.01.17

This document should be used for all studies that do not include a trial. If the study is a trial then the "Trial Protocol" document should be used.

This document is a SPHSU study protocol template. It is provided to SPHSU Staff/collaborators for developing SPHSU-led study protocols. Instructions/guidance is highlighted in *italics* and can be deleted from the completed protocol. Sections should not be deleted if not applicable. Instead, a statement recording that the section is not applicable should be used.

Template authorised by:

Name: Laurence Moore   Role: Director, SPHSU

Signature: Date: 18 June 2015

Project: **The development of a weight management intervention using social support and digital technology for individuals with bipolar disorder.**

STUDY PROTOCOL

V1.1

Start date: September 2015

End date: September 2018

Duration: 36 months

Purpose The purpose of the Protocol is to describe the study/project and provide information about the procedures for entering participants into the study/project. Every care has been taken in drafting this protocol; however, corrections or amendments may be necessary.

This protocol has been authorised by:

12

Sharon Simpson   PhD supervisor

Name   **Role**   **Signature**   **Date**

Name   **Role:**   **Signature**   **Date**

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1.   Summary

Background

A high proportion (approximately 68%) of people who are in treatment for bipolar disorder are obese or overweight. There are few trials testing interventions to reduce obesity in this population through lifestyle interventions tackling healthy eating and physical activity. Trials that have been completed to date have methodological limitations. There are also no trials testing interventions which aim to impact on long term maintenance of behaviour change associated with weight loss and there are very few qualitative studies exploring weight related issues and challenges for this group.

Aims

The study aims are:

1. to complete a systematic review to investigate available interventions for weight management in individuals with bipolar disorder and to explore the theoretical basis of these interventions.
2. to systematically review the qualitative evidence with regard to the experience of bipolar patients around weight issues and weight management and the challenges they face.
3. to explore in the systematic review and qualitative interviews the weight management experiences of people with bipolar disorder and the barriers and facilitators to change in this population, as well as the influence of family, friends and health professionals.
4. to explore the social networks of people with bipolar disorder to try to understand how these could be mobilised to help them in their weight management attempts.
5. to use information from the above to develop initial ideas for a theory based intervention to support weight related behaviour change for people with bipolar disorder.

Design

The study will be completed in three stages. Stage 1 will consist of a systematic review of the research evidence on weight loss interventions for people who have bipolar disorder and barriers and facilitators to behaviour change around weight management. This will be a mixed methods review exploring quantitative as well as qualitative studies. In stage 2, interviews will be conducted with people with bipolar disorder, their families and clinicians involved in their care. These interviews will explore issues around weight management, diet and physical activity in this population as well as barriers and facilitators to change. In this stage we will also collect social network data to explore the nature of social networks in this group and the potential for intervening via social networks. In stage 3, a theory-based intervention will be developed using the evidence from the systematic review, the qualitative results from the interviews, as well as the social network data. Initial ideas are that the intervention might include social support or social network elements and be delivered in part via the web or an app. This will be explored in relation to findings from stages 1 and 2.

Analysis: All qualitative data will be analysed using a thematic approach supported by NVIVO. Social network data will be analysed using descriptive statistics and qualitative approaches.

Population and recruitment: The population of interest are adults aged 18 or over, who have a diagnosis of bipolar disorder and whose BMI is 25 or over. However, for the qualitative interviews, we will attempt to recruit those of healthy weight to try and gain insights into what might be different about these individuals and their circumstances compared to those who are overweight or obese. The participants will be recruited from Bipolar Scotland, a voluntary organisation which supports people with bipolar disorder, from the NHS via Community Mental Health Teams and via advertising. For the qualitative work we will also interview family or friends (aged 18+) and clinicians who are caring for people with bipolar disorder including nurses; psychologists and psychiatrists. We will recruit these via the Bipolar Scotland groups and through NHS contacts as well as advertising. All

participants will be fully consented before taking part in the study.

Outcomes

Stage 1:

At the end of stage 1, a research paper describing the review will be produced that will detail the quantity and quality of previous intervention studies, as well as the content and theoretical basis of successful and unsuccessful interventions. It is unlikely we will be able to complete a meta-analyses due to study heterogeneity. However, the review will also include qualitative evidence on experiences, barriers, and facilitators to weight management in this population. Insights from this review will influence subsequent stages of the study.

Stage 2:

In this stage, key outcomes will be qualitative evidence on experiences of weight management, barriers, and facilitators to changing behaviours in relation to weight loss, physical activity and diet in this population. Insights on the social networks of people with bipolar disorder will also be an output at this stage.

Stage 3:

At the end of stages 1 and 2 we will have gathered useful data with regards to people diagnosed with bipolar disorder and weight, physical activity and diet. This evidence will be used to develop initial ideas for an intervention and logic model.

Duration

The study will last 36 months

2. Introduction

2.1 Background

Bipolar disorder is a severe mood disorder characterised by episodes of both major depression and mania/hypomania (hypomania is a less severe form of mania).(178) Traditionally, clinical services have tended to view mental health and physical health as separate. However, there is a growing trend within both research and clinical practice that physical health and mental health are strongly inter-related.(3) Studies are now assessing the complex relationship between mental health and physical health conditions across a range of settings and patient groups.

Individuals with bipolar disorder are more likely to present with cardiometabolic disease, including obesity, hypertension, diabetes, high cholesterol, and heart disease. (4) The number of deaths due to CVD in individuals with bipolar disorder is twice as high as the general population.(4) Presenting with any of the above conditions can ultimately have a high financial cost on long term health care over and above bipolar disorder care.(21) A key point is that the likelihood of these conditions developing can be reduced by weight loss. Even when these conditions are ongoing, the risk can be reduced by increasing physical activity, improving diet and losing weight.(22)

There is a high prevalence of obesity and overweight in individuals with bipolar disorder. Fagiolini et al(179) stated that approximately 68% of people who are in treatment for bipolar disorder are obese or overweight. This is slightly higher than the general population. Results from the Health Survey for England (2014) showed that 61.7% of general population adults were overweight or obese.(180) People with bipolar disorder have often been excluded from weight loss or weight management interventions being tested in randomised controlled trials.

It is important to identify an intervention that could improve the lifestyle and weight management for people with bipolar disorder. There is a growing body of research focusing on interventions for obesity in people with serious mental illness, including schizophrenia and bipolar disorder. In general, the physical health needs of individuals with bipolar disorder are less well documented than in schizophrenia but are likely to be substantial. There have also been fewer interventions targeting bipolar individuals. We will therefore focus our work on bipolar disorder because this is currently an area of unmet clinical need, although our findings are likely to have some future application to individuals with more broadly defined severe mental illness.

In order to develop effective interventions, the relationship between obesity and bipolar disorder must be understood. The development of obesity in people with bipolar disorder is multifactorial. Contributory factors include medication, sleeping patterns, eating disorders, managing symptoms, lifestyle, physical activity, genetics, unhealthy diet including high carbohydrate consumption.(181) All of these overlapping factors need to be taken into consideration when developing an intervention.

To date there are many studies testing weight management interventions for the general population. These tend to have serious mental illness as an exclusion criteria. There are very few trials tackling obesity with lifestyle interventions in individuals with serious mental health problems. There are even fewer trials focussing specifically on bipolar disorder. Existing trials often have methodological issues including lack of consistency about how to measure weight change, small sample size, and brief duration of follow-up. To date, no trial has looked at long term maintenance of weight loss. There are also few qualitative studies exploring weight management and maintenance for individuals with bipolar disorder.

Existing Research

The following section will focus on the results of existing research from both trials and qualitative studies.

Randomised controlled trials (RCTs)

In this section RCTs which tested lifestyle interventions with the aim of weight management will be discussed. In order to gain a better understanding of the current interventions that have been trialled, RCTs in populations with serious mental illness will be discussed and also RCTs focussing specifically on populations with bipolar disorder. RCTs testing intervention for serious mental illness, in some cases, do include people with a diagnosis of bipolar disorder.

Daumit et al (182) conducted a randomised controlled trial testing behavioural weight-loss interventions for people with serious mental illness. Their study included people with bipolar disorder, along with schizophrenia and major depression. This trial supported a behavioural intervention for weight loss. At 18 months post intervention the mean between-group difference in weight (change in intervention group minus change in control group was -3.2kg (-7.0 lb, P= 0.002)(182). Casagrande et al(183) conducted an RCT testing a weight-loss intervention for the general population adapted for people with a serious mental illness. The authors did not state if people with bipolar

disorder were included or not or indeed what serious mental health condition the participants had. The study found that adapting a weight loss intervention from the general population did benefit people with serious mental illness as the participants lost weight. They argued that adaptation of the intervention was required due to the high prevalence of cognitive deficits within a population with serious mental illness.(183)

Ventriglio et al investigated improvements in metabolic abnormalities for people with schizophrenia and bipolar disorder using a psycho-education program.(184) There were no improvements in BMI for the intervention group relative to the control group. However the study did find that intervention group had improved metabolic biomarkers such as pulse rate and several measures of lipid concentrations,(184) suggesting that although there were no benefits from the intervention in terms of BMI, there were benefits for participants' overall health.

Bartels et al [185]conducted research looking at the "In SHAPE" intervention for people with serious mental illness. This research included people with serious mental illness; 60 of the 210 participants had bipolar disorder (the second largest group). The program ran for 12 months and included membership in a public fitness club and weekly meetings with a health promotion coach. The control group only attended the fitness club. The aim of the study was to improve both weight loss and cardiorespiratory fitness. They found that at 12 months the intervention group had a greater weight reduction and improved fitness compared to the control group (F= 4.9, df1,185, p=0.029) and this was maintained at 18 months. (185)

Richardson et al (186) tested a lifestyle intervention aiming to increase physical activity for people with serious mental illness. This study included people with bipolar disorder, schizophrenia and major depression. The outcomes were assessed at baseline, 6 weeks and 18 weeks. Thirty nine participants started the intervention and only 12 participants finished the intervention. The authors found that for those participants who attended the final follow-up session, an average weight loss of 5 pounds over the intervention. Retention within the intervention was a problem. The authors (186) suggested that future interventions should incorporate approaches to minimise dropout.

The research described above included people with serious mental illness including bipolar disorder. However, some RCTs specifically tested interventions for people with bipolar

disorder. Frank et al (53) conducted research looking at Integrated Risk Reduction Intervention (IRRI) for treating obesity in bipolar disorder. This intervention was compared to routine psychiatric care with medical monitoring. Those in the IRRI group had a greater decrease in BMI (d = -0.51, 95% confidence interval: -0.91 to -0.14) compared to the routine psychiatric care and medical monitoring.

Gillhoff et al(187) investigated the impact of a multimodal lifestyle intervention on BMI for patients with bipolar disorder and found that having a lifestyle intervention did not affect cardiovascular and metabolic parameters. However, they did find that BMI for females decreased with the lifestyle intervention compared to males (p= 0.003). (187)

Recently there has been a move towards 'mHealth' and 'eHealth' approaches. (188) These are interventions that use mobile technology (mHealth) and web based technology (eHealth) to either deliver treatment or supplement treatment. Potential advantages are that this new technology could increase adherence, reach large numbers of people and increase accessibility while reducing costs. EHealth and mHealth has been shown to have potential for delivering interventions to people with serious mental illness (including bipolar disorder). According to Naslund et al (189) eHealth and mHealth interventions are useful in the following areas for people with serious mental illness: relapse prevention and illness self-management; promoting health and wellness; delivery of psychoeducation, supporting recovery and promoting health; and wellness and symptom monitoring.

Qualitative research

Qualitative research will also be explored in the present study as it can offer important insights into the barriers and facilitators to lifestyle behaviour change for this population. Also since qualitative interviews are often conducted to assess the feasibility and acceptability of an intervention, the qualitative studies will provide useful insights with regards to intervention development.

There is a lack of qualitative research exploring issues related to obesity in people with serious mental illness. There are also few studies investigating the barriers and facilitators to changing obesity related lifestyle behaviours. There are none solely focussing on people with bipolar disorder, so this section will discuss studies that include participants with a range of serious mental illnesses. Qualitative work related to using technology and peer support will also be reviewed.

Aschbrenner et al(190) conducted interviews and focus groups with 30 participants who had a serious mental illness and were also taking part in a healthy lifestyle intervention. The authors (190) identified that emotional, practical and mutual support from family and social support had an important impact on facilitating behaviour change. The authors also concluded that there is a need to consider the role of family and social contacts as health supporters who can encourage health behaviours for people with serious mental illness.

Yarborough et al [109] conducted interviews and focus groups with 84 participants (41% had a diagnosis of schizophrenia or schizoaffective disorder, 20% had a diagnosis of bipolar disorder, 37% affective psychosis and 2% PTSD). Yarborough et al (109) identified that the barriers to behaviour change for these participants were similar to the general population. The participants identified that lack of support from significant others, the lure of unhealthy foods and poor weather impeding exercise were factors associated with physical health and diet(109). Further to the factors that were the same as the general population, there were specific factors associated with their mental health illness. The participants identified that the effects of psychiatric symptoms or consequences of the symptoms on ability to make and sustain lifestyle changes. Participants also reported that they preferred ongoing, group-based support assisted with motivation and sustaining behaviour change.(109)

McKibbin, Kitchen, Wykes and Lee (191) conducted 5 focus groups with community mental health professionals. The focus of these groups was about obesity management for adults with serious mental illness. The community mental health professionals reported that they would like a collaborative relationship with other health promotion program staff. Again similar to Yarborough et al(109) the participants in McKibbin et al(191) research believe that a frequent group based health promotion would be beneficial. However the health professionals in McKibbin et al (191) research suggested the health promotion should include incentives.

Todd et al (192) conducted focus groups to investigate what people with bipolar disorder are looking for from web-based interventions. The findings from this study indicated that the participants wanted to gain awareness of mood swings as well as information about managing them, the importance of practical and interpersonal issues with regards to mood swings, professional and peer support to assist with overcoming low motivation and procrastination difficulties. Participants with bipolar disorder in this study (192) reported that the internet is

the preferred format to receive treatment. The internet is freely accessible, instant and interactive.

Nicholas et al (193) also conducted qualitative interviews about an online psychoeducational program. People with bipolar disorder tended to drop out of the treatment due to difficulties associated with the phase of their bipolar disorder, not wanting to think about their illness, feeling that the information was too general and feeling that it the program was not tailored to their bipolar disorder.

Peer support can be an additional way to provide help to someone with bipolar disorder. Proudfoot et al (194) identified from participants in interviews and focus groups that using informed supporters as part of an intervention resulted in numerous benefits for people newly-diagnosed with bipolar disorder. The supporters provided practical strategies for illness management as well as emotional support throughout the intervention. Supporters also act as a role model for treatment adherence. The supporters reported positive impacts of this role, they felt a greater connectedness with the mental health system as well as having a broader knowledge of illness management strategies. (194)

Limitations of current studies

There are a number of limitations of current research exploring lifestyle interventions in bipolar patients. In the case of RCTs, the limitations can primarily be categorised as either related specifically to the intervention itself or the method of evaluating the intervention. The limitations of the interventions will be discussed, followed by the method of evaluation.

One thing that is important for any intervention is the financial cost. For example, Frank et al's (53) intervention requires a life coach to facilitate the IRRI for each patient. Each patient may only have a short contact period with the life coach (this is not clarified in the research paper) but the cost and feasibility of delivering this in a National Health Service (NHS) where resources are limited could be prohibitive.

There is often a financial cost to participants of taking part in the intervention. Casagrande et al (183) identified that eating healthier, lower calorie foods is usually more expensive. This may go some way to explaining the lack of success in interventions comparing serious mental illness with general populations. In many cases people with serious mental illness are unable to work and therefore their income may impact on their ability to consume healthier, lower calorie food. These issues need to be considered when developing an intervention.

Reducing the personal cost could make the intervention more inclusive and result in higher uptake and sustainability.

Furthermore, there is an issue around maintenance of behaviour change. To improve the longevity of the change in behaviour it is likely that ongoing support will be needed until the behaviour is well established. Behaviour change is very individual, so identifying a specific time-frame for developing new habits is difficult.(61) However, ongoing support is expensive and is often not feasible to deliver via the NHS.

Many of the studies to date have methodological issues. BMI as a marker of obesity is a common outcome measure within obesity research. However, there is debate as to whether this is the correct marker for identifying whether someone has reduced their risk of cardiovascular complications, hypertension, high cholesterol and diabetes.(179) There are also inconsistencies with regard to how successful interventions are at reducing BMI.(184, 185) Another issue is the BMI cut-off for inclusion, i.e., whether to include obese and or 'overweight'. Frank et al included people who had a BMI equal or greater than 25, i.e the overweight category, as well as obese category.(53) It is possible that people who are classified as overweight will respond differently to those who are obese. Despite controversy there are benefits to using BMI as the primary outcome. Daniels stated that the benefit of using BMI as an outcome is that it is cost effective, easy to use and an easy to compare approach to assessing obesity.(195) Yet it may not adequately define risk comorbidity. Alternative markers for obesity could include percentage of body fat, fitness level, waist circumference, waist-hip ratio and dietary behaviours.

Over and above the issues regarding using BMI as the primary outcome, the majority of interventions have only included participants in remission, excluding a proportion of people who need support for obesity or obesity prevention. Both quantitative and qualitative studies seem to only include participants who have their bipolar disorder controlled and medication stabilised. However, Frank et al [53]stated that during a depressive state motivation and self-discipline are difficult to achieve, therefore risk factors for obesity may be likely to present themselves during this time. Faurholt-Jepson et al (196) noted that the participants in their study presented with fairly stable mood, possibly skewing results of the study as the ratings focused on mental health variables.

Small sample size is a common methodological issue with previous intervention research in this field, as well as not reporting a sample size calculation. The majority of the studies

to date consist of relatively small numbers of participants 17-66.(183, 184, 196) One of the largest RCT's had only 122 participants. (53)

A number of the studies also tend to have insufficient duration of intervention and short-term follow up. A number of studies had 3-6 month follow-up and in some cases there was no follow up post treatment.(184, 196) It is impossible to determine whether intervention effects would last beyond these relatively brief time-frames. Maintenance of behaviour change is key if there is to be an impact on health outcomes and if interventions are to prove cost-effective.

Within the qualitative studies, the participants may not represent a broad spectrum of people with bipolar disorder. Finally, a limitation of the RCTs is that participants are often not asked if they are taking part in additional interventions. Therefore, it is possible that participants are not all having exactly the same intervention.

Summary

Although there is an increase in RCTs testing interventions to address obesity in serious mental illness, there is a lack of high quality research looking specifically at bipolar disorder. Furthermore, there is a lack of qualitative research looking at the challenges and barriers to lifestyle change and the experiences of obesity management for people with serious mental illness, including bipolar disorder, which is needed in order to understand how to intervene effectively with this population.

2.2   Rationale and Aim

As noted above, individuals with bipolar disorder have higher rates of obesity than the general population, are more likely to present with metabolic syndrome (associated with the development of diabetes and CVD) and twice as likely to die due to CVD. Improvements are needed in addressing this health inequality. Very few interventions have been developed for people with bipolar disorder who are obese or overweight and only a small number of studies have explored their experiences of weight management, diet and physical activity in order to inform intervention development.

The issues identified above **of high cost of delivering one-to-one interventions, maintenance of behaviour change and ongoing support** could potentially be addressed by interventions using smartphones and engaging social support and social networks. These have shown promise with other clinical populations.(59) Social support has been identified as

important for facilitating the initiation and maintenance of behaviour change(61) and promoting improved health behaviours.(60)

There is evidence that interventions delivered via new technologies have the potential to engage difficult-to-reach groups.(59) Growing evidence suggests that technology can be effective in promoting behaviour change. However, interventions have often been simplistic, lacking strong evidence and underpinning theory of behaviour change. There is a need to improve knowledge of how ehealth or mhealth interventions might facilitate behaviour change effectively. So while this approach has shown some promise, more work is needed.

The proposed study aims to investigate evidence from RCTs testing interventions for weight management (diet and physical activity) for individuals with bipolar disorder, as well as seek insights from qualitative work with a particular focus on social support, social networks and new technology. This will inform the development of a lifestyle intervention for people with bipolar disorder. The proposed study will also seek to enhance our understanding of the positive role of social support in helping individuals make and maintain changes.

2.3   Objectives and Research Questions

Overall research aim:

Understanding the evidence and gaining perspective by reviewing the research and collecting data to inform a weight management intervention for people with bipolar disorder.

Overall research objectives for the thesis are:

- To systematically review the research evidence and (1) to develop an understanding of the effectiveness of different lifestyle interventions for obese adults with bipolar disorder (or Serious Mental Illness) (2) to conduct a theoretical review to identify the most effective intervention elements using qualitative and quantitative findings and (3) to review the qualitative evidence with regard to the experience of bipolar patients around weight issues and weight management and the challenges they face. For all of these there will be a particular focus on social support, social networks and new technologies.

- To develop an understanding of the context, experience, barriers, and facilitators to weight management and lifestyle change for adults with bipolar disorder by

interviewing adults suffering with bipolar disorder, their families and clinicians.

- To explore the nature of the participant's ego network (people who support and influence them). The ego network is a subset of the person's larger social network. Qualitative and quantitative data will be used to try to understand how an individual's social network might be mobilised to help them in their weight management attempts.

- To use the qualitative data, social network data and evidence from the systematic review and theoretical review, to aid in the development of initial ideas for an intervention and a logic model.

2.3.1 Research Questions
Stage 1- Systematic Review

To explore:

- What are the effects of lifestyle interventions for the support of weight loss or weight maintenance in adults with bipolar disorder?
- What are the effects of lifestyle interventions for increasing physical activity and improving diet in adults with bipolar disorder?
- What theories and behaviour change techniques have been used in the interventions tested in RCTs?
- What behaviour change techniques appear to be the most effective in this group?
- What are the experiences of adults with bipolar disorder in relation to lifestyle changes for weight management (including weight loss and weight maintenance)?
- What are the barriers and facilitators to behaviour change?
- Is there any evidence that social network/social support or technology based interventions may be helpful for weight related behaviour changes in this group?

Stage 2- Qualitative Research

- What are the experiences of adults with bipolar disorder in relation to weight management and making lifestyle changes (diet and physical activity)?

- What are the barriers and facilitators to behaviour change in relation to weight loss, weight maintenance, increased physical activity and a healthy diet?
- What previous behaviour change techniques have been used to lose weight, increase physical activity or eat more healthily?
- What type of interventions might help with weight management particularly in relation to physical activity or healthy eating?
- What is the nature of participant's ego network?
- What social support is provided by friends and family in relation to healthy eating, physical activity and weight loss?
- What is the service provider's opinion of NHS support available for healthy eating, physical activity, and weight management?
- What is the service provider's opinion of additional support that would benefit people with bipolar disorder in relation to healthy eating, physical activity, and weight management?

Stage 3 – Intervention development

- What should be included in an intervention which supports people with bipolar disorder to change behaviour with regards to diet, physical activity and weight?
- What are the potential mechanisms supporting behaviour change within the developed logic model?

3   Study Design/Methods

3.1   Study Design

The proposed study has 3 stages: a systematic review (stage 1), qualitative interviews including social network analysis (stage 2) and intervention development including the development of a logic model (stage 3).

Stage 1 will consist of systematic review of randomised controlled trials (RCT's) investigating lifestyle (diet and physical activity) interventions for the management of obesity in people with bipolar disorder. The systematic review will also include qualitative studies exploring weight management in this population.

In stage 2, up to 35 participants will be recruited. There will be 3 participant groups. One group will include individuals who have a diagnosis of bipolar disorder. This group will take part in

qualitative interviews and the social network analysis. The second group will be friends and family that support people with bipolar disorder, and a final group will be clinicians that work with people who have bipolar disorder. Both of these groups will take part in qualitative interviews.

Stage 3 will consist of the initial development of the intervention ideas and logic model.

3.2 Setting

Participants will be recruited through Bipolar Scotland (a charity organisation), alternative local support groups, NHS Greater Glasgow and Clyde via clinicians, advertising, as well as social and community groups.

3.3 Participant Selection

Stage 1

This is a systematic review; therefore, no participants are required.

Stage 2

Group 1: Adults with bipolar disorder:

Up to 20 participants will be recruited for the interviews. Participants will have a diagnosis of bipolar disorder, it does not matter how long they have had their diagnosis. Participants will be selected to ensure a spread of gender, socio-economic status and age. We will also recruit those of both overweight/obese and healthy weight. This will allow us to explore potential differences in lifestyle, circumstances etc comparing those who are overweight/obese and healthy.

Group 2: Friends and family:

Up to 10 participants who are family or friends who support (not necessarily carers) people with bipolar disorder will be recruited. The person that they support does not need to be taking part in the study.

Group 3: Clinicians:

We will recruit 5 clinicians that work closely with people who have bipolar disorder. These may include community psychiatric nurses (CPN's), psychologists, occupational therapists and psychiatrists.

Participants will be excluded if they have dementia or poor competence in English as they will be unable to comply with the study informed consent process. Unfortunately we do not have the resources to provide translation services. Participants will also be excluded if they are currently experiencing an episode of depression, hypomania or mania. Given that people with bipolar disorder may find it difficult to engage with assessments when experiencing an acute episode of depression, hypomania or mania, we will only include participants with bipolar disorder who are not currently experiencing a clinically significant episode of mood disturbance. Participants will only be identified by the NHS staff if they are currently not experiencing any mood disturbances. Participants who are recruited from Bipolar Scotland or via the adverts will be able to assess themselves for mood disturbances and know if they are able to take part in the study. All participants recruited will be adults (18 years and older).

Stage 3- The development of the intervention and logic model does not require participants.

3.4   Recruitment

Participants for group 1 will be identified via: Bipolar Scotland (charity with local support groups); alternative local support groups; and NHS Greater Glasgow and Clyde. Further recruitment will be from advertising, social groups, and community groups. In order to recruit participants from all socio-economic groups we will target areas with different levels of social deprivation.

Firstly, participants will be recruited from Bipolar Scotland and other local support groups. The organisation staff will be contacted via email or telephone by the researcher. The staff will be asked if the researcher can attend the support sessions/groups to recruit potential participants. The participants at the support sessions/groups will be provided with an information sheet (Participant with bipolar disorder information sheet v1.1_10.01.17), along with an advert (advertisement v1.0_11.10.16) to get in contact with the researcher if they would like more information about taking part. Participants will have plenty of time to discuss taking part with their family and friends because the onus will be on them to contact the researcher if they want to take part.

Secondly, participants will be recruited from Community Mental Health Teams (CMHTs) in NHS Greater Glasgow and Clyde. CMHTs staff (including PhD supervisor) will identify potentially eligible participants from their caseload. On behalf of the research team, the staff will send an information sheet

(Participant with bipolar disorder information sheet v1.1_10.01.17) about the study, along with an advert (Advertisement v1.0_11.10.16) to contact the researcher if they would like more information about taking part.

If potential participants respond to the advert (Advertisement v1.0_11.10.16), asked if they are interested in taking part. Information sheets (Participant with bipolar disorder information sheet v1.1_10.01.17) can be sent out again if needed.

Participants for group 2 are friends and family who support someone with bipolar disorder. In many cases people who provide support attend support groups to gain more knowledge and understanding of the person they know with bipolar disorder. Therefore, participants for group 2 will also be identified via Bipolar Scotland (charity with local support groups) and alternative local support groups. Additionally, we will utilise advertising and local social and community groups will be contacted. In order to recruit participants from all socio-economic groups we will target areas with different levels of social deprivation.

As above, the Bipolar Scotland staff will be contacted via email or telephone by the researcher. The staff will be asked if the researcher can attend the support sessions/groups to recruit potential participants. The participants of the support sessions/groups will be provided with an information sheet (friends and family information sheet v1.1_10.01.17), along with an advert (advertisement v1.0_11.10.16) to get in contact with the researcher if they would like more information about taking part. They will have plenty of time to discuss taking part with their family and friends because the onus will be on them to contact the researcher if they want to take part.

All participants who contact the research team expressing an interest will be asked for their contact details. The researcher will then contact them to discuss the study further and answer any questions. Then the researcher will arrange to meet them in person to obtain informed consent for taking part (participants with bipolar disorder consent form v1.1 10.01.17 and friends and family consent form v1.1_10.01.17). The meeting venue could include the participant's home (SPHSU policies for lone working will be followed), the University, or a community venue.

Participants for group 3 are clinicians that work closely with people with bipolar disorder. These participants will be recruited through our contacts within the NHS. The contacts

will identify potential staff who may be interested in taking part in the research. The researcher will then contact them and provide them with an information sheet describing the study(Clinician information sheet v1.1_10.01.17). The participants will be called after a few days to see if they would be interested in taking part and to answer any questions they may have. At this point an interview date would be arranged and full informed consent would be taken prior to the interview (Clinician consent form V1.1 10.01.17).

Due to resource constraints, and participant's preferences, some interviews may take place via telephone. These participants will be consented via post, whereby an information sheet and consent form will be sent out for completion by the participant and when returned to the researcher, she will contact them to arrange an interview time and answer any questions they may have.

3.5   Withdrawal

Participants have the right to withdraw consent at any time during the study. When participants withdraw or decline from taking part in the study this will have no impact on the NHS care they receive.

3.6   Study Procedures

The proposed study has 3 stages: systematic review (stage 1); qualitative interviews with social network analysis (stage 2); and intervention development and logic model (stage 3).

Stage 1 Systematic Review

The systematic review will be conducted over 12 months at the beginning of the study. This will consist of a comprehensive critical and theoretical review of interventions for weight management for people who have bipolar disorder. The review will evaluate both qualitative and quantitative studies (specifically, randomised controlled trials) that focus on lifestyle interventions for obesity, physical activity, and diet for people with bipolar disorder.

The systematic review will search five databases: EMBASE, Medline, CINAHL, Web of Science and PsycINFO.

The following PICOS framework will be employed:

Table: PICOS framework

Population	Adults with bipolar disorder
Intervention	Lifestyle intervention (including diet, physical activity)

Comparison	No intervention or minimal intervention (for example a leaflet)
Outcomes	Physical activity, diet, weight related outcomes (including weight, BMI, waist-hip, waist circumference
Study design	RCT's, and qualitative

Types of participants
For the purpose of this review, adults (18 years and older) who have bipolar disorder will be included. Further exclusion criteria are identified below.

Types of interventions
The review will include lifestyle interventions that promote weight management via physical activity and/or healthy eating.

Types of Interventions excluded
Studies that will be excluded from the review will be those that target medication, smoking, alcohol or drug use unless such studies have considered diet, and/or physical activity related outcomes.

Types of outcome measures
Outcome measures will be those that are related to the prevention and control of obesity, these are outcomes that directly indicate change or alteration in factors leading to obesity

Primary outcomes will include: 1) measures of obesity such as waist-hip ratio, body mass index (BMI), weight change, weight gain, weight loss and waist circumference; 2) measures of diet such as food diaries, food preferences and food habits and 3) measures of physical activity such as walking, exercise and fitness.

The secondary outcomes will include 1) changes in knowledge regarding obesity, diet and physical activity, 2) changes in expressed motivation to modify weight, diet or physical activity, and 3) reported adverse outcomes/ harms and unintended consequences of the intervention.

All identified RCTs will be assessed using Michie et al [197] Theoretical Domains Framework and Behaviour Change Wheel to explore the theoretical basis and behaviour change techniques used in the intervention.

Stage 2 Interviews
The interviews will be conducted after completion of the systematic review. These interviews will take place in

university buildings, people's homes or in appropriate community settings. Interviews will be mostly face to face following the consent process outlined above. However due to resource constraints, and participant's preferences, some interviews may take place via telephone.

Approximately 35 participants will be recruited for stage 2. Each participant will be contacted to identify a suitable time to meet with the researcher for one to one interviews or by telephone. Each participant will be given a consent form and an information sheet that details what the research is about. They will then be given the opportunity to ask questions about the study before agreeing to take part. They may decline at any point.

Group 1 participants will have a diagnosis of bipolar disorder. Up to 20 participants, will be asked to take part in one to one interviews in order to discuss their experiences of weight management and maintenance, how their bipolar disorder impacts their experiences, and the barriers to lifestyle change (Participants with bipolar disorder interview schedule v1.0_11.10.16).

Once they have completed their interview participants will then be asked to complete an ego network diagram known as a sociogram, to map out their social network and also a questionnaire about their social network (SNA v1.0_11.10.16). They will also be asked to identify if individuals in their social network know each other. This process will also be audio recorded.

At the end of the interviews the participants will be asked to complete a brief demographic questionnaire (Participants with bipolar disorder demographic questionnaire version 1.0_11.10.16) then they will be thanked for taking part and given a voucher to for their time. For those who have had the interview via the phone they will have a voucher posted to them.

For Group 2, up to ten participants will be recruited as family and friends of people who have bipolar disorder. Each of these participants will be asked to take part in a short one to one interview with the researcher where they will discuss the experiences of the person they know with bipolar disorder around the topic of weight management, lifestyle issues and behaviour change. These interviews may also be conducted via the telephone if required. At the end of the interviews participants will be asked to complete a brief demographic questionnaire (Friends and family demographic questionnaire

v1.0_11.10.16).They will be thanked for their time and be given or sent a voucher.

Finally with regards to Group 3, 5 clinicians who care for people with bipolar disorder will be recruited. The researcher will meet them on a one-to-one basis at a suitable venue or the interviews may be conducted by telephone. In the interview (Clinician interview schedule v1.0_11.10.16) they will be asked what current advice or services are available to people with bipolar disorder around lifestyle issues. They will also be asked for their views of the barriers to change and ideas for things that could help people with bipolar disorder make healthy lifestyle changes. At the end of the interview participants will be asked to complete a demographic questionnaire (Clinician demographic questionnaire v1.0_11.10.16).

Stage 3 Development of Intervention
This stage of the study will utilise findings from the systematic review, insights related to the health behaviour change techniques and theories, as well qualitative findings and the social network data to inform the development of initial ideas for an intervention that will meet the identified needs of people with bipolar disorder.

For the formal development of the intervention, the Six Steps for Quality Intervention Development (6SQuID) method will be employed (98) identifying needs, targets and processes for change. The development of the intervention follows the MRC guidance for the development of complex interventions in health.

3.7   Data Collection
The researcher will collect all the data. For stage 2 the data will be collected face to face at a location of the participant's choice. In some cases, if face-to-face interviews are not possible (or are not preferred) then telephone interviews will be used. Qualitative and quantitative data will be collected. This will consist of one-to-one interviews, social network questionnaire and sociogram (SNA booklet v1.0_11.10.16) and demographic questionnaire (Participant with bipolar disorder demographic questionnaire v1.0_11.10.16, Friends and family demographic questionnaire v1.0_11.10.16, and clinician demographic questionnaire v1.0_11.10.16).

The interview topics for the 3 participant groups for stage 2 (Interview schedule for participants with bipolar disorder v1.0_11.10.16, Interview schedule for friends and family v1.0_11.10.16, and Interview schedule for clinicians v1.0_11.10.16) Further to this the social network analysis questionnaire (SNA booklet v1.0_11.10.16)

3.8   Data Analysis

Data obtained in the systematic review will be analysed narratively as it is unlikely that there will be enough studies for a meta-analysis and those studies that exist are likely to be very heterogeneous. Therefore, a narrative review will be completed summarising the evidence from RCTs, and qualitative studies.

Qualitative data collected in stages 2 and 3. The interviews will be semi-structured therefore the emergent themes are likely to be on areas of interest to the study but this method also allows for unexpected themes to emerge and to be added to the coding framework.

All interviews and focus groups will be audio recorded and transcribed for analysis. The transcriptions will be checked and will be analysed using thematic analysis supported by NVivo software. Thematic analysis is a method of identifying, analysing and reporting patterns (known as themes) within data(142). Not only does the thematic approach organise and describes the data in detail thematic analysis also interprets various aspects of the research topic and examines the relationship between the themes.

The process outlined by Braun and Clark(142) will be adhered to for this study, following each of the stages that they describe. They outlined thematic analysis as having 5 themes: (1) familiarisation, (2) initial coding, (3) creation of themes, (4) reviewing themes and (5) defining and naming themes.

Data collection and analysis of interview data will be conducted simultaneously and the analyses will inform data collection in terms of changes to the interview schedule, for example adding new questions to probe particular areas of interest.

The analysis will help to identify issues that are challenging for people with bipolar disorder in terms of healthy eating, physical activity and weight loss. The social network analysis will consist of qualitative ego-network analysis and descriptive statistics. The conversations taking place while participants complete the sociogram will be analysed using thematic analysis. Identifying common themes with regards to the support that their social network provides.

 References

4.   Research Governance and Regulatory Issues
4.1   Ethical issues

Research Ethics Committee: *NHS West of Scotland Research Ethics Committees*

Research Ethics Committee Reference: *Awaited*

The study will be submitted to the NHS West of Scotland research ethics committee for review due to both patients and staff being recruited through the NHS.

Consent will be sought for participation in the qualitative elements of stage 2 of the study. All participants in the study will receive an information sheet (Participants with bipolar disorder information sheet v1.1_10.01.17, Friends and family information sheet v1.1_10.01.17, and Clinician information sheet v1.1 10.01.17) on the study and will give full informed consent before taking part. The study is low risk for participants. Withdrawal from the study will have no detrimental effect on current or future health care or employment.

The research team will preserve the confidentiality of participants in accordance with the Data Protection Act 1998. All participants will be allocated a unique identifier and data collected will be held in linked anonymised form. Identifiable information will be stored separately from clinical data.

Access to all data will be restricted to the research team and representatives of the study Sponsor, NHS GG&C, may also access data for audit purposes. . Individual's names will be replaced with pseudonyms in interview transcripts. Digital recordings of interviews will be stored securely, and will be held separately from transcripts and information on participant identities. In reporting the results of the interviews, care will be taken to use quotations which do not reveal the identity of respondents. All data collected as part of the project will be treated as confidential and will only be viewed by members of the research team and representatives of the study Sponsor, HNS GG&C; anonymised data will be used wherever possible. All procedures for data storage, processing and management will comply with the Data Protection Act 1998.

The main circumstances under which the researchers would break confidentiality are where participants were at risk of serious harm or they were at risk of harming others. This would be most likely to occur as a result of a disclosure during an interview which raised serious concerns regarding individuals' wellbeing. All participants will be informed that if they disclose information about neglect, abuse, serious suicidal thoughts or self-harm that we will pass this information on to an appropriate authority. Consent for this will be sought prior

to the collection of any data. A standard operating procedure to deal with this will be developed and followed.

NHS Greater Glasgow and Clyde will provide indemnity and compensation in the event of a claim by, or on behalf of participants, for negligent harm as a result of the management of the research. Indemnity will be provided by the NHS scheme, CNORIS, since NSH GG&C are the Sponsor. Protocol authors with NHS substantive contracts are indemnified by CNORIS. Protocol authors employed by GU indemnified by GU Clinical Trials Insurance policy. Both CNORIS and GU clinical trials insurance will apply to cover recruitment from both NHS and non-NHS sites.

4.2 Data Monitoring
The PI will provide overall supervision and advice for the study. The study will use standardised research protocols and adherence will be monitored by the supervisory team. Representatives of the study Sponsor, NHS GG&C, may audit the research study.

4.3 Data Management
A data management plan has been developed for the study.

4.4 Data Storage and Retention
The University of Glasgow Research Governance Framework Regulations for clinical research stipulates that all data will be kept for 10 years. The data from this study will be stored confidentially on password protected servers maintained on the University of Glasgow network and any data repositories required by the Medical Research Council.

5 Project Management
The primary supervisor will have overall responsibility for the conduct of the study. The PhD Researcher will complete the day-to-day management of the study and will be supported and mentored by the primary supervisor. The study will be project managed by the PhD student and the supervisory team who will meet at least monthly.

The supervision team will assist the PhD Researcher by providing specialist advice, input and comments on the study procedures and documents (information sheets, protocol etc). The team will also advise on the recruitment procedures, data collection and provide expertise if any issues arise.

The Study Team consists of the following members:

Name	Division/Organisation
Professor Sharon Simpson	SPHSU, University of Glasgow
Professor Daniel Smith	Institute of Health and Wellbeing, University of Glasgow
Miss Natalie Chalmers	SPHSU, University of Glasgow

Minutes of meetings will be taken on the CoSS supervision record template and a Decision Log will be created and maintained by the PhD student.

5.1   Advisory Group / Steering Committee
N/A

6.   Dissemination
6.1   Publication Policy
The publication policy will be drafted and approved by the study team. The policy will: state principles for publication; describe a process for developing knowledge exchange and public engagement; and contain specific details and a timeline of intended dissemination.

6.2   Public Engagement and Knowledge Exchange
For the purpose of this study there will be a number of planned public engagement and knowledge exchange activities. The study will be of interest to both clinicians and researchers. It is anticipated that the study will be presented at the UK Society for Behavioural Medicine conference and at appropriate mental health conferences.

The study results will be presented to Bipolar Scotland and to NHS Scotland. This will be achieved by attending support group sessions, conferences and workshops.

Journal articles will be submitted for publication. An extensive list of specific journals has not been fully identified. However journals such as Journal of Clinical Psychiatry or Bipolar Disorder will be considered.

7.   Project Milestones / Timelines

The following sets out the key project milestones points when key decisions must be taken:

Gantt Chart v1.0_11.10.16

8.   Project Risk Assessment

The risks relevant to the project are recorded in the study risk assessment form and contained in the initial Project Risk/Issue log stored   T:\projects\phd_nchalmers\Study protocol

The Risk Log will be regularly reviewed and updated at by the study team.

Appendix 6

Do you have bipolar disorder or know someone with bipolar disorder?

Would you like to help with a new study?

We are looking for people to take part in an interview about lifestyle issues, like to hear from people (adults 18 plus) who:

- have a diagnosis of bipolar disorder, or

- support someone with bipolar disorder, such as family and friends

If you would like to find out more about our study, please contact Natalie Chalmers on **0141 353 7645** or email **n.chalmers.1@research.gla.ac.uk**

(Any personal details you give us will be kept strictly confidential.)

MRC/CSO Social and Public Health Sciences Unit, University of Glasgow

University of Glasgow   CHIEF SCIENTIST OFFICE   MRC | Medical Research Council   NHS Greater Glasgow and Clyde

The University of Glasgow, charity number SC004401   v.10, 11.10.18
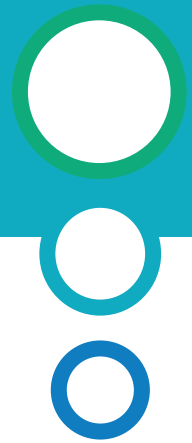
29

Participant Information Sheet

V1.1 10/01/17

What is this study for?

This study will develop an intervention that aims to help people with bipolar disorder manage their weight by helping them eat more healthily or do more physical activity. We will explore the potential of social support and digital technology to help with this. This is a study that is part of an educational qualification, a PhD (doctor of Philosophy degree).

We want to recruit people to the study who have a diagnosis of bipolar disorder. We would like to explore what things help and support people with bipolar disorder to eat more healthily and do more physical activity as well as manage their weight. We will also ask about the issues that people with bipolar disorder face trying to change their behaviour. We will use the information we collect to develop a new intervention. Taking part in this study does not include access to the intervention.

Who is organising and funding the study?

This study is being organised by the Social and Public Health Sciences Unit at the University of Glasgow and sponsored by NHS Greater Glasgow and Clyde. The research is being paid for by the Medical Research Council.

Invitation

We would like to invite you to help with this study by taking part in an interview with one of our researchers.

Before you decide if you would like to take part, you should understand why the research is being done and what it would involve for you.

Please take time to read this information carefully and to decide if you want to take part or not.

Talk to others about the study if you wish, such as your GP, or members of your family or friends.

Please ask if anything is not clear or if you would like more information. Take time to decide whether you wish to take part.

Why have I been invited?

We have invited you to take part because you have a diagnosis of bipolar disorder, and you are aged 18 years or older.

Do I have to take part?

No, it is up to you whether you choose to take part or not.

If you are interested in taking part, a researcher will meet with you. They will give you more information and answer any questions that you have about the study.

If you decide that you would like to take part after this, we will ask you to read and sign a consent form to show you have agreed to take part.

If you decide that you don't want to take part you can leave at any time without giving a reason, even after you have signed the consent form. Your usual NHS care will not be affected if you do this.

What will happen if I agree to take part?

If you agree to take part we will contact you and arrange to meet you at a time and place that suits you.

The meeting will last about 60 minutes.

You will be asked to take part in an interview, complete a short questionnaire about the people who support you (your social network) and complete a short questionnaire about you. The interview will consist of questions about your experiences of physical activity and healthy eating and weight loss or weight gain. The questionnaire about your social network will ask you about the people that help and support you and the sort of things they do to help.

If you agree, we would like to make a sound recording of the interview so that we don't miss anything you say. After the interview the recording will be typed up so that we can look at what you said in more detail and compare it to what others have said.

Could there be any benefits to taking part?

Although taking part is unlikely to offer you significant benefits, you will have the opportunity to share with the researcher issues that you

think are important in relation to healthy eating, physical activity and weight. In the longer term the information you give us will help to inform the development of an intervention, which may help people with bipolar disorder to eat more healthily, do more physical activity and lose weight.

Could there be any disadvantages or risks if I take part?

The only disadvantage to taking part is that we ask you to give about 60 minutes of your time.

It's also possible that some people may find it upsetting to talk about their experiences.

What will happen to my information?

Any information which is collected about you during the course of this study will be seen by a team of researchers at the University of Glasgow. There are two types of information we will collect:

Study data

This is anonymous information that we collect from everyone who takes part in the study. It does not

Personal information

This is information that we use to identify each individual who takes

Study data will be kept separate from personal information, and both will be stored securely at the University.

Once transcribed the recordings will be deleted from the digital audio device and stored on the secure network which can be accessed only by the study team.

We will only use your personal information to get in touch with you about taking part in the study, such as arranging an interview or sending you a voucher to compensate you for taking part in the study.

The only people who will be able to see your personal information are members of the research team and officials from research regulators who may want access to the information to check the quality of the research. Members of the research team and the regulators must comply with the Data Protection Act 1998 by keeping your information confidential and secure.

When we no longer need to keep your personal information it will be destroyed.

Study data will be kept securely for up to 10 years in line with University of Glasgow policies.

We will only share information about you with to anyone outside the study if we have concerns about your or anyone else's safety.

If you agree, we would like to share your study data (but not your personal information) with other researchers by storing it with the UK Data Archive, where it could be used by other scientists and researchers to help answer future research questions. The UK Data Archive must also comply with the Data Protection Act 1998.

You do not have to agree to us sharing your data to be able to take part in the study.

What will happen to the results of the research study?

The research results will be included in a PhD thesis written by Natalie Chalmers, a research student at the University of Glasgow. A summary will be published on the University's website. The results of the study will also be published in scientific journals and presented at scientific meetings and conferences.

We may include direct quotes from your interview but your personal information will not be included in any report, publication or presentation, and no one will be able to identify you.

If you would like us to send you a copy of the research results please get in touch with Natalie Chalmers using the contact details at the end of this leaflet.

Who has reviewed the study?

All research studies are looked at by a Research Ethics Committee, which is an independent group of people who monitor the safety, rights, wellbeing and dignity of people who take part in research. This study has been reviewed by the NHS Research Ethics Committee for the West of Scotland.

Expenses and payments

We cannot pay you directly for taking part in the interview, but afterwards we will send you a £10 high street shopping voucher to thank you for your help.

What if I don't want to carry on with the study?

You can withdraw from the study at any time without giving a reason. If you withdraw at any time, or decide not to take part, we will use the data collected up to that point (unless you ask us not to) but we will not collect any more data.

What if there is a problem?

If you have a concern about any aspect of this study, you can speak to the research team at the University of Glasgow using the contact details at the end of this leaflet. They will do their best to answer your questions.

If you are still not happy and wish to complain formally, please contact NHS Greater Glasgow and Clyde:

Email: complaints@ggc.scot.nhs.uk

Or

Tel: 0141 201 4500 (during office hours 9.00am to 5.00pm)

Contact for further information

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Glasgow G12 0XH

Tel: 0141 211 3935

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Thank you for reading this leaflet and taking an interest in our study.

Appendix 8

Participant Consent Form v1.1 10/01/17

Study title: Development of a weight management intervention using social support and digital technology for individuals with bipolar disorder

Name of researcher: Natalie Chalmers

Participant ID:

Please initial the boxes if you agree

1 I confirm that I have read and understood the Participant Information Sheet v1.1 dated 10.01.17.

2 I have had time to think about the study and ask questions about it, and I am happy with the answers that I have been given.

3 I understand that I do not need to take part in the study and that I can leave at any time without giving a reason. I understand that my usual NHS care will not be affected if I do this.

4 I understand that my words may be quoted in reports and articles that are published about the study, but without using my name or anything else that would tell people who I am.

5 I understand that any information I give to the researchers about myself will only be used for this study. The information will be seen by research staff from the University of Glasgow, by regulatory authorities who supervise the study, and by the NHS Board. It will be stored securely at the University of Glasgow.

6 I understand that other genuine researchers will have access to this data, only if they agree to preserve the confidentiality of the information as requested in this form.

7 I understand that other genuine researchers may use my words in publications, reports, web pages and other research outputs, only if they agree to preserve the confidentiality of the information as requested in this form.

8 I agree to a sound recording being made of my interview.

9 I agree to take part in the study.

Participant name	Date	Signature

Researcher name	Date	Signature

ParticipantConsent Formv11 100117

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Appendix 9

Development of a weight management
intervention using social support and digital
technology for individuals with bipolar disorder

University of Glasgow · CHIEF SCIENTIST OFFICE · MRC Medical Research Council

Clinician
Information Sheet

V1.1 10/01/17

NHS
Greater Glasgow
and Clyde

What is this study for?

This study will develop an intervention that aims to help people manage their weight by developing goals around eating more healthily or doing more physical activity. We will explore the potential of social support and digital technology to help with this. This is a study that is part of an educational qualification, a PhD (doctor of Philosophy degree).

We want to recruit people to the study who work closely with people who have bipolar disorder. We would like to explore what help and support people with bipolar disorder receive on the topics of healthy eating and physical activity as well as their weight in order to inform the development of a new intervention. Taking part in this study does not include access to the intervention

Who is organising and funding the study?

This study is being organised by the Social and Public Health Sciences Unit at the University of Glasgow and sponsored by NHS Greater Glasgow and Clyde. The research is being paid for by the Medical Research Council.

Invitation

We would like to invite you to help with this study by taking part in an interview with one of our researchers.

Before you decide if you would like to take part, you should understand why the research is being done and what it would involve for you.

Please take time to read this information carefully and to decide if you want to take part or not.

Talk to others about the study if you wish, such as your GP, or members of your family or friends.

Please ask if anything is not clear or if you would like more information.

Why have I been invited?

We have invited you to take part because you work with people who have a diagnosis of bipolar disorder, and you are aged 18 years or older. Job roles include psychologists, psychiatrists, nurses, doctors and occupational therapists

Do I have to take part?

No, it is up to you whether you choose to take part or not.

If you are interested in taking part, a researcher will meet with you. They will give you more information and answer any questions that you have about the study.

If you decide that you would like to take part after this, we will ask you to read and sign a consent form to show you have agreed to take part.

If you decide that you don't want to take part you can leave at any time without giving a reason, even after you have signed the consent form. Your employment will not be affected.

What will happen if I agree to take part?

If you agree to take part we will contact you and arrange to meet you at a time and place that suits you.

The meeting will last about 45 minutes.

You will have an opportunity to tell us about the support that people with bipolar disorder receive in terms of eating and physical activity as well as weight management and any other issues you think are important related to the lifestyle of your patients.

If you agree, we would like to make a sound recording of the interview so that we don't miss anything you say. After the interview the recording will be typed up so that we can look at what you said in more detail and compare it to what others have said.

Could there be any benefits to taking part?

You will have the opportunity to share with the researcher issues that you think are important for this group. In the longer term the information you give us will help to inform the development of an intervention which may help people with bipolar disorder to eat more healthily, do more physical activity and lose weight.

Could there be any disadvantages or risks if I take part?

The only disadvantage to taking part is that we ask you to give about 45 minutes of your time.

What will happen to my information?

Any information which is collected about you during the course of this study will be seen by a team of researchers at

the University of Glasgow. There are two types of information we will collect:

Study data

This is anonymous information that we collect from everyone who takes part in the study. It does not include any details which would tell us who gave us the information.

Personal information

This is information that we use to identify each individual who takes part in the study. It includes your name and address or other contact details.

Study data will be kept separate from personal information, and both will be stored securely at the University. We will only share information about you with anyone outside the study if we have concerns about your or anyone else's safety.

Once transcribed the recordings will be deleted from the digital audio device and stored on the secure network which can be accessed only by the study team.

We will only use your personal information to get in touch with you about taking part in the study, such as arranging an interview.

The only people who will be able to see your personal information are members of the research team and officials from research regulators who may want access to the information to check the quality of the research. Members of the research team and the regulators must comply with the Data Protection Act 1998 by keeping your information confidential and secure.

When we no longer need to keep your personal information it will be destroyed.

Study data will be kept securely for up to 10 years in line with University of Glasgow policies.

We will only pass information about you to anyone outside the study if we have concerns about your or anyone else's safety.

If you agree, we would like to share your study data (but not your personal information) with other researchers by storing it with the UK Data Archive, where it could be used by other scientists and researchers to help answer future research questions. The UK Data Archive must also comply with the Data Protection Act 1998.

You do not have to agree to us sharing your data to be able to take part in the study.

What will happen to the results of the research study?

The research results will be included in a PhD thesis written by Natalie Chalmers, a research student at the University of Glasgow. A summary will be published on the University's website. The results of the study will also be published in scientific journals and presented at scientific meetings and conferences.

We may include direct quotes from your interview but your personal information will not be included in any report, publication or presentation, and no one will be able to identify you.

If you would like us to send you a copy of the research results please get in touch with Natalie Chalmers using the contact details at the end of this leaflet.

Who has reviewed the study?

This study has been reviewed by the NHS Research Ethics Committee for the West of Scotland.

What if I don't want to carry on with the study?

You can withdraw from the study at any time without giving a reason. If you withdraw at any time, or decide not to take part, we will use the data collected up to that point (unless you ask us not to) but we will not collect any more data.

What if there is a problem?

If you have a concern about any aspect of this study, you can speak to the research team at the University of Glasgow using the contact details at the end of this leaflet. They will do their best to answer your questions.

If you are still not happy and wish to complain formally, please contact NHS Greater Glasgow and Clyde:

Email: complaints@ggc.scot.nhs.uk

Or

Tel: 0141 201 4500 (during office hours 9.00am to 5.00pm)

Contact for further information

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Glasgow G12 0XH

Tel: 0141 211 3935

Email: Daniel.smith@glasow.ac.uk

Thank you for reading this leaflet
and taking an interest in our study.

Appendix 10

Clinician Consent Form v1.1 10/01/17

Study title: Development of a weight management intervention using social support and digital technology for individuals with bipolar disorder

Name of researcher: Natalie Chalmers

Participant ID:

Please initial the boxes if you agree

1   I confirm that I have read and understood the Clinician Information Sheet v1.1 dated 10.01.17

2   I have had time to think about the study and ask questions about it, and I am happy with the answers that I have been given.

3   I understand that I do not need to take part in the study and that I can leave at any time without giving a reason. I understand that my usual NHS role will not be affected if I do this.

4   I understand that my words may be quoted in reports and articles that are published about the study, but without using my name or anything else that would tell people who I am.

5   I understand that any information I give to the researchers about myself will only be used for this study. The information will be seen by research staff from the University of Glasgow, by regulatory authorities who supervise the study, and by the NHS Board. It will be stored securely at the University of Glasgow.

6   I understand that other genuine researchers will have access to this data, only if they agree to preserve the confidentiality of the information as requested in this form.

7   I understand that other genuine researchers may use my words in publications, reports, web pages and other research outputs, only if they agree to preserve the confidentiality of the information as requested in this form.

8   I agree to a sound recording being made of my interview.

9   I agree to take part in the study.

_____	_____	_____
Participant name	**Date**	**Signature**
_____	_____	_____
Researcher name	**Date**	**Signature**

Appendix 11

Development of a weight management
intervention using social support and digital
technology for individuals with bipolar disorder

University of Glasgow   CHIEF SCIENTIST OFFICE   MRC Medical Research Council

Friends and Family Information Sheet

V1.1 10/01/17

What is this study for?

This study will develop an intervention that aims to help people with bipolar disorder manage their weight by helping them eat more healthily or do more physical activity. We will explore the potential of social support and digital technology to help with this. This is a study that is part of an educational qualification, a PhD (doctor of Philosophy degree).

We want to recruit people to the study who support someone with a diagnosis of bipolar disorder. We would like to explore what things help and support people with bipolar disorder to eat more healthily and do more physical activity as well as manage their weight. We will also ask about the issues that people with bipolar disorder face trying to change their behaviour. We will use the information we collect to develop a new intervention. Taking part in this study does not include access to the intervention

Who is organising and funding the study?

This study is being organised by the Social and Public Health Sciences Unit at the University of Glasgow and sponsored by NHS Greater Glasgow and Clyde. The research is being paid for by the Medical Research Council

Invitation

We would like to invite you to help with this study by taking part in an interview with one of our researchers.

Before you decide if you would like to take part, you should understand why the research is being done and what it would involve for you.

Please take time to read this information carefully and to decide if you want to take part or not.

Talk to others about the study if you wish, such as your GP, or members of your family or friends.

Please ask if anything is not clear or if you would like more information.

Why have I been invited?

We have invited you to take part because you support someone who has a diagnosis of bipolar disorder, and you are aged 18 years or older.

Do I have to take part?

No, it is up to you whether you choose to take part or not.

If you are interested in taking part, a researcher will meet with you. They will give you more information and answer any questions that you have about the study.

If you decide that you would like to take part after this, we will ask you to read and sign a consent form to show you have agreed to take part.

If you decide that you don't want to take part you can leave at any time without giving a reason, even after you have signed the consent form.

What will happen if I agree to take part?

If you agree to take part we will contact you and arrange to meet you at a time and place that suits you.

The meeting will last about 45 minutes.

You will have an opportunity to tell us about your experiences of supporting your friend or family member with a focus on healthy eating and physical activity, as well as weight management issues and any other issues you think are important related to their lifestyle.

With your permission we will record the interview so that we do not miss what you say. After the interview, the recording will be typed up so that we can explore what you said in more detail and compare it to what others have said.

Could there be any benefits to taking part?

You will have the opportunity to share with the researcher issues that you think are important for your friend or family member with bipolar. In the longer term the information you give us will help to inform the development of an intervention, which may help people with bipolar disorder to eat more healthily, do more physical activity and lose weight.

Could there be any disadvantages or risks if I take part?

The only disadvantage to taking part is that we ask you to give about 45 minutes of your time.

It's also possible that some people may find it upsetting to talk about their experiences of supporting others.

What will happen to my information?

Any information which is collected about you during the course of this study will be seen by a team of researchers at the University of Glasgow. There are two types of information we will collect:

Study data	Personal information
This is anonymous information that we collect from everyone who takes part in the study. It does not include any details which would tell us who gave us the information.	This is information that we use to identify each individual who takes part in the study. It includes your name and address or other contact details.

Study data will be kept separate from personal information, and both will be stored securely at the University.

Once transcribed the recordings will be deleted from the digital audio device and stored on the secure network which can be accessed only by the study team.

We will only use your personal information to get in touch with you about taking part in the study, such as arranging an interview or sending you a high street voucher to compensate you for taking part in the study.

The only people who will be able to see your personal information are members of the research team and officials from research regulators who may want access to the information to check the quality of the research. Members of the research team and the regulators must comply with the Data Protection Act 1998 by keeping your information confidential and secure.

When we no longer need to keep your personal information it will be destroyed.

Study data will be kept securely for up to 10 years in line with University of Glasgow policies.

We will only share information about you with anyone outside the study if we have concerns about your or anyone else's safety.

If you agree, we would like to share your study data (but not your personal information) with other researchers by storing it with the UK Data Archive, where it could be used by other scientists and researchers to help answer future research questions. The UK Data Archive must also comply with the Data Protection Act 1998.

You do not have to agree to us sharing your data to be able to take part in the study.

What will happen to the results of the research study?

The research results will be included in a PhD thesis written by Natalie Chalmers, a research student at the University of Glasgow. A summary will be published on the University's website. The results of the study will also be published in scientific journals and presented at scientific meetings and conferences.

We may include direct quotes from your interview but your personal information will not be included in any report, publication or presentation, and no one will be able to identify you.

If you would like us to send you a copy of the research results please get in touch with Natalie Chalmers using the contact details at the end of this leaflet.

Who has reviewed the study?

All research studies are looked at by a Research Ethics Committee, which is an independent group of people who monitor the safety, rights, wellbeing and dignity of people who take part in research. This study has been reviewed by the NHS Research Ethics Committee for the West of Scotland.

Expenses and payments

We cannot pay you directly for taking part in the interview, but afterwards we will send you a £10 high street shopping voucher to thank you for your help.

What if I don't want to carry on with the study?

You can withdraw from the study at any time without giving a reason. If you withdraw at any time, or decide not to take part, we will use the data collected up to that point (unless you ask us not to) but we will not collect any more data.

What if there is a problem?

If you have a concern about any aspect of this study, you can speak to the research team at the University of Glasgow using the contact details at the end of this leaflet. They will do their best to answer your questions.

If you are still not happy and wish to complain formally, please contact NHS Greater Glasgow and Clyde:

Email: complaints@ggc.scot.nhs.uk

Or

Tel: 0141 201 4500 (during office hours 9.00am to 5.00pm)

Contact for further information

Natalie Chalmers
MRC/CSO SPHSU
200 Renfield Street
Glasgow G2 3AX

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Gartnavel Royal Hospital
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Glasgow G12 0XH

Tel: 0141 211 3935

Email: Daniel.smith@glasow.ac.uk

Thank you for reading this leaflet
and taking an interest in our study.

Appendix 12

Friends and Family Consent Form v1.1 10/01/17

Study title: Development of a weight management intervention using social support and digital technology for individuals with bipolar disorder

Name of researcher: Natalie Chalmers

Participant ID:

Please initial the boxes if you agree

1. I confirm that I have read and understood the Friends and Family Information Sheet v1.1 dated 10.01.17.

2. I have had time to think about the study and ask questions about it, and I am happy with the answers that I have been given.

3. I understand that I do not need to take part in the study and that I can leave at any time without giving a reason. I understand that any involvement with the NHS will not be affected if I do this.

4. I understand that my words may be quoted in reports and articles that are published about the study, but without using my name or anything else that would tell people who I am.

5. I understand that any information I give to the researchers about myself will only be used for this study. The information will be seen by research staff from the University of Glasgow, by regulatory authorities who supervise the study, and by the NHS Board. It will be stored securely at the University of Glasgow.

6. I understand that other genuine researchers will have access to this data, only if they agree to preserve the confidentiality of the information as requested in this form.

7. I understand that other genuine researchers may use my words in publications, reports, web pages and other research outputs, only if they agree to preserve the confidentiality of the information as requested in this form.

8. I agree to a sound recording being made of my interview.

9. I agree to take part in the study.

_____   _____   _____
Participant name   Date   Signature

_____   _____   _____
Researcher name   Date   Signature

Appendix 13

Qualitative research question	Interview question from people with bipolar disorder	Interview questions from friends/family	Interview questions from clinicians
What are the experiences of adults with bipolar disorder in relation to weight management and making lifestyle changes (diet and physical activity)?	Explore what the participant did the previous day with regards to eating and physical activity and whether this was typical	Explore if the person that they participant supports has changed weight (up or down). If so over how long/what time span?	Explore if the participant discusses healthy eating, physical activity or weight issues with their patients with bipolar disorder- how this is received
	Explore whether they have any concerns about their weight	Explore participant's understanding of the reason for the family/friends weight changes	
	Explore any weight fluctuations	Do they think the person they support eats healthily and is physically active	
	Explore if there has been any weight change since being diagnosed with bipolar		
	Explore any changes to physical activity since being diagnosed		
	Explore current activities/level of physical activity (including walking)		
	Explore previous activities/level of activities/has this changed		
	Examine sedentary behaviour. How many hours do they spend sitting on an average day?		
	Explore sleeping behaviours throughout the night and day. Explore if there are problems sleeping		
	Explore ideas about healthy eating		
	Explore any changes to diet since being diagnosed– what/when/quantity; have any of these changes been intentional (specific diet etc)		
	Explore relationship with food (e.g. do they eat when they are down)		
	Explore drinking habits		
	Explore any concerns about their diet		
	If not struggled with their weight: Explain that we know that weight gain often happens in people with Bipolar disorder because of some of the effects of the medication. Given this do they have any insight as to how they have maintained a healthy weight. What do they do? Have they found it challenging?		

What are the barriers and facilitators to behaviour change in relation to weight loss, weight maintenance, increased physical activity and a healthy diet?	Explore whether they have any current physical activity goals	Does the person they support experience challenges with maintaining a healthy weight or with weight loss?	Explore participants views of barriers/facilitators to changing lifestyle behaviour for people with bipolar disorder (about diet, physical activity and weight)
	Explore motivation to take part in physical activity	If struggled with weight: explore the participant's knowledge of the family/friend's weight loss attempts. Has the person they support always struggled with their weight. Explore the effect any weight change has had on their friend's/family member's life.	Explore participant's views of the motivation of people with bipolar disorder to change their behaviour (with relation to diet, physical activity and weight)
	Explore barriers/facilitators to physical activity	If not struggled with weight: Explain that we know that weight gain often happens in people with Bipolar disorder because of some of the effects of the medication. Given this do they have any insight as to how the person they support has maintained a healthy weight. What do	
	Explore motivation to eat healthily	Explore what the barriers/facilitators to physical activity that are experienced by the person they support	
	Explore the barriers /facilitators to healthy eating	Explore what the barriers/facilitators to the person they support eat more healthily	
What previous behaviour change techniques have been used to lose weight, increase physical activity or eat more healthily?	Explore any weight loss or weight management techniques they have used in the past or are using now	Do they know if the person they support does much exercise or physical activity including walking?	
	Explore what has been successful and why?	Do they know if the person they support attends any groups for weight or physical activity (such as Weight Watchers or exercise groups)	
	Explore whether they had any previous improvements to levels of physical activity, what were these changes and were they maintained		
	If there were changes, did that have any impact on weight		
	Explore whether they feel that they have been supported by friends/family/work colleagues to assist with healthy eating and physical activity. What was helpful/ unhelpful		

	Explore their own use of any apps on their smartphone/electronic devices (for diet/physical activity/weight loss) What do they like and dislike about them?		
	Explore views of using this type of support (social support) (and the bipolar Scotland groups) to encourage behaviour change		
What type of interventions might help with weight management particularly in relation to physical activity or healthy eating?	Explore participant's ideas about things that could support them or other people with bipolar disorder in improving diet, levels of physical activity or weight loss?	Explore whether participants think there is additional support they could provide (what has previously been helpful/unhelpful)	(see research question below)
	Explore their views of using devices to monitor physical activity/diet/weight loss (app on phone, Fitbit, step counter)	Explore ideas that the participant has that could help the person they supported in terms of weight loss, physical activity or healthy eating?	
	Is there anything family/friends/work colleagues could do to help in the domains of healthy eating/physical activity/weight loss	Explore what they feel the benefits of this might be/are?	
	Explore their views of using support groups such as Bipolar Scotland (particularly in terms of healthy eating, physical activity and diet)	In the participants experience what is their opinion of what does/doesn't work in relation to providing support for physical activity and healthy eating	
	Is there anything family/friends/work colleagues could do to help in the domains of healthy eating/physical activity/weight loss	Explore what they feel the benefits of this might be/are?	
	Explore their views of using support groups such as Bipolar Scotland (particularly in terms of healthy eating, physical activity and diet)	In the participants experience what is their opinion of what does/doesn't work in relation to providing support for physical activity and healthy eating	
	Describe the HMDI study as a model, do they think it will work?	Explore views with regards to the person they support using apps on smart phones or other electronic device to support behaviour change around physical activity/health eating/ weight loss. Do they think it would work?	
		Opinion of the benefit of currently available technology like Fitbit	

		Explore participant's view of the importance of support from peers, family, friends or work colleagues in helping support behaviour change around physical activity/healthy eating/weight loss	
		Explore views of using this type of support (and the Bipolar Scotland groups) to encourage behaviour change	
		Describe the HMDI study as a model, do they think it would work?	
What is the nature of participant's ego network?	(Social Network Analysis Booklet)		
What social support is provided by friends and family in relation to healthy eating, physical activity and weight management?	Explore whether family/friends/colleagues are supportive or participate with them in healthy eating	Explore the last time the participant and the person they support did any exercise together including walking, and was this typical	(see research question below)
	Explore the last time the participant and a family/friend/colleague who supports them ate together, what did they eat and was that typical?	Explore whether the participant and the person they support regularly do any physical activity including walking together	
	Explore whether the participant and a family/friend/colleague who supports them regularly eat together	Explore if the participant discusses physical activity or exercise with the person supported; what discussed/encouragement/improvements	
	Explore importance of support from family/friends/colleagues in making and maintaining healthy lifestyle (particularly in relation to diet/physical activity/weight loss)- what/when/how (verbal, by participating, by facilitating)	Explore the participant's motivation to help the person they support take part in physical activity	

	Explore whether anyone from family/friends/colleagues are supportive or participate with them in physical activities	Explore the last time the participant and the person they support ate together, what did they eat and was that typical?	
	Explore the last time the participant and a family/friend/colleague who supports them did any exercise together including walking, and was this typical	Explore whether the participant and person with bipolar disorder regularly eat together	63
	Explore whether the participant and a family/friend/colleague who supports them regularly do any physical activity including walking together	Explore if the participant discusses healthy eating with the person they support; what discussed/encouraged/improvements	
		Explore the participant's motivation to help the person they support eat more healthily	

What is the service provider's opinion of NHS support available for healthy eating, physical activity, and weight management?			Explore the support provided generally to people with bipolar disorder, focusing on healthy eating, physical activity or weight issues
			Explore how the support is delivered/ provided
			Explore the clinicians view of current services (amount/type) offered to people with bipolar disorder with regards to physical activity, healthy eating and weight issues
			Explore the positive and negative aspects of the services
			Opinion of the benefits of the service
			Opinion of the benefit currently available technology like Fitbit

What is the service provider's opinion of additional support that would benefit people with bipolar disorder in relation to healthy eating, physical activity and weight management?			Explore ideas about what could be provided to people with bipolar disorder to promote physical activity- content/delivery
			Explore ideas about what could be provided to people with bipolar disorder to promote healthy eating and weight management- content/delivery
			Explore the barriers to doing this (promoting health eating and weight management)
			Opinion of potentially using apps on smart phones or other technology to support behaviour change activities in relation to diet, physical activity and weight loss in this group
			Explore the potential of using technology to provide support- independently/combined with face to face or other support
			Explore participant's views about peer/family members providing support (or additional support) o people with bipolar disorder in relation to healthy eating and physical activity and weight management (using the HMDI study as a model and the Bipolar Scotland groups)

Interview Topic Guide
V1.0 11/10/16
Participants with bipolar disorder

Introduction
- Explain the study
- Emphasise no right/wrong answers
- Inform participants it will not impact on the care that they receive
- Ensure informed consent

Weight issues
- Explore what the participant did the previous day with regards to eating and physical activity and whether this was typical
- Explore whether they have any concerns about their weight
- Explore any weight fluctuation and reasons.
- Explore if there has been any weight change since being diagnosed with bipolar disorder?
- Explore any weight loss or weight management techniques they have used in the past or are using now.
- Explore what has been successful and why

Physical activity
- Explore any changes to physical activity since being diagnosed
- Explore current activities/level of physical activity (including walking)
- Explore previous activities/level of activities/ has this changed
- Examine sedentary behaviour. How many hours do they spend sitting on an average day.
- Explore sleeping behaviours through the night and day. Explore if there are problems with sleeping.
- Explore whether they had any previous improvements to levels of physical activity, what were these changes and were they maintained
- If there were changes did that have any impact on weight
- Explore whether they have any current physical activity goals
- Explore motivation to take part in physical activity
- Explore barriers/facilitators to physical activity
- Explore whether anyone from family/friends/colleagues are supportive or participate with them in physical activities

Healthy Eating
- Explore ideas about healthy eating
- Explore any changes to diet since being diagnosed- what/when/quantity; have any of these changes been intentional (specific diet etc.)
- Explore motivation to eat healthily
- Explore relationship with food (eg do they eat when they are down)
- Explore drinking habits
- Explore any concerns about their diet

- Barriers/facilitators to healthy eating
- Explore whether family/friends/colleagues are supportive or participate with them in healthy eating

Support

- Explore participant's ideas about things that could support them or other people with bipolar disorder in improving diet, levels of physical activity or weight loss?
- Explore their views of using devices to monitor physical activity/diet/weight loss (app on phone, Fitbit, step counter)
- Explore their own use of any apps on the smartphone/electronic devices (for diet/physical activity/weight loss). What do they like and dislike about them.
- Explore importance of support from family/friends/colleagues in making and maintaining a healthy lifestyle (particularly in relation to diet/physical activity/weight loss)- what/when/ how (verbal, by participating, by facilitating)
- Is there anything else family/friends could do to help in the domains of healthy eating/physical activity/weight loss
- Explore views of using this type of support (and the Bipolar Scotland groups) to encourage behaviour change
- Describe the HMDI study as a model, do they think it would work.

Closing

- Provide summary of interview discussion
- Is there anything else that the participant wants to add to what has already been discussed
- Ensure interviewee has opportunity to add comments/ ask questions
- Seek feedback on the interview experience

Development of a weight management intervention using social support and digital technology for individuals with bipolar disorder

University *of* Glasgow

CHIEF SCIENTIST OFFICE

MRC | Medical Research Council

Participant

Questionnaire

Participant ID:

V1.0 11/10/16

NHS
Greater Glasgow and Clyde

INSTRUCTION

The purpose of this questionnaire is to provide some basic background information about you. Please answer the following questions. If you are unsure of a question please leave it blank.

1 What age are you?

[   ] years

2 What is your current postcode for your house?

[ ] [ ] [ ] [ ]   [ ] [ ] [ ]

3 What is your gender?

Please tick ONE box

Male [ ] 1

Female [ ] 2

Transgender [ ] 3

Other [ ] 4

4 Do you have a diagnosis of bipolar disorder?

Please tick ONE box

Yes [ ] 1

No [ ] 2

5 If you ticked 'yes' above, how long have you been diagnosed with bipolar disorder?

Please write in

[ ] years [ ] months

6 Please can you tell us your height and weight?

Please write in

Height [ ] cm

Weight [ ] kg

OR

Height [ ] ft [ ] in

Weight [ ] st [ ] lb

Thank you for your help in filling out this questionnaire.

Appendix 16

Interview Topic Guide
V1.0 11/10/16

Participants who are friends and family who support people with bipolar disorder

Introduction
- Explain the study
- Emphasise no right/wrong answers
- Inform participants it will not impact their friend/ family members care
- Ensure informed consent

Relationship
- Explore the relationship with person with bipolar disorder
- Explore amount of contact
- Explore the type of support provided
- Explore the way support is provided
- Explore any concerns that the participant has about the person they support in terms of lifestyle, weight etc

Weight loss
- Explore if the person that the participant supports has changed weight (up or down), if so over how long/ what time span.
- Explore participant's understanding of the reason for the family/friend's weight changes
- Does the person they support experience challenges with maintaining a healthy weight or with weight loss?
- If struggled with weight:
  - Explore participant's knowledge of the family/friend's weight loss attempts. Has the person they support always struggled with their weight
  - Explore the effect any weight change has had on their friend's/family member's life
- If not struggled with weight:
  - Explain that we know that weight gain often happens in people with BP disorder because of some of the effects of the medication. Given this do they have any insights as to how the person they support has maintained a healthy weight. What do they do. Have they found it challenging.

Physical activity
- Do they know if the person they support does much exercise or physical activity including walking
- Explore the last time the participant and the person they support did any exercise together including walking and was this typical
- Explore if the participant discusses physical activity or exercise with the person supported; what discussed/encouragement/improvements
- Explore whether the participant and the person they support regularly do any physical activity including walking together
- Explore what the barriers/facilitators to physical activity that are experienced by the person they support
- Explore the participant's motivation to help the person they support take part in physical activity

- Explore whether participant thinks there is any additional support they could provide

Healthy Eating

- Do they think the person they support eats healthily
- Explore the last time the participant and the person they support ate together what did they eat and was that typical
- Explore whether the participant and person with bipolar disorder regularly eat together.
- Explore if the participant discusses healthy eating with the person they support; what discussed/encouragement/improvements
- Explore what the barriers/facilitators to healthy eating are experienced by the person they support
- Explore the participant's motivation to help the person they support eat more healthily
- Explore whether participant thinks there is any additional support they could provide

Lifestyle changes

- Explore ideas that the participant has that could help the person supported in terms of weight loss, physical activity or healthy eating?
- Explore what they feel the benefits of this might be/are
- Explore their opinion of what does/doesn't work
- Explore views with regards to the person they support using apps on smart phones or other electronic device to support behaviour change around physical activity/ healthy eating/weight loss. Do they think it would work.
- Opinion of the benefit of currently available technology like fitbit
- Explore participant's view of the importance of support from peers, family, friends or work colleagues in helping support behaviour change around physical activity/ healthy eating/weight loss.
- Explore views of using this type of support (and the Bipolar Scotland groups) to encourage behaviour change
- Describe the HMDI study as a model, do they think it would work.

Closing

- Provide summary of interview discussion
- Is there anything else that the participant wants to add to what has already been discussed
- Ensure interviewee has opportunity to add comments/ ask questions
- Seek feedback on the interview experience

Appendix 17

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University of Glasgow

CHIEF SCIENTIST OFFICE

MRC Medical Research Council

Friends and family
Questionnaire

ID:

V1.0 11/10/16

NHS
Greater Glasgow and Clyde

The purpose of this questionnaire is to provide some basic background information about you. Please answer the following questions. If you are unsure of a question please leave it blank.

1 What age are you?   **Please write in**   Years

2 What is your current postcode for your house?   **Please write in**

3 What is your gender?   **Please tick ONE box**

Male 1

Female 2

Transgender 3

Other 4

4 How physically active do you rate your own lifestyle?

Please circle one number

Not very active ⟶ **Very active**

1   2   3   4   5   6   7   8   9   10

5 How healthy would you rate your own diet (including alcohol and sugary drinks)?

Please circle one number
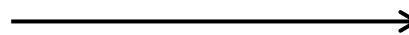
Not very active ⟶ **Very active**

1   2   3   4   5   6   7   8   9   10

Thank you for your help in filling out this questionnaire.

Interview Topic Guide
V1.0 11/10/16
Participants who are clinicians that work closely with people with bipolar disorder

Introduction
- Explain the study
- Emphasise no right/wrong answers
- Inform participants it will not impact on their job
- Ensure informed consent

Relationship
- Explore the relationship between the participant and people with bipolar disorder

Current support provided
- Explore if the participant discusses healthy eating, physical activity or weight issues with their patients with bipolar disorder – and how this is received
- Explore the support provided generally to people with bipolar disorder, focusing on healthy eating, physical activity or weight issues

- Explore how the support is delivered/provided
- Explore clinicians view of current services (amount/type) offered to people with bipolar disorder with regards to physical activity, healthy eating and weight issues
- Explore the positive and negative aspects of the services
- Opinion of the benefit of the services
- Explore participant's views of barriers/facilitators to changing lifestyle behaviour for people with bipolar disorder
- Explore participant's views of the motivation of people with bipolar disorder to change their behaviour

Participant's ideas
- Explore ideas about what could be provided to people with bipolar disorder to promote physical activity- content/delivery
- Explore ideas about what could be provided to people with bipolar disorder to promote healthy eating and weight management- content/delivery
- Explore the barriers to doing this

Support
- Opinion of using apps on smart phones or other technology to support behaviour change activities in relation to diet, physical activity and weight loss in this group
- Opinion of the benefit currently available technology like fitbit
- Explore the potential of using technology to provide support- independently/ combined with face to face or other support

- Explore participant's views about peers/family members providing support (or additional support) to people with bipolar disorder in relation to healthy eating and physical activity and weight management (using the HMDI study as a model and the Bipolar Scotland groups).

Closing
- Provide summary of interview discussion
- Ask participant if there is anything else they would like to add to what has been discussed
- Ensure interviewee has opportunity to add comments/ ask questions
- Seek feedback on the interview experience

Appendix 19

Clinician

Questionnaire

ID:

V1.0 11/10/16

The purpose of this questionnaire is to provide some basic background information about you. Please answer the following questions. If you are unsure of a question please leave it blank.

Please write in

1 What age are you? Years

2 What is your gender? **Please tick ONE box**

Male | 1

Female | 2

Transgender | 3

Other | 4

3 What is your job title? **Please write in**

4 How long have you been in this role? **Please write in**

Years Months

Thank you for your help in filling out the questionnaire.

Appendix 20
SIMD- Scottish Government
 Quick Finder
 To find the rank of a postcode simply enter the postcode(s) in column A below.
 If the results are displayed as "not found" then the postcode specified is either a very new postcode
 or is no longer a valid postcode.
This lookup file is set up for up to 1000 postcodes. To find more postcodes, copy some rows as many
times as needed at the bottom of the list, or use the underlying data provided in the sheet
"all postcodes" of this file.

Rank 1:   most deprived data zone in Scotland
Rank
6976:   least deprived data zone in Scotland

Vigintile: All 6976 data zones are grouped into 20 bands (vigintiles), each containing 5% of the
            data zones.
            Vigintile 1 contains the 5% most deprived data zones in Scotland.
Decile: All 6976 data zones are grouped into 10 bands (deciles), each containing 10% of the data
            zones.
            Decile 1 contains the 10% most deprived data zones in Scotland.
Quintile: All 6976 data zones are grouped into 5 bands (quintiles), each containing 20% of the
             data zones.
            Quintile 1 contains the 20% most deprived data zones in Scotland.

            SIMD16 was published on 31 August 2016.
            This postcode look-up is based on the NRS Scottish Postcode Directory 2016-1.
            It was published on 7 September 2016. It is updated regularly.
            For more information, guidance, and SIMD16 Technical Notes please go to
            http://www.gov.scot/SIMD

Enter your postcode below:	Data Zone	SIMD16 Rank	SIMD16 Vigintile	SIMD16 Decile	SIMD16 Quintile
	S01006514	6808	20	10	5
	S01009920	5348	16	8	4
	S01010043	224	1	1	1
	S01010460	6008	18	9	5
	S01010238	2690	8	4	2
	S01012567	2417	7	4	2
	S01011704	5619	17	9	5
	S01011602	645	2	1	1
	S01012780	490	2	1	1
	S01010235	4880	14	7	4
	S01007572	3494	11	6	3
	S01013102	6708	20	10	5
	S01007695	2960	9	5	3
	S01007728	914	3	2	1
	S01007719	906	3	2	1
	S01012125	281	1	1	1
	S01010238	2690	8	4	2
	S01011774	3433	10	5	3
	S01011704	5619	17	9	5
	S01008297	5590	17	9	5

Appendix 21

ID	Ind	gender (male = 1, female = 2)	age	Age (in decades)	BMI	BMI_Category (1= normal, 2= over, 3=)	BMI_2_cat (1= normal, 2= above)	lifestyle (Healthy=1, neutral = 2, unhealthy =3	influence on healthy lifestyle (positive =1, neutral= 2, negative =3)	inflence on trying to lose weight (positive =1, neutral = 2, negative =3)	closest to participant (yes =1, no =2)	trying to lose weight (yes =1, neutral= 2)	relationship	distance from participants home	physically active	provide support for lifestyle change	frequency of contact	healthy diet	trying to lose weight	mental health condition
ego001	1	2	27	20	23.1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
00101	0	2	40	40	0	0	0	1	1	1	1	2	6	2	4	1	2	4	2	1
00102	0	2	50	50	0	0	0	1	1	2	1	2	2	4	4	1	1	3	2	2
00103	0	2	20	20	0	0	0	2	1	2	1	1	3	3	3	1	2	3	1	2
00104	0	1	60	60	0	0	0	1	1	2	2	2	2	4	4	1	2	3	2	2
00105	0	1	30	30	0	0	0	3	1	2	2	1	5	3	3	1	2	3	1	1
ego002	1	2	34	30	20.7	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
00201	0	1	40	40	0	0	0	1	1	1	1	1	3	3	3	1	2	3	1	1
00202	0	2	30	30	0	0	0	1	1	1	1	1	2	3	3	2	3	3	1	1
00203	0	2	40	40	0	0	0	1	1	1	2	2	5	3	4	1	2	2	2	2
00204	0	1	30	30	0	0	0	3	2	2	2	2	2	3	1	3	2	2	2	2
00205	0	2	60	60	0	0	0	1	2	2	2	2	2	3	2	3	2	3	2	2
00206	0	1	60	60	0	0	0	3	2	1	2	2	0	0	0	0	0	0	0	0
ego003	1	2	55	50	21	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
00301	0	1	67	60	0	0	0	1	1	1	1	2	6	4	2	1	2	3	2	1
00302	0	2	61	60	0	0	0	1	1	2	2	2	2	4	4	1	2	3	1	1
00303	0	2	53	50	0	0	0	1	1	2	2	1	3	3	3	1	2	3	1	2
00304	0	1	56	50	0	0	0	1	1	2	2	2	6	5	4	1	2	2	2	1
ego004	1	2	56	50	24.1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
00401	0	2	20	20	0	0	0	1	1	2	1	2	2	1	3	1	1	3	2	2
00402	0	1	20	20	0	0	0	1	1	2	2	2	6	4	4	1	2	4	2	2
00403	0	2	70	70	0	0	0	3	3	2	2	2	2	3	2	3	3	2	2	1
00404	0	2	40	40	0	0	0	3	1	2	2	1	3	3	2	1	3	2	1	2
00405	0	2	50	50	0	0	0	2	2	2	2	2	5	4	2	1	1	5	3	2
00406	0	2	60	60	0	0	0	3	1	2	2	1	0	0	0	0	0	0	0	0
ego005	1	1	67	60	32	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0

ID																			
00501	0	2	60	60	0	0	0	3	2	2	1	1	6	4	2	1	3	3	1	2
00502	0	1	70	70	0	0	0	3	2	2	2	2	0	0	0	0	0	0	0	0
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00504	0	1	60	60	0	0	0	3	3	3	2	2	3	3	1	1	2	2	2	3
00505	0	1	30	30	0	0	0	1	1	1	1	2	2	3	2	1	3	3	2	2
00506	0	1	60	60	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0
00507	0	1	50	50	0	0	0	1	2	2	2	2	0	0	0	0	0	0	0	0
00508	0	1	90	90	0	0	0	1	2	2	2	2	0	0	0	0	0	0	0	0
00509	0	1	60	60	0	0	0	1	2	2	2	2	0	0	0	0	0	0	0	0
ego006	1	1	43	40	38.1	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0
00601	0	2	40	40	0	0	0	1	1	1	1	2	1	1	4	1	1	4	2	2
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00605	0	1	40	40	0	0	0	1	2	2	2	2	2	2	4	1	3	3	2	2
ego008	1	2	56	50	27.3	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0
00801	0	2	80	80	0	0	0	3	3	3	1	2	2	3	1	2	1	1	2	3
00802	0	2	50	50	0	0	0	1	1	1	2	2	3	3	4	1	1	4	1	2
00803	0	1	20	20	0	0	0	1	1	1	2	2	2	2	3	1	2	3	2	1
00804	0	2	40	40	0	0	0	3	3	3	2	2	2	3	1	2	2	1	2	2
00805	0	2	50	50	0	0	0	1	1	1	2	1	2	3	4	1	2	4	1	2
ego009	1	2	57	50	37.1	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0
00901	0	2	70	70	0	0	0	1	2	2	1	1	3	5	4	1	3	4	3	2

00902	0	1	60	60	0	0	0	1	2	1	1	2	2	3	2	1	2	1	2	1
00903	0	2	50	50	0	0	0	1	1	1	1	1	2	3	4	1	2	4	1	2
00904	0	2	50	50	0	0	0	1	2	2	2	2	3	3	2	1	2	4	2	2
00905	0	2	50	50	0	0	0	1	1	2	2	2	3	3	4	1	2	4	2	2
ego0010	1	2	53	50	23.9	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
001001	0	2	60	60	0	0	0	1	2	1	1	1	3	3	3	1	1	3	1	3
001002	0	2	60	60	0	0	0	1	1	1	2	2	3	2	4	1	2	2	1	1
001003	0	2	50	50	0	0	0	1	1	2	2	2	2	4	3	1	2	3	1	2
001004	0	2	50	50	0	0	0	1	2	2	2	2	3	4	2	3	3	3	2	2
001005	0	2	60	60	0	0	0	1	2	2	2	2	3	4	3	3	1	3	1	2
001006	0	2	60	60	0	0	0	3	2	2	2	2	0	0	0	0	0	0	0	0
001007	0	2	80	80	0	0	0	1	2	2	2	2	0	0	0	0	0	0	0	0
ego0011	1	2	55	50	53.3	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0
001101	0	2	40	40	0	0	0	1	1	1	2	2	2	5	3	1	2	3	2	3
001102	0	1	50	50	0	0	0	1	2	2	2	1	6	5	5	1	2	5	3	3
001103	0	2	70	70	0	0	0	3	3	1	1	2	6	2	2	1	2	2	2	2
001104	0	1	30	30	0	0	0	1	2	1	2	1	6	3	2	1	1	2	2	1
001105	0	2	30	30	0	0	0	3	2	1	2	2	6	3	2	1	2	3	2	1
ego0012	1	2	56	50	26.5	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0
001201	0	1	50	50	0	0	0	1	1	2	2	2	2	5	4	1	2	4	2	1
001202	0	2	40	40	0	0	0	1	1	1	2	1	3	5	3	1	1	4	1	2
001203	0	2	50	50	0	0	0	1	1	2	1	2	3	2	3	1	3	3	3	1
001204	0	2	50	50	0	0	0	1	2	1	1	2	2	3	4	1	2	4	2	2
001205	0	2	50	50	0	0	0	3	2	2	2	1	3	5	1	1	1	2	1	2
001206	0	1	30	30	0	0	0	3	1	1	1	2	0	0	0	0	0	0	0	0
001207	0	2	50	50	0	0	0	3	3	3	2	1	0	0	0	0	0	0	0	0
001208	0	2	50	50	0	0	0	1	2	1	2	2	0	0	0	0	0	0	0	0
ego0013	1	2	51	50	35.2	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0
001301	0	2	50	50	0	0	0	1	1	1	1	1	3	5	2	1	2	3	1	2
001302	0	2	80	80	0	0	0	3	2	2	2	2	2	1	1	1	1	2	1	2
001303	0	2	50	50	0	0	0	2	2	2	2	2	3	4	2	1	3	2	3	3
001304	0	1	70	70	0	0	0	1	2	1	2	2	2	1	3	3	1	3	3	2

001304	0	1	70	70	0	0	0	1	2	1	2	2	2	1	3	3	1	3	3	2
001305	0	2	50	50	0	0	0	1	2	1	2	2	2	5	3	1	3	3	2	2
001306	0	1	50	50	0	0	0	1	2	1	2	2	0	0	0	0	0	0	0	0
001307	0	1	50	50	0	0	0	1	2	1	2	2	0	0	0	0	0	0	0	0
001308	0	2	60	60	0	0	0	2	2	2	2	2	0	0	0	0	0	0	0	0
001309	0	2	50	50	0	0	0	1	2	2	2	1	0	0	0	0	0	0	0	0
0013010	0	2	50	50	0	0	0	2	2	2	2	2	0	0	0	0	0	0	0	0
0013011	0	2	50	50	0	0	0	3	2	2	2	2	0	0	0	0	0	0	0	0
ego0014	1	2	57	50	32.4	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0
001401	0	1	50	50	0	0	0	2	2	2	1	2	1	3	4	1	1	2	2	2
001402	0	2	50	50	0	0	0	1	2	3	2	2	6	2	1	1	3	1	3	1
001403	0	2	50	50	0	0	0	1	2	3	2	1	6	3	1	1	2	1	1	1
001404	0	2	70	70	0	0	0	1	2	3	2	1	6	3	2	1	1	1	1	1
001405	0	1	40	40	0	0	0	2	2	2	2	2	0	0	0	0	0	0	0	0
001406	0	1	50	50	0	0	0	3	1	1	2	2	0	0	0	0	0	0	0	0
ego0015	1	2	20	20	30.1	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0
001501	0	2	20	20	0	0	0	1	1	1	1	2	3	3	3	1	1	3	2	2
001502	0	1	20	20	0	0	0	1	1	1	2	1	3	3	2	3	3	3	1	1
001503	0	1	60	60	0	0	0	1	1	1	2	1	3	3	1	1	2	4	1	2
001504	0	2	20	20	0	0	0	1	1	2	2	1	3	3	1	3	2	2	3	1
001505	0	2	20	20	0	0	0	3	2	1	2	1	3	3	3	1	1	2	1	1
001506	0	1	20	20	0	0	0	1	1	1	2	1	0	0	0	0	0	0	0	0
001507	0	2	20	20	0	0	0	3	2	1	2	1	0	0	0	0	0	0	0	0
001508	0	2	20	20	0	0	0	1	1	1	2	2	0	0	0	0	0	0	0	0
001509	0	2	50	50	0	0	0	1	1	1	2	1	0	0	0	0	0	0	0	0
ego0016	1	2	31	30	33.8	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0
001601	0	2	20	20	0	0	0	1	1	1	1	1	3	2	3	1	1	3	1	1
001602	0	1	30	30	0	0	0	1	2	2	2	2	2	3	4	1	3	4	1	2
001603	0	2	30	30	0	0	0	1	1	1	2	2	3	1	3	1	2	3	2	2
001604	0	2	30	30	0	0	0	1	2	1	2	2	3	2	4	1	2	3	2	1
001605	0	2	50	50	0	0	0	3	2	3	2	2	2	2	1	2	1	2	2	2
001606	0	2	20	20	0	0	0	2	2	1	2	2	0	0	0	0	0	0	0	0
001607	0	1	50	50	0	0	0	1	1	1	2	1	0	0	0	0	0	0	0	0
001608	0	2	40	40	0	0	0	3	2	2	2	2	0	0	0	0	0	0	0	0
001609	0	2	70	70	0	0	0	2	3	2	2	2	0	0	0	0	0	0	0	0
ego0017	1	2	61	60	29.5	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0
001701	0	2	40	40	0	0	0	1	1	2	1	2	2	4	4	1	3	3	2	2
001702	0	2	60	60	0	0	0	3	3	3	1	2	2	4	1	1	3	1	2	2
001703	0	2	50	50	0	0	0	2	2	3	1	2	3	4	1	1	3	2	2	1
001704	0	2	70	70	0	0	0	2	2	3	2	2	3	4	2	1	4	5	3	2
001705	0	2	50	50	0	0	0	3	2	3	1	2	3	3	1	1	3	5	2	1

Appendix 22