An exploratory cross-sectional study examining the relationship between negative affect and sexual risk-taking behaviour

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~ For Tess ~

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LIST OF ABBREVIATIONS

SRT	Sexual risk-taking
MRSD	Mood-related sexual desire
HADS	Hospital Anxiety and Depression Scale
HADS-A	Anxiety subscale of HADS
HADS-D	Depression subscale of HADS
SUPPS-P	Short version of the Urgency…
MSQ-R	Revised Mood Sexuality Questionnaire
AnxDes	Anxiety related sexual desire subscale
DepDes	Depression related sexual desire subscale
NegUrg	Negative urgency
PosUrg	Positive urgency
Premed	Premeditation
Persev	Perseveration
S-S	Sensation seeking
Comp	Composite score

CHAPTER 1: SYSTEMATIC REVIEW

Exploring the relationship between negative affect and sexual risk-taking behaviour:

A systematic review

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Abstract

Background: Sexually transmitted infection, including HIV, is a significant public health concern, associated with sexual risk-taking (SRT). Negative affective states, such as anxiety and depression have been highlighted as factors influencing engagement in SRT. However, the literature provides mixed evidence as to the existence, and direction of an association between negative affect and SRT. Currently, no narrative synthesis of the evidence base has been identified.

Aims: The review aimed to systematically explore the methodological quality of, and evaluate the evidence pertaining to, a relationship between negative affect (both anxiety and depression) and SRT behaviour. In addition, the measures of anxiety, depression and SRT employed have been reviewed.

Methods: A pre-defined keyword strategy was used to search 4 databases for studies published between 1995 and 2015. Following screening of 111 abstracts, 9 studies were identified as fulfilling the eligibility criteria. The STROBE checklist was used to guide quality assessment for each of the included studies.

Results: Overall, there was a positive relationship identified between anxiety and depression, with SRT, however this was dependent upon the operationalised definition of SRT used. In addition, methodological issues relating to the temporal coverage of measures and highly specific samples highlight the need to interpret findings with caution.

Conclusions: There appears to be tentative evidence indicating an association between anxiety and depression with SRT in the articles under review in this study. Future research must, however, expand beyond cross-sectional design, toward longitudinal analysis, which will enable delineation of the processes underpinning this possible association.

Key words: sexual risk-taking, anxiety, depression, evidence review

Introduction

Sexual risk-taking (SRT) behaviour is a significant public health concern due to the resultant outcomes of unintended pregnancy and sexually transmitted infection (STI), which can have a profound impact on sexual, reproductive and overall health and wellbeing (WHO, 2015). While definitions of SRT vary considerably and continue to evolve, it has been stated that "it is difficult to gather a precise definition of when sexual behavior is risky… a helpful working hypothesis… for risky sexual behavior is associated with undesirable outcome" (Sherr, 2007 p.194). Within the sexual health literature SRT has often been narrowly defined and typically focused on individual sexual practices such as multiple sexual partners and non-condom use (e.g., Noar, Cole, & Carlyle, 2006) that place the individual at high risk for directly contracting a STI, including HIV. However, broader conceptualisations of SRT have emerged to include age at first sex before the age of 16 years, previous STI diagnosis (Sonkin et al., 2007), number of one-night-stands (Bancroft et al., 2007), exchanging sex for money (e.g. Roberts et al., 2003), and engaging in sexual acts under the influence of alcohol and/or drugs (e.g. Camacho, Brown, & Simpson, 1996). Moreover, in addition to the individual's behaviour, SRT can be defined according to the nature of the partner, for example, engaging in sexual practices with HIV-positive, intravenous drug using, and non-monogamous, sexual partners. Although these broad conceptualisations may not relate to an individual's high risk of directly acquiring a STI (i.e. unprotected sex), they are associated with placing the individual at increased risk (Bancroft et al., 2007). For the purposes of the current work, SRT is considered to include both the direct high-risk behaviours, and the higher-risk indirect behaviours indicated above. This broad definition of SRT is important to capture empirical behavioural indicators of SRT and has been recommended for use in epidemiological study worldwide (see Slaymaker, 2004).

The consequences of SRT can permeate beyond the individual risk-taker, affecting families, communities and wider society (Scottish Government, 2011). For example,

mother-to-child transmission of STIs can result in stillbirth, neonatal death, sepsis, and pneumonia, and the Human Papilloma Virus infection causes 530,000 cases of cervical cancer worldwide each year (WHO, 2015). Thus, the modification of SRT is of paramount importance in preventing the spread of STIs (Downing-Jones, Cook, & Bellis, 2006). To address this issue researchers have attempted to identify factors that may lead individuals to engage in SRT behaviour. One area of focus has been in relation to the association between SRT and common mental health disorders (e.g. Ramrakha et al., 2000; Roberts et al., 2003)

Common Mental Health Disorders

"Common mental health disorders" is an umbrella term used to include conditions such as depression, generalised anxiety disorder, panic disorder, social anxiety disorder, post-traumatic stress disorder (PTSD) and obsessive compulsive disorder (OCD) (NICE, 2011). These disorders can affect a significant proportion of the population at any one time, with research demonstrating significant co-morbidity among the disorders (Singleton et al., 2001). This co-morbidity suggests that the construct of common mental health disorders is a more valid and useful approach to conceptualising individual experiences of symptoms. For example, of the common mental health disorders a mix of symptoms of anxiety and depression is the most frequently occurring, with only a small proportion experiencing one without the other (Singleton et al., 2001). Although a number of studies have found an association between negative affective states and SRT in both adolescents and adults by assessing severity of psychiatric distress, few studies have found an association when using diagnostic assessments of psychiatric disorders (Remien, 2004)

Anxiety and Depression in the Context of Sexual Risk-Taking Behaviour

Symptoms of anxiety and depression differ considerably in severity, typically ranging in intensity from mild, moderate, to severe (American Psychiatric Association, (APA), 2013).

Many of the symptoms associated with common mental health disorders (e.g. low energy levels, fatigue, increased irritability, anxiety, and reduced interest and pleasure in previously enjoyed activities) *may* prohibit behavioural and social engagement and interaction (APA, 2013). Indeed, around 1 in 5 cases can become chronic and debilitating, negatively impacting upon routine daily activities and relationships, including sexual functioning (WHO, 2001).

It is commonly assumed that during elevated anxious and depressive states sexual libido (i.e. sexual desire and physiological arousal) is reduced (e.g. Beck, 1967; Kaplan, 1988; Figueira, et al., 2001; Ernst, Foldenyi & Angst, 1993). An alternative hypothesis suggests that although many experiencing anxiety and depression have reduced sexual libido, there are a significant proportion of individuals with anxiety (Cranston-Cuebas & Barlow, 1990; Ware et al., 1996) and/or depression (Bancroft et al, 2004; Angst, 1998) that experience unchanged or increased sexual libido. Indeed, it has been suggested that a subjective experience of negative affect may be reduced by engaging in sexual behaviour, resulting in increased sexual desire (e.g. Bancroft et al., 2004). Thus, individuals may engage in sexual activity to increase a sense of self-worth, intimacy, and as a means to regulate and improve mood (e.g. Lykins, Janssen & Graham, 2006). Indeed, there is evidence suggesting that SRT increases in both anxiety and depression (e.g. Bancroft et al., 2004). In depression at least, this may be related to an individual's increased risk for suicidal ideation and self-destructive behaviour, which may lead to disinhibition of sexual impulses. Individuals who do not care whether they live or die may come to the conclusion that there is no reason to warrant safe sex to avoid the risk of acquiring a STI (Remien, 2004).

A meta-analysis assessing the association between negative affective states (i.e. depression and anxiety [and anger]) and SRT reported little evidence of an association of any kind (neither positive nor negative; Crepaz & Marks, 2001). The authors found that effect sizes varied significantly across samples, and suggested that a number of potential moderating variables (e.g. operationalization of SRT, HIV status, studies with the strongest

methodological designs) may account for the variation observed. However, none of the variables identified significantly moderated associations that were found.

Furthermore, Crepaz and Marks (2001) identified a number of methodological and conceptual explanations for their outcome, which may have diminished the ability to detect significant associations (if present). First, even methodologically strong studies failed to measure negative affect and SRT over the same time frame (i.e. past week/month/year), thereby hampering opportunities to gain an accurate understanding of the temporal link between these factors. Secondly, the majority of the reviewed studies adopted statistical models that failed to account for the possibility that when anxious/depressive symptoms are severe, sexual libido may be greatly diminished, which can limit engagement in sexual activity; while in those individuals experiencing moderate anxious/depressive symptoms, sexual libido may be greatly increased, and may therefore be more likely to engage in SRT. Thirdly, it is suggested that the reviewed papers may not have accounted for all potential moderator variables (e.g. impulsivity, sexual desire) that could influence the association between negative affect and SRT. It was recommended that future research should refine and re-develop conceptual and methodological practices.

Aims and Objectives

Given the co-morbid nature of anxiety and depression, it is important to focus on both these manifestations of common mental health disorders. Indeed, in the context of SRT the determination of the presence and direction of an association between anxiety and depression on the one hand, and SRT on the other, has important clinical and policy implications in terms of broadening conceptual understanding to inform prevention programmes (Bancroft et al., 2004; Semaan et al., 2002; Donohew, Palmgren & Lorch, 1994). Thus, the review aims to critically appraise the evidence base in relation to the associations between *both* anxiety and depression, and SRT behaviour. In so doing, the following key questions are addressed:

1. Are individuals experiencing symptoms of anxiety and/or depression more likely to engage in SRT than individuals with no symptoms of anxiety and/or depression?
2. What measures of anxiety, depression, and SRT have been employed within the research literature?
3. What are the methodological limitations of studies exploring the associations among anxiety, depression, and SRT?

Method

Search Strategy

A number of different databases were searched in order to cover a wider range of relevant disciplines. EBSCO host was used to search CINAHL (nursing and allied health sciences) and PsychINFO (psychological and behavioural sciences) databases, and OVID was used to search EMBASE and MEDLINE (both medical science) databases. The search strategy included terms for the two key constructs: SRT behaviour, and anxiety and depression. The following is the search strategy as entered into Medline, including the use of database truncations (denoted by *) to search possible differences in endings in the terms:

1. [SEX* RISK-TAKING] or [RISKY SEX]
2. [DEPRESS*] or [LOW MOOD] or [NEGATIVE MOOD] or [AFFECT] or [MENTAL HEALTH] or [COMMON MENTAL HEALTH DISORDER] or [ANXI*] or [STRESS*]
3. 1. AND 2.

All searches were limited to those studies published in English language over the last 20 years (1995-). The searches were undertaken on the 1st July 2014 and updated in March

2015. Furthermore, as electronic database searches may not identify all relevant studies the reference lists of all included full text articles were manually reviewed for relevant articles.

Eligibility Criteria

The eligibility of studies was assessed according to a set of pre-specified inclusion and exclusion criteria (see Table 1).

Table 1

Eligibility criteria for including studies in the current review

Inclusion criteria	Exclusion criteria
Studies that explore both depression *and* anxiety (as evident in co-morbidities in common mental health disorder) as a composite or individual score.	Studies that employ measures of anxiety that are specific to particular types of anxiety disorders at listed in DSM-5 or ICD-10 (e.g. General Anxiety Disorder, Social Anxiety Disorder, PTSD, etc.).
Studies investigating any form of sexual risk-taking behaviour, as it has been operationalized in many different ways.	Studies of adult or child sexual abuse. Studies not published in English.
Observational study designs (cohort, case control, and cross-sectional) as these are most suited to investigating associations.	
Participants aged 16 years and above, which represents the age of sexual consent in the UK (among other countries).	
Data analysis could include primary or secondary quantitative data.	

Study Selection

The study selection process has been in accordance with the PRISMA recommendations.

Initially, all titles and abstracts were assessed for eligibility by the author and a second

rater, an academic researcher in public health. The full text of each of the remaining studies was screened by the author, and reasons for exclusion were noted. Disagreement between the raters arose relating to the title and abstracts of two studies, that both noted 'adolescents' as the participant sample. It was unclear at this stage whether the adolescent sample included participants below the age of 16 years. This was addressed through discussion, resulting in the papers being included for full paper review.

Data Extraction and Synthesis

The following data were extracted for each eligible paper, as appropriate: author(s), year of publication, country of study, key sample characteristics (sampling strategy, number, age, and gender), study design, measure of anxiety, measure of depression, measure of SRT behaviour, and key findings.

Due to considerable heterogeneity in terms of study measures and outcomes, a meta-analysis was considered to be a misleading approach, thus a narrative synthesis is reported. A narrative synthesis of the extracted data was conducted according to the themes addressed in the three research questions (i.e. nature of association, sample characteristics, measure of SRT, anxiety and depression). No quantitative meta-analysis was carried out.

Quality Assessment

A variety of tools (scales and checklists) exist for the critical appraisal of observational studies, which differ in terms of the study design(s) to which they relate (i.e. cross-sectional, case-control, and/or cohort) their generic or subject-specific nature, and the criteria against which a study is appraised (see Sanderson et al. 2007). However, the Cochrane Collaboration openly discourages the use of scales and summary scores in favour of checklists (see Higgins & Green, 2011).

One of the most thorough checklists is the STrengthening Reporting of Observational studies in Epidemiology (STROBE) statement which was developed based on empirical

evidence and methodological/theoretical considerations and facilitates the critical appraisal of study design, conduct, and analysis (Vandenbroucke et al., 2007). The checklist comprises 22 items relating to each section of an article, with 18 items common across all three of the main study designs and four specific to each design (Vandenbroucke et al., 2007; von Elm et al. 2007). The STROBE statement checklist (see Appendix II) was used to undertake a quality assessment of each of the eligible studies by the author and independent rater for increased reliability. The results of the quality assessment were presented for each STROBE item as "fulfilled" (meaning the paper addressed the item), "partially fulfilled" (meaning the item was partially addressed in the paper, or in the case of items with multiple parts, where not all parts have been addressed), or "unfulfilled" (meaning the paper did not address the item).

From a total of 198 items (22 items per study) the raters disagreed on three studies (Agardh et al., 2012; Bancroft et al., 2003; 2004). The sources of disagreement were focused on 7 items spread across 3 domains: Methods; Results; and Discussion. In two studies (Agardh et al., 2012; Bancroft et al., 2003) disagreement related to 3 items: item 12 in the Methods domain (description and explanation of statistical methods); and items 13 (reporting of rationale for and presentation of participants) and 14 (descriptive data of participants and possible confounders) in the Results domain. In the third study (Bancroft et al., 2004) disagreement was pertaining to item 20 (cautious overall interpretation of results covering objectives, limitations, analyses, and other evidence) from the Discussion domain. This equated to a 96% correspondence between the two reviewers following independent ratings of all 9 studies using the STROBE statement. Discrepancies between the raters were resolved through discussion, which resulted in a “partial fulfilment” categorisation for all of the items under discussion.

Results

In total 116 articles were identified from database searches and manual screening of reference lists. Figure 1 shows the outcomes of each stage of screening for eligibility, which resulted in the inclusion of nine articles for analysis. A summary of each of the included studies can be found in Table 2, and are synthesised thereafter.

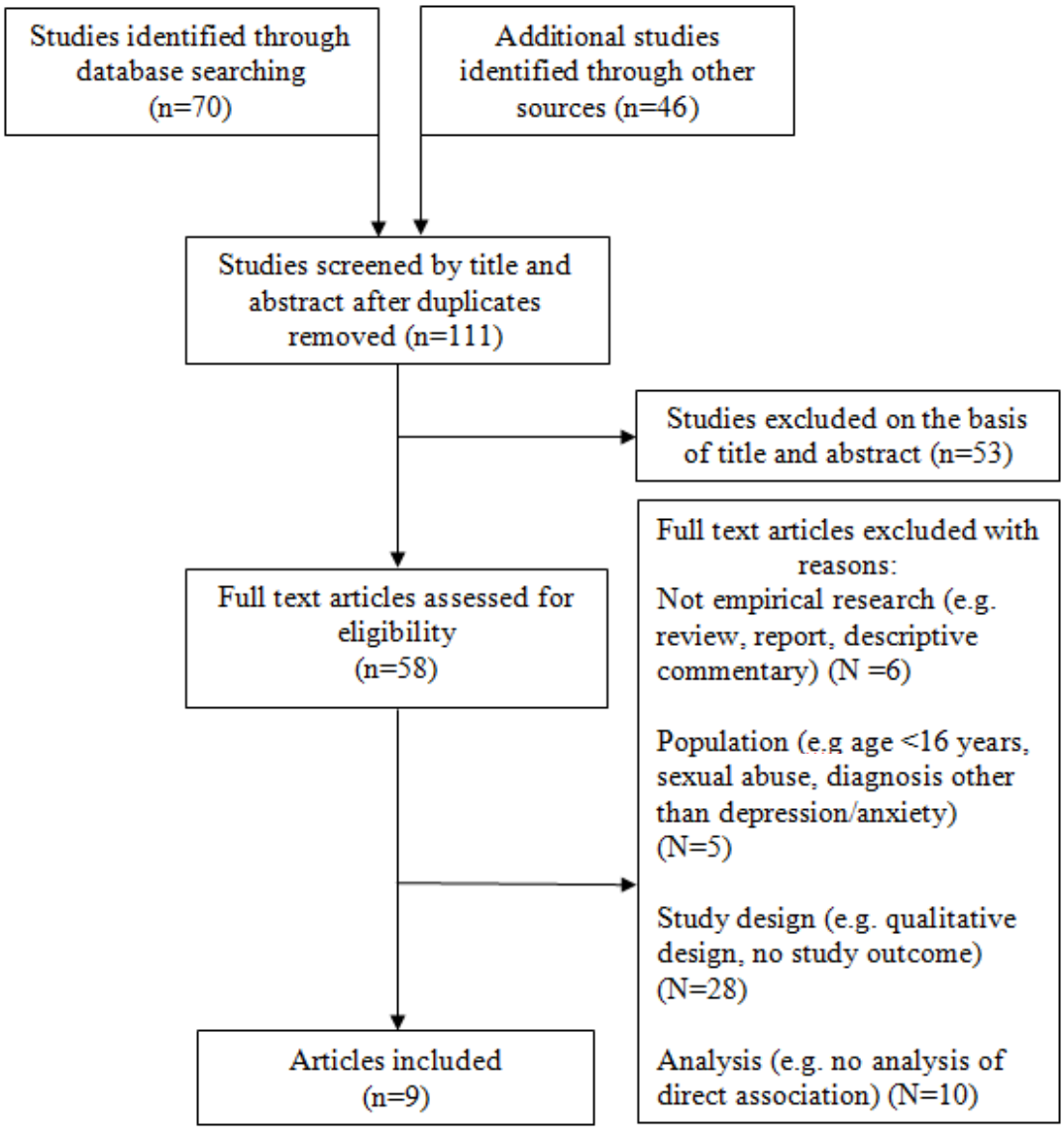


Figure 1. PRISMA flow diagram of search strategy and results

Study Characteristics

The nine studies were published between 1996 and 2011. A total of 5,285 participants were recruited across the studies with a median sample size for the studies of 589 (IQR: [Q3 (894.5) - Q1 (317)] = 577.5). Of the five studies that reported the mean age for participants, the median was 25.2 years (IQR: [Q3 (36.35)- Q1 (17.85)] = 18.5). The majority of studies were conducted in the USA (Bancroft et al, 2003; 2004; 2005, Roberts et al, 2003, Murphy et al, 2001, Marks et al., 1998, Camacho et al, 1996) with only one study conducted outside the USA in Uganda (Agardh et al, 2012). All of the studies employed surveys and seven were cross-sectional (Agardh et al, 2012; Turner et al., 2011; Bancroft et al, 2004; 2005, Roberts et al, 2003, Marks et al., 1998, Camacho et al, 1996), one was described as observational (Murphy et al, 2001), and one as matched-pairs (Bancroft et al., 2003). Moreover, five of the studies used primary data (Agardh et al, 2012, Turner et al., 2011, Bancroft et al., 2003; 2004, Marks et al., 1998), two used secondary data (Bancroft et al., 2005 & Murphy et al, 2001), and the remaining studies conducted secondary analysis of primary data samples taken from intervention studies (Roberts et al, 2003 & Camacho et al, 1996). Moreover, two of the studies utilised the same dataset (Bancroft et al., 2003, 2005).

Participant Sample Characteristics

The study samples in the nine reviewed papers differed across various dimensions. First, samples differed in terms of their gender with four studies using both male and female participants (Agardh et al, 2012; Turner et al., 2011; Murphy et al, 2001; Camacho et al, 1996), four studies using only male participants (Bancroft et al, 2003, 2004, 2005, Marks et al., 1998), and one study using only female participants (Roberts et al, 2003). Secondly, samples varied according to sexuality, with four studies using hetero-, homo- and, bi-sexual participants (Agardh et al, 2012; Turner et al., 2011; Marks et al., 1998; Camacho et al, 1996), three studies using only homosexual participants (Bancroft et al., 2003, 2005;

Table 2

Summary of included studies

Study	Sample	Design	Measure of anxiety	Measure of depression	Measure of SRT	Results
Agardh, et al. (2012) Uganda	Convenience sample. Male and female Undergraduate students (N=980; 628 <23 years , 329 >23 years, 23 missing age). Non-clinical sample.	Cross-sectional design. Self-administered questionnaire. Primary data.	HSCL-25 Anxiety items	HSCL-25 Depression items	Bespoke measure: (i) Number of sexual partners in last 12 months (≥2 coded as high and 1 as low) (ii) Condom use at last occasion of sexual intercourse (yes, no, and other dichotomised as consistent condom use and inconsistent condom use)	1. Positive association depression: ($p<0.05$) between number of sexual partners and depression (both males and females) 2. Positive association anxiety: ($p<0.05$) number of sexual partners and inconsistent condom use and anxiety (among males only).
Turner et al. (2011) USA	Convenience sample. Male and female African-American out-of-school youth (N= 680; 16-23 years). Non-Clinical sample.	Cross-sectional design. Audio computer-assisted self-interview. Primary data	BAI	CES-D	YRBSS sexual risk behaviour section. (i) Age of sexual debut (ii) Number of lifetime sexual partners (iii) Condom use at last sexual intercourse.	1. Positive association anxiety: ($p<0.01$) lack of condom use and elevated anxiety symptoms. 2. Positive association depression ($p<0.01$) number of lifetime sexual partners and depression symptoms
Bancroft et al. (2005) USA	Secondary data sample (taken from Bancroft et al, 2003) Homosexual males (HIV+ and HIV–; N= 583; 18-67 years). Non-clinical sample	Matched-pair design (taken from two sample sources across various sites)	STAI	ZDPR	Bespoke measure: (i) Frequency of unprotected anal intercourse (UAI) in the last 6 months as receptive partner, with someone whose serostatus is unknown (ii) Number of partners with whom UAI had occurred. Scores for 1. and 2. were combined for	No significant main effects or interactions found across all analyses.

					analysis	
Bancroft et al. (2004) USA	Convenience sample. Heterosexual men (N=879; 18-81 years). Mixed clinical/non-clinical sample.	Cross-sectional design. Self-administered questionnaire. Primary data.	STAI	ZDPR	1. One question from KISACUQ regarding HIV testing and serostatus, and past history of other STIs 2. Three questions from DSHQ: (i). Number of different sexual partners in the past 12 months (ii) Number of sexual partners in last 3 years with whom no condoms used (iii) Number of one-night stands in lifetime	1. Negative association depression ($p<0.04$): those with a propensity for depression reported fewer partners with whom no condoms were used than those with no depressive symptoms 2. Positive association anxiety ($p<0.018$): those with anxiety reported an increased number of partners with whom no condoms had been used. ($p<0.018$)
Bancroft et al. (2003) USA	Convenience sample. Homosexual men (N = 589; 18-67 years). Non-Clinical sample.	Cross-sectional design. Self-administered questionnaire. Primary data.	STAI	ZDPR	Measured over last 6 months and over longer term: 1. Two questions from the original SOI, and one question from the revised SOI 2. KISACUQ and DSQU were used to generate composite sores for (i) Anal intercourse (ii) Oral sex (iii) Casual sex (iv) Cruising (v) Information about HIV testing and serostatus and past history of other STIs	1. No association across all depression analyses: recent SRT and anal intercourse ($p=0.060$ns); recent SRT and oral sex (B= 0.074ns); depression and no. of casual sex partners (B= -0.001ns); recent SRT and cruising (B=0.001ns) 2. Negative association anxiety: recent SRT and anal intercourse ($p=0.002$); recent SRT and oral sex ($p= 0.004$)
Roberts et al. (2003) USA	African-American crack-abusing women (N=522; 18-52 years) Non-Clinical sample.	Cross-sectional design. 1-hour interview. Secondary analysis of primary data.	DATAR Anxiety scale	DATAR Depression scale	RRBA (in the last 30 days) (i) how many sexual partners, (ii) use of condoms, (iii) sex-trading behaviours (for drugs, money, food, shelter)	1. Positive association depression ($p<0.01$): women with multiple partners reported higher levels of anxiety and depression. 2. Positive association anxiety ($p<0.01$):

Murphy et al. (2001) USA	HIV infected male and female adolescents Age 15+ Clinical Sample	Observational study in 15 clinic sites (repeated measures). Secondary data.	RCMAS	CES-D	Bespoke measure: (i) Number of sexual partners in the past 3 months (0 versus ≥1) (ii) condom use at most recent sexual intercourse (yes versus no).	Positive association: 1. depression and unprotected sex at last intercourse. 2. No association found with anxiety
Marks et al. (1998) USA	Convenience sample. HIV positive men (hetero-, homo-, bi-sexual; N=155; 25-46+ years). Clinical Sample	Cross-sectional design. Researcher-administrated questionnaire. Primary data	POMS. Tension-Anxiety mood dimension	POMS Depression-Dejection mood dimension.	Bespoke measure: most recent sexual encounter in the last 6 months (i) Type of partner (e.g. casual, anonymous, prostitute), (ii) HIV status of partner (HIV+ or -), (iii) Use of alcohol or drugs by participant (yes or no) and partner (yes or no) (iv) Type of sex (e.g. receptive or insertive sex etc.) (v) Non-condom use in both anal and vaginal intercourse at last sexual intercourse	Positive association depression and anxiety: 1. unprotected anal intercourse, males only ($p<0.05$) (associations were consistent with HIV positive, HIV negative and unknown serostatus males).
Camacho et al. (1996) USA	Male and female opioid addicts (N=834; M=37 years). Clinical Sample.	Cross-sectional design using self-administered questionnaire. Secondary analysis of primary data	DATAR anxiety scale	DATAR depression scale	Bespoke measure: In the last 6 months 1. number of sexual partners 2. frequency of unprotected sex with (i) injection drug use (IDU) (ii) while intoxicated and (iii) trading sex	1. Positive association depression and anxiety: number of sex partners ($p<0.01$); unprotected sex with IDU ($P<0.05$); unprotected sex while trading sex ($p<0.05$)

Key: HSCL-25 = Hopkins symptom checklist-25 (Derogatis et al., 1974); DATAR = Drug Abuse Treatment for Aids-risk Reduction (Simpson, 1990); POMS = Profile of mood states questionnaire (McNair et al., 1981); CES-D = Center for Epidemiological Studies-Depression Scale (Radloff, 1977); STAI = Spielberger Trait Anxiety Inventory (Spielberger et al., 1970); ZDPR = Zemore Depression Proneness Ratings (Zemore et al., (1990); BAI = Beck Anxiety Inventory (Beck et al., 1988); RCMAS = Revised Manifest Anxiety Scale (Reynolds & Richmond, 1978); YRBSS = Youth Risk Behavior Surveillance; Survey (Centers for Disease Control and Prevention, 2004);

SOI= Sexual Orientation Inventory (and revised) (Simpson & Gangestad, 1991; Seal & Agostinelli, 1994); KISACUQ = Kinsey Institute Sexual Activity and Condom Use Questionnaire (Bancroft et al, 2003); DSHQ = Demographic and Sexual History Questionnaire (Bancroft et al., 2003); RBA=Revised Risk Behavioral Assessment (National Institute on Drug Abuse, 1991; Roberts et al., 2003)

Marks et al., 1998), and one study using only heterosexual participants (Bancroft et al., 2004). Thirdly, samples varied according to clinical status with five studies using non-clinical samples (Agardh et al, 2012; Turner et al., 2011; Roberts et al, 2003, Bancroft et al., 2003, 2005), four using clinical samples (Murphy et al, 2001, Marks et al., 1998; Camacho et al, 1996), with the remaining study using a mixed, clinical and non-clinical sample (Bancroft et al., 2004). Additional differentiation among samples included two studies that involved a drug-using sample (Roberts et al, 2003 & Camacho et al, 1996), two studies involved a HIV + sample (Murphy et al, 2001; Marks et al., 1998), one study involving a mixed, HIV+ and HIV- sample (Bancroft et al., 2005), one study involved an undergraduate student sample (Agardh et al., 2012), and one study involving a sample of unemployed youths not currently attending school, college, or university (Turner et al., 2011).

Measures of Sexual Risk Taking Behaviour

A variety of tools were used to assess SRT. Five studies used measures/questions developed for the purpose of the study (Agardh et al., 2012; Turner et al., 2011; Murphy et al, 2001; Marks et al., 1998; Camacho et al, 1996) and four studies used one or more pre-existing measures/questions, including the Kinsey Institute Sexual Activity and Condom Use Questionnaire (KIACQ) (Bancroft et al., 2003, 2004) the Demographic and Sexual History Questionnaire (DSHQ) (Bancroft et al., 2003, 2004) the Sexual Risk Behavior section from the 2003 Youth Behavior Surveillance Survey (YRBSS) (Centers for Disease Control and Prevention, 2004) (Turner et al., 2011), and the NIDA-developed Risk Behavioral Assessment (RBA) instrument (Roberts et al., 2003).

Each of the nine studies included multiple measures of SRT, ranging from a minimum of two to a maximum of seven behaviours. All of the studies considered SRT as unprotected sex (either vaginal, anal, or both) as defined by non-condom use; however, there were differences in terms of when the risk behaviour took place. For instance, five

studies measured ‘non-condom’ use at the last occasion of sexual intercourse, (Agardh et al., 2012; Turner et al., 2011; Murphy et al, 2001; Marks et al., 1998) with the remainder measuring the frequency of behaviour (i.e. how many incidents of unprotected sex) over a defined period of time (e.g. 6 months, 1 year, or 3 years) (Bancroft et al., 2003, 2004, 2005; Roberts et al., 2003, Camacho et al, 1996 Eight studies also explored the ‘number of sexual partners’ as a SRT behaviour (excluding, Marks et al., 1998); however, the way in which this was operationally defined varied. For instance, six studies included number of sexual partners’ to cover both protected and unprotected sex (Agardh et al., 2012, Turner et al., 2011, Roberts et al., 2003, Murphy et al., 2001, Camacho et al., 1996), with the remaining three considering those ‘with whom no protection was used’ (Bancroft et al., 2003, 2004, 2005).

In addition, each study set different temporal parameters when asking for the number of sexual partners. Of those studies that included protected and unprotected sex, one considered the number of sexual partners within the past 12 months (Agardh et al., 2012), two, within the last 6 months (Murphy et al., 2001, Camacho et al., 1996), one within the last 30 days (Roberts et al., 2003), and one measured lifetime sexual partners (Turner et al., 2011). Of the studies that considered unprotected sex only, three studies measured the number of sexual partners within the past 6 months (Bancroft et al., 2003, 2004, 2005), one within the last 12 months (Bancroft et al., 2003), three within the last 3 years (Bancroft et al., 2003; 2004), and two in a lifetime (Bancroft et al., 2003, 2004). The remaining measures of SRT were often specific to the study sample. Five studies measured self-report HIV status, self-directed HIV testing, and past history of STIs (Bancroft et al., 2003, 2004, 2005; Murphy et al., 2001; Marks et al., 1998).

In addition, two studies also measured sex performed as a receptive partner, with someone whose HIV serostatus is unknown, and sex with casual partners (Bancroft et al., 2003; Marks et al., 1998). Finally, two studies measured sex with injection drug-users, sex

whilst intoxicated, and trading for sex (i.e. prostitution) (Roberts et al, 2003; Camacho et al, 1996).

Measures of Anxiety and Depression

A variety of scales were used to measure anxiety and depression in the nine included studies. The most frequently used anxiety measure was the STAI, and most frequently used depression measure was the ZDPR (see Table 3).

Table 3

Summary of anxiety and depression measures used in included studies

Scales	Cut-off	Studies
For anxiety		
STAI	Moderate 30 Severe 45	Bancroft et al. (2003; 2004; 2005)
DATAR (anxiety scale)	No recommendation	Roberts et al. (2003), Camacho et al. (1996)
BAI	Minimal 0-7 Mild 8-15 Moderate 16-25 Severe 26-63	Turner et al. (2011)
HSCL-25	1.75> caseness	Agardh et al. (2012)
RCMAS	19> caseness	Murphy et al., (2001)
POMS (tension-anxiety dimension)	No recommendation	Marks, et al. (1998)
For depression		
ZDPR	No recommendation	Bancroft et al. (2003; 2004; 2005)
DATAR (depressive scale)	No recommendation	Roberts et al. (2003), Camacho et al. (1996)
HSCL-25	1.75> caseness	Agardh et al. (2012)
CES-D	16> symptomatic	Turner et al. (2011), Murphy et al., (2001)
POMS (depression-dejection dimension)	No recommendation	Marks, et al. (1998)

Note: for abbreviations see key to Table 1.

Nature of Association

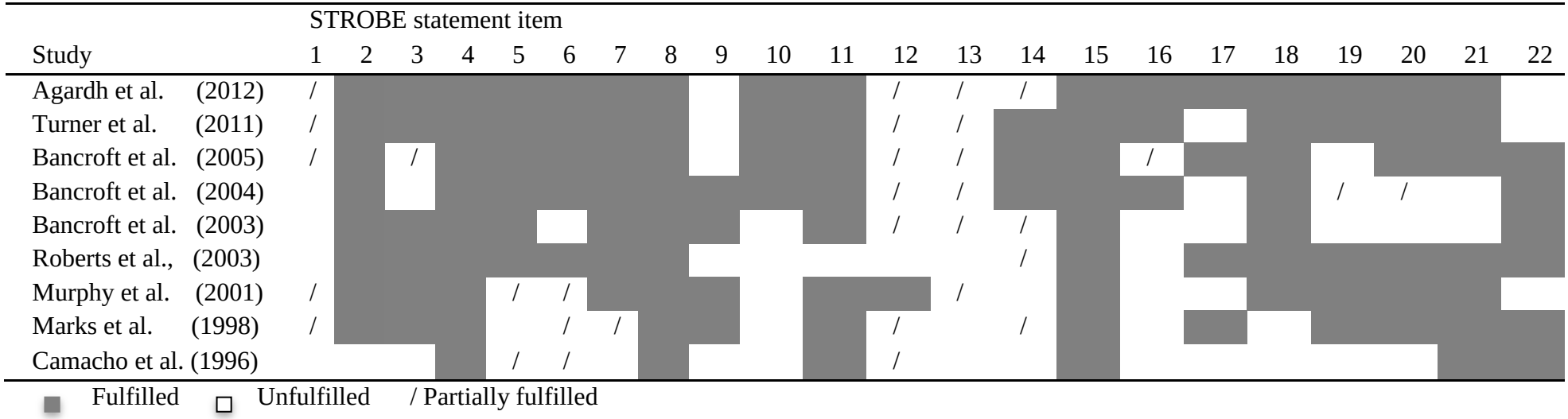
The review provides mixed evidence of an association between SRT and anxiety and depression. For instance, six studies found a positive association between anxiety and SRT (Agardh et al., 2012, $p<0.05$; Turner et al., 2011, $p<0.01$; Roberts et al., 2003, $p<0.01$; Marks et al., 1998, $p<0.05$; Camacho et al, 1996, $p<0.01/p<0.05$; Bancroft et al., 2004, $p<0.018$), whilst one found a negative association (Bancroft et al., 2003, $p<0.002$), and two found no association (Bancroft et al., 2005; Murphy et al., 2001, no *p*-values reported). Similarly, six studies found a positive association between depression and SRT (Agardh et al., 2012, $p<0.05$; Turner et al., 2011, $p<0.01$; Roberts et al., 2003, $p<0.01$; Murphy et al., 2001, no *p*-value reported; Marks et al., 1998, $p<0.05$; Camacho et al, 1996, $p<0.01/p<0.05$), whilst one study found a negative association (Bancroft et al., 2004, $p<0.04$), and two found no association (Bancroft et al., 2003, $p=0.06$; 2005, no *p*-value reported).

Quality Assessment

The outcome of the quality assessment undertaken by the two assessors using the STROBE statement checklist is presented in Table 4. No one study fulfilled all items on the checklist with some variation across items that were fulfilled. The studies that fulfilled the most items on the checklist are Agardh et al., (2012), Turner et al., (2011) and Bancroft et al., (2005), while the study by Camacho et al. (1996) fulfilled the least. A small number of items were fulfilled by all studies (‘4’, presenting of key methods used early in paper; ‘8’, description of data sources and methods of measurement; and ‘15’, reported numbers of outcome events/summary measures) while items ‘1’ (appropriate and informative title and abstract), and ‘13’ (detailed participant reporting) were either unfulfilled or only partially fulfilled by all the studies.

Table 4

Quality assessment of eligible studies



Discussion

Sexual risk-taking poses a considerable public health problem, and the modification of such behaviour is believed to be of paramount importance in the prevention of STIs (Downing-Jones et al, 2006). In particular, understanding the relationship between common mental health disorders, especially anxiety and depression, and SRT is believed to have important clinical and policy implications for modification of SRT and the prevention of STIs (Bancroft et al., 2004; Semaan et al., 2002; Donohew et. al., 1994). A variety of studies have explored the association between anxiety and depression, and SRT, however, a synthesis of these individual studies is required to give a global view of the evidence base.

This systematic review identified nine observational studies that explored the association between anxiety and depression, and SRT. The nature of the association between anxiety and depression and SRT differed across the nine studies. Five studies observed a positive association for both anxiety and depression with SRT (Agardh et al., 2012; Turner et al., 2011; Roberts et al., 2003; Marks et al., 1998; Camacho et al, 1996) and one study found no association across all of the variables tested (Bancroft et al., 2005). In the remaining studies, one found a negative association with depression and a positive association with anxiety (Bancroft et al., 2004), one found a positive association with depression only (Murphy et al., 2001), and a negative association with anxiety only (Bancroft et al., 2003). The nature of the association in one study differed in terms of gender with a positive association with depression for males and females but only a positive association with anxiety for males *not* females (Agardh et al., 2012). Thus, this review supports the current evidence base indicating an association between anxiety, depression and SRT, and that a proportion of individuals (but by no means all) experience unchanged or increased subjective sexual desire during negative affective states (e.g. Bancroft et al., 2004; Ware et al., 1996).

Traditionally, the association has been observed in terms of the negative impact of associated symptoms (e.g. low energy levels, fatigue, increased irritability, and reduced interest and pleasure in previously enjoyed activities; APA, 2013), and the documented side effects of anti-depressant/anxiety medications (e.g. Selective-Serotonin-Reuptake-Inhibitors; Beta-Blockers) on routine daily activities and relationships, including sexual functioning (WHO, 2001). Relating to this issue of sexual functioning, difficulties with physiological sexual arousal (e.g. erectile dysfunction) may be a factor influencing sexual performance, which may affect the measurement of SRT outcomes. For example, an elevated subjective desire to engage in sexual activity may be offset or negatively affected by the ability to achieve or maintain an erection which may influence an individual's decision to engage in sex at all, or indeed increase SRT behaviours in order to avoid certain situations (e.g. safe-sex practices such as condom negotiation with a partner) which may exacerbate such difficulties.

The presence of a positive association suggests that experiences of anxiety and depressive symptoms are linked to increased self-report of a variety of SRT behaviours. One explanation for this outcome is the idea that individuals may engage in SRT as a form of "self-medication" in order to reduce or minimise the experiences of negative affect (e.g. Bancroft et al., 2004). For instance, during sexual activity there is a release of endorphins (the body's natural pain-killer), which produces an overall sense of well-being and increases feelings of security, peacefulness and self-worth (e.g. Legato, 2006; Lykins, Janssen & Graham, 2006). Moreover, during orgasm the release of the neurotransmitters oxytocin (in women) and vasopressin (in men) boost feelings of pleasure and a sense of intimacy, promoting partner bonding (Legato, 2012). However, this self-medication hypothesis requires further study to understand the potentially complex relationship between affect, sexual libido (i.e. both physiological arousal *and* subjective sexual desire) and SRT, and the factors that mediate and moderate these relationships.

Sample Characteristics

The samples used in each of the reviewed studies varied widely in terms of gender (e.g. Marks et al, 1998; Roberts et al., 2003), age (e.g. Murphy et al., 2001; Turner et al., 2011), sexual orientation (Bancroft et al., 2004; Bancroft et al., 2005), and ethnic group (e.g. Rubin, Gold & Primack, 2009; Agardh et al, 2012). Across these highly specific samples there are likely to be a myriad of differences in terms of degrees of SRT. For example, in one study with a sample of undergraduate students with an age range of 16-23, SRT was classified as 'high' when a participant had 2 or more sexual partners within the past 12 months, which does not warrant a classification of 'high' on a SRT measure (i.e. Agardh et al, 2012). Similarly, sample groups of injection (e.g. Roberts et al., 2011) may bias study outcomes because measures of SRT incorporate sex-trading (i.e. prostitution) and sex with injection drug-users which may be a risk more commonly encountered by this group relative to the general population. However, an increased focus on specific population samples as seen here may reflect an interest in addressing elevated risk in these groups.

Additionally, there may be factors to consider that are specific to particular population groups. One study that sampled male only participants found that moderator variables accounted for the direction of association (i.e. Bancroft et al., 2003). For instance, the negative association found between anxiety and SRT pertained to the issue of physiological arousal. That is to say, sexual intercourse, which required a degree of physiological arousal, was negated by the effects of anxiety (Bancroft et al., 2003). Similarly, in HIV+ men there was evidence to suggest that possible condition-related erectile dysfunction impacted upon the ability to engage in sexual intercourse (Bancroft et al., 2005). This demonstrates that there are both between and within sample/group factors that may mediate the association between anxiety and depression and SRT, which justifies studying highly specific population groups.

Measures of Sexual-Risk Taking

As previously noted, there is a link between sample characteristics and the way in which SRT is operationalised and measured. A variety of SRT measures were used across the nine studies. For instance, in studies that sampled from highly specific groups-measures incorporating sex that had taken place with injection drug-users (e.g. Roberts et al., 2011), anal sex with HIV + and HIV – males (e.g. Marks et al., 1998), and trading sex for drugs, money, food, and shelter (e.g. Camacho et al., 1996). Moreover, even types of SRT that were used in all studies (i.e. unprotected sex) were operationalised and measured in different ways. The use of multiple definitions, and in some instances, the creation of composite scores has identified that associations may exist with specific behaviours rather than SRT in general.

In addition, a number of studies used a dichotomous distinction (i.e. yes versus no) to assess whether participants had engaged in SRT (e.g. non-condom use) at last sexual intercourse (i.e. Agardh et al, 2012; Turner et al 2011; Roberts et al., 2003; Murphy et al., 2001; Marks et al, 1998). However, this type of question neglects occasions when participants may have engaged in unsafe sexual practices prior to the last occurrence of sex (which may be within close temporal proximity to the last occurrence of sex). A number of studies addressed this issue by asking the frequency of SRT (i.e. Camacho et al 1996; Bancroft et al., 2003; 2004; 2005), however conceptual disparities across studies mean that variation of study outcomes were likely.

Across the studies an issue of concern is the temporal incongruence between the SRT measure and the measurement of anxiety and depression symptoms (Crepaz & Marks, 2001). For example, participants may be asked about their SRT behaviour over the last 6-months, but are only asked to report depressive and anxiety symptoms in the last 7-days. Three of the studies included in the review used incongruent measures of both anxiety and depression which did not map onto the timeframe assessing SRT (i.e. Agardh et al, 2012;

Turner et al 2011; Marks et al, 1998). Moreover, one study had an incongruent measure of depression in relation to SRT, but did not report temporal overlap for anxiety (i.e. Murphy et al., 2001), and two studies did not report the temporality of their measures for both anxiety and depression (i.e. Camacho et al., 1996; Roberts et al., 2011). Given that one of the recommendations of Crepaz and Marks (2001) following their meta-analysis was to address this issue of temporal incongruence, only three of the six studies published after this date reported having addressed the issue by adequately measuring the time of SRT in line with the self-report of anxiety and depression (i.e. Bancroft et al., 2003, 2004, 2005).

Measurement of Anxiety and Depression

The way in which anxiety and depression were measured also displayed considerable variation and have consequences for measurement incongruence identified by Crepaz and Marks (2001). State and trait measures of anxiety and depression assess symptoms over different time periods: state measures assess for transient and shorter-term feelings and so tend to ask participants to consider shorter periods of time when responding, whereas trait measures capturing broader, longer-term, and enduring characteristics of affect ask participants how they feel more 'generally'. There are few standardised measures of trait anxiety and depression, and only three studies in the review used state measures (STAI and ZDPR; Bancroft et al., 2003, 2004, 2005).

There is also the issue of matching measures, in terms of the psychometric properties for specific population samples. A number of studies selected state measures of anxiety and depression because they had been validated for use within a specific population sample (i.e. adolescents, Murphy et al., 2001; drug-users, Camacho et al., 1996, and Roberts et al., 2011; ethno-culturally specific sample, Agardh et al., 2012) and with reliability for both community (e.g. Murphy et al., 2001) and clinical samples (e.g. Agardh, et al., 2012). There is, therefore, need to identify valid and reliable trait measures of anxiety and

depression to overcome issues of temporal incongruence when exploring the association that SRT has with anxiety and depression.

A further issue raised by Crepaz and Marks (2001) concerns the suitability of statistical models used to determine the presence of a significant association in datasets. They suggested that those with moderate depression may be more likely to engage in SRT (as there is a psychological need for, and physical capacity to engage in sexual activity) than those with low (no psychological need to engage in sexual activity) or high (incapacitated by symptoms to engage in sexual activity) levels of anxiety and/or depression. They point out that curvilinear analysis is more appropriate to detect such an 'inverted U-shape' relationship between anxiety and depression, and SRT. This has further implications for the way in which anxiety and depression are reported. Most studies tended to use a dichotomous distinction of anxious/depressed and not anxious/depressed, or high anxious/depressive scores versus low anxious/depressive scores. A richer analysis of the data than can be achieved by assessing differences by utilising clinical cut-off scores in standardised measures to differentiate low, moderate, and high level scores for anxiety and/or depression severity (i.e. HADS).

Future Research Considerations

Future research should involve further cross-sectional, questionnaire-based research, which should attempt to address the issues related to temporal incongruence between measures including the use, where possible, of different state and trait measures to explore implications for the nature of the association, and the assessment of non-linear trends in the data. However, in order to move the field forward, particularly in terms of understanding the causal nature of the association, it will be important to move beyond the current reliance within the field on cross-sectional designs, to the design and implementation of prospective longitudinal studies that follow individuals over time.

Further work is also required in exploring the influences of individually occurring personality factors, mood, sexual desire and arousal, particularly in female populations, which are lacking within the extant literature. There have been developments in the form of a Dual Control model of sexual response, which posits that the interactive processes of inhibition and excitation may best explain findings observed within the literature (Janssen & Bancroft, 2006). Thus, future research could explore mood-related sexual desire, and propensity to reach orgasm as a factor influencing SRT, which may shed light upon the proposed inhibitory and excitation mechanisms outlined in the Dual Control model.

Limitations

To the author's knowledge this is the first systematic review offering a narrative synthesis of studies evaluating association between both anxiety and depression, and SRT. In addition to the biases and limitations considered in the synthesis of the individual research studies, the systematic review process itself is not immune from such considerations.

Systematic reviews are employed because they can reduce the risk of bias associated reliance on the outcome of single studies (Gard, Hackman & Tonelli, 2008). However, the nature of the review process is itself open bias. For example, while the current review searched more databases than did an existing meta-analysis in the field (e.g. Crepaz & Marks, 2001) and covered a broad array of relevant disciplines, there is still the potential for relevant literature to have been overlooked in the synthesis. The current review attempted to minimise this bias by searching the reference lists of the final full papers, which resulted in 46 additional papers that yielded one additional study in the synthesis. Future reviews may benefit from conducting a search of the grey literature to minimise the risk of publication bias whereby positive and "interesting" results are more likely to be published in academic journals (Gard et al**,** 2008). Limitations in time and resource availability precluded the ability to assess the grey literature in this review.

In addition, the decision to include *both* anxiety *and* depression in the search, rather than studies that focus solely on anxiety or depression, may have restricted the conclusions that can be drawn in the current review. Future reviews should seek to broaden the inclusion criteria to address this issue.

Conclusion

The findings in this review point to a positive association between anxiety and SRT, and depression and SRT such that experiences of anxiety and depressive symptoms are linked to increased self-report of a variety of SRT behaviours. However, the nature of the association differs somewhat according to the study sample, and the method of measuring SRT, anxiety, and depression, and the interaction between these features. Indeed, the range of methodological and conceptual issues outlined in this review with respect to the individual studies and the review process itself highlight the need to interpret these findings with a degree of caution. The relationships between SRT and anxiety and depression are likely to be complex and the possibility remains that these relationships are moderated and mediated by the influence of a range of contextual factors. Efforts to understand these relationships more fully will require further delineation and refinement of both conceptual definitions and methodological considerations.

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CHAPTER 2: MAJOR RESEARCH PROJECT

An exploratory cross-sectional study examining the relationship between negative affect and sexual risk-taking behaviour

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Lay Summary

Sexual risk-taking (SRT) behaviour such as non-condom use and having multiple sexual partners, poses a significant risk to health through its association with acquiring sexually transmitted infections, including HIV. Conditions such as anxiety and depression have traditionally been associated with reduced sexual libido; however, there is now evidence showing that for some individuals, these conditions may actually lead to increased sexual libido and, engagement in SRT behaviours as a means to alleviate negative mood states. In addition to anxiety and depression, mood-related sexual desire (MRSD) and impulsivity traits may play a role in influencing SRT behaviour. This study explores the relationship between SRT, and anxiety and depression, along with the consideration of MRSD and impulsivity in an inner-city sexual and reproductive health clinic. One-hundred-and-twenty adult participants attending the clinic completed an anonymous survey on their engagement in SRT behaviour, depression and anxiety, MRSD and impulsivity. There was some evidence indicating that higher levels of anxiety, depression, MRSD, and impulsivity were associated with higher levels of various SRT behaviours. However the exact nature of the relationship is complex, requiring further study. This information may be important for identifying individuals with an increased risk of engaging in SRT that can negatively impact on their physical and mental health. Findings from this study may contribute towards the development of appropriate support to prevent engagement in risky sexual practices, and promote improvement in sexual health and wellbeing.

Abstract

Background: Sexual risk-taking (SRT) is a primary contributor to the transmission of sexually transmitted infection, including HIV, and therefore poses a significant public health concern. Evidence suggests that the propensity to engage in SRT may be influenced by negative affective states (i.e. anxiety and depression symptoms), and individually varying characteristics (i.e. mood-related sexual desire (MRSD), and impulsivity).

Aims: The aim of this study was to explore the association between negative affect and five SRT behaviours. In addition it sought to explore the association between SRT and two key individual characteristics, MRSD and impulsivity.

Methods: A cross-sectional survey was completed by a convenience sample of 120 participants (median age 25.5; 78 female) recruited from an inner-city sexual and reproductive health clinic. The survey comprised 5 questionnaires relating to each of the key variables being explored.

Results: Non-parametric analysis provided evidence of the existence of an association between various forms of SRT and negative affect; however, the nature of the association differed according to the type of SRT. In addition, MRSD and impulsivity demonstrated mainly positive associations with SRT.

Conclusion: The findings support emerging evidence of increased engagement in certain forms of SRT when experiencing anxiety and depression symptoms. Moreover, the association with MRSD and impulsivity suggest these factors need further exploration in explaining the link between SRT and negative affect. This has implications for the development and implementation of prevention and intervention practices relating to SRT and mental health.

Keywords**:** anxiety, depression, sexual risk-taking, sexual desire, impulsivity

Introduction

The sexual health of Scottish citizens is poor (Scottish Executive, 2005). This is evidenced by a year-on-year increase in rates of sexually transmitted infections (STIs) (see: ISD Scotland, 2008 for most recent data). Individuals of varying sexual orientation, age, gender and ethnicity can be affected by STIs, including HIV transmission (WH0, 2015). The consequences of STIs can be significant with short- and long-term negative health outcomes for both men and women (Macdowell, 2002). These include (in)fertility issues, certain types of cancer, and in some instances premature mortality (Scottish Executive, 2005). Sexual risk-taking (SRT) behaviour plays a significant primary role in the contraction and transmission of STIs (WHO, 2015). Thus, identifying and understanding the factors that may lead individuals to engage in SRT has important implications for the prevention of STIs and promotion of sexual health.

Sexual Risk-Taking Behaviour

Sexual risk-taking encompasses a broad range of behaviours, however there are a core element of behavioural measures that are generally accepted (e.g. Slaymaker, 2004), including: unprotected sex, sexual debut, number of sexual partners, involvement in sex trading (i.e. prostitution), and type of sexual partner (i.e. long-term versus casual). Engagement in sexual activity, including SRT, can be used to regulate and improve anxious and depressive mood states (Lykins, Janssen & Graham, 2006); however, this is a relatively recent assertion, as previously it was commonly assumed that reduced sexual libido (i.e. sexual desire and arousal) was a secondary symptom of those experiencing anxiety and depression (e.g. Figueira, et al., 2001; Beck, 1967). Indeed, for a significant proportion of individuals with anxiety (e.g. Ware et al., 1996) and/or depression (e.g., Bancroft et al, 2004) sexual libido is unchanged or can be increased. Moreover, both of

these common mental health disorders have been linked to increases in SRT (see Bancroft et al., 2005).

Common Mental Health Disorders

The term "common mental health disorders" refers to a set of commonly occurring mental health conditions within the general population such as generalised anxiety disorder, social anxiety, and depression (NICE, 2011). A profile of mixed anxiety and depression is the most frequently occurring co-morbidity, with relatively few people receiving a depression or anxiety diagnosis in isolation (Singleton et al., 2001). Indeed, evidence suggests that individuals with comorbid disorders (e.g. anxiety and depression) are more likely to engage in SRT than those with no mental health disorder (Ramrakha et al., 2000). It would therefore be informative for any study interested in exploring the relationship between SRT and anxiety and depression, to evaluate both of these forms of common mental disorders together.

Sexual Risk-Taking in the Context of Negative Affect

The relationship between SRT and negative affect is complex, with contradictory evidence about the nature of these relationships (Janssen et al., 2013). Emerging evidence indicates that individuals experiencing anxiety and/or depression may be more likely to engage in SRT (e.g. Mazzaferro et al., 2006; Rubin et al., 2009). This may in part be linked to a behavioural strategy that serves to reduce tension, and cope with stress (Folkman et al., 1992). Indeed, such negative affective states can significantly impede cognitive performance resulting in risk appraisal and problem solving deficits, and impairment in self-directed positive and protective behaviour (Canin et al. 1999). The only meta-analysis in the field found insufficient evidence to support the hypothesis that anxiety and/or depression is associated in any way with SRT behaviour (Crepaz & Marks, 2001).

However, Bancroft et al., (2003) assert that the tendency for negative affect to increase SRT in some individuals and reduce it in others would account for the "nil effect" found in the meta-analysis. This highlights the potential role of individual differences in moderating the relationship between anxiety and/or depression and SRT.

Moderating Factors in the Relationship Between Negative Affect and Sexual Risk-Taking

The relevance of personality and other individually orientated variables has been explored within the context of the relationship between negative affect and SRT. In a series of cross-sectional studies, Bancroft and colleagues investigated the relevance of sexual arousability and sensation-seeking and found that in heterosexual males they accounted for 19% of the variance in their Mood Sexuality Questionnaire (Bancroft et al., 2003) whereas in homosexual males they found a more complicated relationship whereby only 4% of the variance in mood-sexuality was accounted for (Bancroft et al., 2003). Janssen and Bancroft note that a number of moderating variables can help explain the paradoxical relationship between negative mood and SRT. In addition to severity of anxious and depressive symptoms, additional key personality-related moderating variables include mood-related sexual desire (MRSD) and impulsivity (Bancroft et al., 2004).

Sexual Risk-Taking in the Context of Mood-Related Sexual Desire

Individual differences arising from the unique personal experience of anxiety and depression are relevant when considering the effect of MRSD on SRT. Since the late 1960s it has been reported that anxiety (e.g. Kaplan, 1988) and depression symptoms (e.g. Beck, 1967) reduce sexual libido. However, a body of evidence has emerged highlighting that this may not be the case for a significant proportion of individuals experiencing anxiety and depression symptoms (Bancroft et al., 2003). For some, sexual desire may actually

increase when anxious (e.g. Ware et al., 1996) and depressed (e.g. Bancroft et al, 2004) and thus moderate SRT. This may reflect a need to seek sexual contact for the purpose of mood regulation, sexual pleasure, need for intimacy and self-validation, or to simply feel calmer following orgasm (Bancroft et al., 2003). Moreover, there is evidence to suggest that the tendency to experience increased sexual desire when anxious and depressed may be associated with a stronger tendency to engage in regrettable sexual behaviours (Janssen, Macapagal, & Mustanski, 2013).

In a comprehensive attempt to quantify the effects of negative affective states on sexuality, Bancroft et al. (2003), designed the Mood Sexuality Questionnaire (MSQ), which was superseded by the MSQ-Revised (Janssen et al., 2013). These are the first scales to ask individuals to self-report personal, real-life experiences on the general effects of anxiety and depression on their sexual desire and response. Prior to the development of these measures research investigating association between mood states and sexuality were, for the most part, inferred by calculating correlations between, for example, anxiety and depression measures and sexual physiological response, and through experimentation using mood induction methods (see Janssen et al., 2013). While the MSQ seeks to capture participant responses on the effects of negative affect on their sexual desire and anticipated behavioural response, the MSQ-R goes further in its ability to measure some of the intricate and complex dimensions in the relationship among mood states (see MSQ-R in method).

The considerable variability in how negative affect influences MRSD, and the effect upon sexual behaviour has been reported in a mixed population sample (Janssen et al., 2013). It was found that heterosexual women were less likely than heterosexual and homosexual men to experience increased MRSD when anxious, and homosexual men and heterosexual women were less likely to experience increased MRSD when depressed

(Janssen et al., 2013). This highlights the importance of individual differences in the way MRSD influences regrettable sexual behaviour.

Sexual Risk-Taking in the Context of Impulsivity

Impulsivity has been a popular area of interest for investigators seeking to understand the relationship between personality constructs and risky, externalising behaviours, including substance misuse (e.g. Boschlooa, 2013), physical violence (e.g. Krueger, 2007) and SRT (e.g. Deckman & DeWall, 2011). More specifically, it has been found that individuals identified as anxious and depressed had higher impulsivity scores than individuals who are not anxious (e.g. Del Carol et al., 2012) or depressed (i.e. Corruble et al., 2003) supporting a potential moderating role of impulsivity in the association between SRT and negative affect (Dudley et al., 2004).

Impulsivity has been conceptualised and measured in a variety of different ways (Cyders et al., 2014). The development of the UPPS model of impulsivity (see Whiteside & Lynam, 2001) highlighted the multi-dimensional nature of impulsivity, originally proposing four dimensions which were expanded to five following further research, (Cyders & Smith, 2008):

- Positive Urgency: propensity for rash action when in positive mood states
- Negative Urgency: propensity for rash action when in negative mood states
- Premeditation (lack of): propensity not to consider consequences of one's actions
- Perseverance (lack of): propensity to experience difficulty remaining focused on challenging and boring tasks
- Sensation seeking: tendency to favour stimulating or exciting activities

Despite this, the majority of studies examining the effect of impulsivity on SRT focus on one of five factors – most commonly sensation-seeking (e.g. Bancroft 2003, 2004, 2005). This is likely due to the substantial body of evidence supporting the association between sensation-seeking and SRT (Hoyle et al., 2000). However, Birthrong and Latzman (2014) found that sensation-seeking and (lack of) perseveration were not significantly associated with SRT, and asserted that an examination of sensation-seeking alone is insufficient when evaluating the influence of impulsivity on SRT. It is therefore important any study of impulsivity uses a measure that accounts for the complexity of the construct.

The Current Study

Given the broad public health implications of STIs, it is essential to elucidate risk factors associated with SRT. The majority of studies seeking to ascertain the effects of negative affective states on SRT have returned inconsistent and complex findings. The considerable heterogeneity in outcomes and limited exploration of individual differences places limitations upon informing clinical practice and public health policy. This exploratory study considers some of the apparent limitations identified relating to the association between anxiety and depression with SRT, and the role of individual differences (i.e. MRSD and impulsivity) in a clinical sample.

Hypotheses

The following hypotheses will be tested:

Hypothesis 1a: Individuals with anxiety symptoms will exhibit increased levels of SRT compared to non-anxious individuals.

Hypothesis 1b: Individuals with anxiety symptoms will exhibit increased propensity for impulsivity, compared to non-anxious individuals.

Hypothesis 1c: Individuals who rate highly on MRSD when anxious will exhibit higher levels of SRT than individuals who rate low.

Hypothesis 1d: Individuals who rate highly on MRSD when anxious will exhibit higher levels of impulsivity than individuals who rate low.

Hypothesis 2a: Individuals with depression symptoms will exhibit increased levels of SRT compared to non-depressed individuals.

Hypothesis 2b: Individuals with depression symptoms will exhibit increased propensity for impulsivity compared to non-depressed individuals.

Hypothesis 2c: Individuals with who rate highly on MRSD when depressed will exhibit higher levels of SRT than individuals who rate low.

Hypothesis 2d: Individuals who rate highly on MRSD when depressed will exhibit higher levels of impulsivity than individuals who rate low.

Method

Ethical approval for the study was granted by the National Research Ethics Service prior to recruitment (15/WS/0023; see Appendix III).

Participants

A convenience sample of 120 adults (median age 25.5, IQR 21-33) attending an inner-city sexual and reproductive health clinic, situated within NHS Greater Glasgow and Clyde (NHSGGC) in Glasgow between March and May 2015 were recruited (see Table 5 for participant demographics).

Table 5

Participant characteristics

	Median	Range	Inter-quartile range
Age	25.5	17-68	21-33
Education status			
Number of years	14	2-22	12-17
	n (%)		
Level of education (missing *n*=2)			
Up to secondary (complete)	13 (10.8)		
Up to college (complete)	20 (16.7)		
Up to University (complete)	44 (36.7)		
Attending college or university	41 (34.2)		
Gender (missing *n*=1)			
Male	41 (34.2)		
Female	78 (65.0)		
Employment (missing *n*=1)			
Full-time	49 (40.8)		
Part-time	21 (17.5)		
Unemployed	18 (15.0)		
Full-time education	31 (25.8)		
Ethnicity			
White	111 (92.5)		
Other Asian	3 (2.5)		
Black African	1 (0.8)		
Other	5 (4.2)		
Income per annum (missing *n*=1)			
Below 10k	62 (51.7)		
11-20k	25 (20.8)		
21-30k	13 (10.8)		
31-40k	8 (6.7)		
41-50k	9 (7.5)		
51k +	2 (1.7)		
Sexual Orientation (missing *n*=2)			
Heterosexual	86 (71.7)		
Homosexual	11 (9.2)		
Bisexual	18 (15)		
Uncertain	3 (2.5)		
Current sexual partner (missing *n*=2)			
Yes	90 (75.0)		

No	28 (23.3)
Relationship status (missing *n*=1)	
Exclusive/monogamous	73 (60.8)
Non-exclusive/non-monogamous	18 (15.0)
No relationship	28 (23.3)
Marital status (missing *n*=1)	
Single/never married	94 (78.3)
Cohabiting	13 (10.8)
Married	4 (3.3)
Civil partnership	4 (3.3)
Separated/divorced	4 (3.3)

The clinic receives the majority of their patients via self-referral; however, many are referred from practitioners associated with local and regional community and acute health and social care settings. Services include community gynaecology, genitourinary medicine (e.g. STI assessment and treatment, including HIV testing), psychosexual medicine and counselling, termination of pregnancy, and acute sexual health emergencies. Despite being an inner-city clinic, the typical patient demographic varies considerably throughout the year, which is dependent on a number of factors such as the close proximity of temporary, short-stay asylum seeker housing, and educational institutions, including nearby Universities. The participant sample corresponds fairly closely with that of the patient group attending the clinic over the study period (1st March to 31st May 2015) on a number of key demographic variables (see Table 6). Thus, the sample can be considered broadly representative of the patient population.

Table 6

Comparison of demographic data for participant sample with population of clinic attending patients for the period between - 1st March and 31st May 2015

	Population n (%)	Sample n (%)
Clinic attending patients	18921	120
Gender (missing *n*=1)		
Female	13712 (72.46)	78 (65.0)
Male	5209 (27.53)	41 (34.16)
Sexual orientation		
Heterosexual	16141 (85.87)	86 (71.66)
Homosexual	2780 (14.69)	11 (9.16)
Age		
<16	358 (1.89)	0
16-19	2362 (12.48)	21 (17.5)
20-29	8031 (42.44)	57 (47.5)
30-39	4511 (23.84)	24 (20.0)
40-49k	2514 (13.28)	12 (10.0)
50 +	1210 (6.39)	6 (5.0)
Ethnicity (not recorded *n*=1941)		
White	14826 (78.35)	111 (92.5)
Other	1277 (6.74)	5 (4.16)
Asian (South & Other)	426 (2.25)	3 (2.5)
Black (African & Other)	318 (1.68)	1 (0.83)
Chinese	138 (0.72)	0

Justification for sample size

The study is an exploratory study, and to the author's knowledge no similar study exists in the examination of anxiety and/or depression symptoms, MRSD, impulsivity and SRT. It is, therefore, not possible to draw on existing effect sizes to calculate a sample size to ensure this study is sufficiently powered. The results of this study will be used to generate effect sizes that will facilitate sample size estimate for future research. However, Table 7 shows the power values assuming that anxiety/depression had a correlation with SRT (r = 0.4) and setting alpha at 0.025 (two-tailed).

Table 7

*Power and effect size calculation obtained using G*Power 3* (Faul et al., 2007).

Power	0.60	0.65	0.70	0.75	0.80	0.85	0.90
Sample size	52	58	65	73	82	93	109

The aim was to recruit up to 109 participants within the 12-week recruitment phase between 9th March and 31st May 2015. The sexual health clinic was visited by 11,556 attendees during this time frame in 2013 (Sandyford, 2013) thereby it was estimated that less than 1.0% of possible attendees would be required to participate to achieve a sample size necessary to yield a moderate effect.

Design

This study employed a cross-sectional survey design to explore the association between symptoms of anxiety and/or depression, SRT, MRSD, and impulsivity within a sexual health clinic population sample.

Measures

The survey comprised five elements:

Demographic and sexual information questionnaire (adapted from Socio-sexual Orientation Inventory [SOI], Simpson & Gangestad, 1991; SOI-revised, Seal & Agostinelli, 1994)

This measure captures a range of demographic and historical data, and SRT behaviours: age, gender, ethnicity, education level, employment status, sexual orientation, relationship status, frequency of sexual activity (not necessarily intercourse) in the last week; frequency of sexual activity with a partner (not necessarily intercourse) in the past 12 months;

number of different partners with whom sexual intercourse occurred in the past 12 months; number of single-occasion sexual partners (i.e. one night stands) in a lifetime; and number of sexual partners with whom safe-sex was not practiced. Completion time is approximately 2-3 minutes.

Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983)

This measure is a widely used 14-item self-administered screening tool for the identification of caseness for anxiety and depression in clinical and non-clinical populations. It was specifically designed to detect state-level anxiety, and depression and emotional distress in patients undergoing clinical treatment in such a way to reduce the confounding effect of somatic symptoms associated with physical health conditions (e.g. fatigue). Completion time for the 14 items (7 for the anxiety subscale; HADS-A, and 7 for the depression subscale; HADS-D) is approximately 2-3 minutes, which are scored according to four response options ranging from 'not at all' (0) to 'most of the time' (3). The total score is summed to give anxiety, and depression scores, and an overall emotional distress score. The scale has good reliability and validity, which varies from .40 to.74 (M = .56) and Cronbach's alpha for HADS-A varies from .68 to .93 (M = .83) and for HADS-D from .67 to .90 (M = .82) (Zigmond & Snaith, 1983).

Short (English version of the) Urgency, Premeditation, Perseverance, Sensation-Seeking-Positive Scale (SUPPS-P) (Cyders et al., 2014)

This is a 20-item self-report measure that assesses five facets of impulsivity (i.e. sensation-seeking, e.g. "I would like to fly an aeroplane"; (lack of) perseverance, e.g. "I finish what I start"; (lack of) premeditation, e.g. "I usually think carefully before doing anything"; negative urgency, e.g. "When I am upset I often act without thinking"; and positive urgency, e.g. "I tend to lose control when I am in a great mood") in adults and adolescents.

Completion time is approximately 2-3 minutes. Each factor is measured by four items, each of which is scored on a 4-point scale ranging from 'strongly agree' (1) to 'strongly disagree' (4). The points attributed to each item of a given factor can be added to form a total score, and an overall composite score can be calculated. Each factor subscale on the short version has adequate reliability, internal consistency (Cronbach alphas = 0.74-0.88 across subscales) and inter-scale correlations that compare favourably to the original long version (Cyders et al., 2014).

Revised Mood and Sexuality Questionnaire (MSQ-R) (Janssen, et al., 2013)

This is a self-report trait measure that explores how mood (i.e. anxiety/stress, sadness/depression, and happiness/cheerfulness) influences sexual desire, arousal, masturbation frequency, and sexual behaviours that may be later regretted). The questionnaire comprises eight subscales, the internal consistency of each has been found to be sufficiently high. However, for the purposes of this study only two subscales were used in the analysis of MRSD: Anxiety-desire (AnxDes) and Depression-desire (DepDes) (e.g. "When I feel anxious/stressed [or] sad/depressed, I think about sex"). Higher scores indicate a propensity for greater desire to have sex when anxious/stressed and sad/depressed. Cronbach alphas for the AnxDes measure are .87 for heterosexual men, .84 for heterosexual women, and .86 for homosexual men (Janssen et al., 2013). For the DepDes measure Cronbach alphas were .87 for heterosexual men, .86 for heterosexual women, and .87 for homosexual men (Janssen et al., 2013). Completion time approximately 3-5 minutes.

Research Procedures

Individuals wishing to seek the services of the sexual and reproductive health clinic registered their attendance with the receptionist following walk-in or scheduled

appointment. They were then offered a Participant Information Sheet (PIS) so as to make an informed decision regarding their participation. Due to the anonymous nature of the study participants were not required to provide personal information or a signature to offer consent, but rather, completion of the survey *implied* their consent to participate. Participants who had completed the survey that reported their age to be 16 and below were excluded. Individuals were informed they could opt-out of the study at any time without reason, but given the anonymous nature of the survey, their data could not be withdrawn at a later date.

Participants were offered three options to complete the survey (see Figure 2): 1. on-site using a paper format of the survey either prior to or following appointment which could be returned in deposit boxes provided; 2. off-site using a paper survey, which could be returned using a stamp-addressed envelope; or 3. off-site using an electronic version of the survey, which could be accessed via an internet web-link provided on the PIS.

The survey took approximately 10-15 minutes to complete. The PIS was explicit in stating that participation would require self-reflection on their current mental health status and sexual history. All participants were offered contact details of supportive organisations (e.g. Samaritans, SAMH etc.), NHS-24, and directions on how to obtain 1-to-1 supports from the Sandyford Listening Ears Counselling Service. Participants were encouraged to make contact with their G.P with any concerns surrounding their physical or mental health, which may have arisen following participation in the study.

The email and telephone numbers of three contact persons were provided on the PIS, one of which was an independent contact, and one whom was on-site at all times to answer questions and ensure participant comfort and safety. No clinicians took part in advertising or data collection processes. Participation did not affect any aspect of care or treatment. Participants were reminded that they should not provide any personal identifiers.

Data Analysis

While data collected from Likert-type scales (that denote specific categories of response) are often treated as interval data (at least) and analysed using parametric tests (when assumptions are met), it should be treated as ordinal level data necessitating non-parametric analysis (Field, 2009). The HADS, SUPPS-P, and MRSD subscales of the MSQ-R require participants to self-report on Likert-scales, and as such were treated as ordinal in the analysis. As ordinal level data violates a core assumption for the use of parametric tests the appropriate non-parametric equivalents were used.

Analysis involved data on each of the measures in its raw form and transformed into categories. Raw data for HADS-A and HADS-D were transformed into three categorical values according to the recommended clinical cut-offs for optimal identification of asymptomatic (score 0-7), borderline symptomatic (score 8-10), and symptomatic (score 11-21) groups (Zigmond & Snaith, 1983; Bjelland et al., 2002). However, there was an imbalance in the number of participants across the categories on HADS-D: asymptomatic group n=89, borderline n=13, and symptomatic n=18. Thus, to improve the power of the analysis an alternative cut-off, recommended for use in primary care (e.g. Wilkinson & Barczak, 1988) and out-patient samples (e.g. Olsson, Mykletun, & Dahl, 2005), was employed whereby a score of 0-7 is used to denote asymptomatic and a score of $\geq$8 to denote symptomatic.

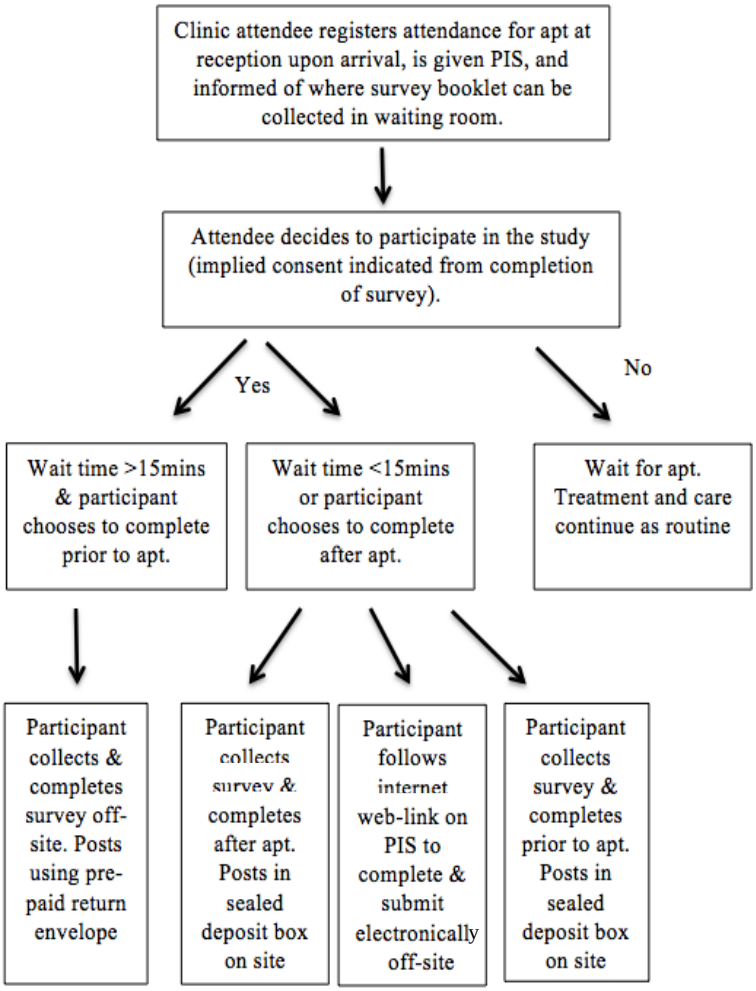

Figure 2. Flow chart illustrating participant recruitment process

The raw data for SUPPS-S and each of its five subscales were transformed into categorical values as proposed by Cyders et al., (2014) creating four groups (1= no endorsement of impulsivity, 2= low, 3= moderate, and 4= high levels of self-report impulsivity). Following exploration of each category size there was an imbalance in the number of participants across each of these groups on perseveration (high score *n*=3) and premeditation (high score *n*=4). Thus, at the expense of losing variation, the high and moderate categories were combined for these scales only to create a moderate/high category (perseveration *n*=22, and premeditation *n*=32) to improve the power of the analysis. It is worth noting that Cyders et al., (2014) proposed using the mean of the items

to identify the category into which an individual falls. However, as the data is ordinal, it is more appropriate to take the median of the scores in order to categorise the data. Finally, raw data for the AnxDes and DepDes subscales of the MSQ-R were categorised into high and low groups using a median split.

Statistical analysis was undertaken using IBM Statistical Package for the Social Sciences (SPSS) version 22. Bivariate correlational analysis using Spearman's Rho was conducted on the raw data to determine the associations between the variables and each of the five SRT factors and six scores derived from SUPPS-P (as appropriate). To minimise the risk of Type I error resulting from undertaking multiple correlations Bonferroni adjustments were calculated. For correlations involving the five factors of SRT the adjusted alpha value was .01; whereas for correlations involving the six scores derived from SUPPS-P the adjusted alpha value was .008.

To explore differences between the categories on the various scales and subscales for each of the five SRT factors and six scores derived from SUPPS-P (as appropriate), independent between groups comparisons were undertaken. For comparisons between multiple groups (i.e. HADS-A and SUPPS-P scores) Kruskal-Wallis tests were used, and post-hoc comparisons were made by SPSS with an automatic adjustment to correct the p-value. For comparisons between two groups (i.e. HADS-D and the two MRSD subscales) Mann-Whitney U tests were used.

As the study is exploratory in nature, both adjusted and unadjusted alpha values will be presented as well as findings approaching significance ($p<.10$). This is typical in exploratory research because methods of adjusting alpha to account for multiple comparisons can be conservative, particularly the Bonferroni correction, thereby increasing the risk of Type II error (Field, 2009).

Results

To begin, details of the participants are provided, which is followed by the presentation of the results of the inferential statistics according to the study hypotheses.

Participant Characteristics

One hundred and twenty six participants completed the survey. Table 5 provides descriptive data relating to the participants. Six participants were excluded due to missing/incomplete data. There was a greater proportion of female (65%) than male participants, and predominantly of white ethnicity (92.5%). The majority were in full- or part-time employment (70%), however over 50% of these participants earned below national average wages of £10k per annum. Most of the participants were in exclusive/monogamous relationships (60.8%), were heterosexual (86%), and had never been married (94%). Over 80% of the participants had previously had an STI test, of these 33% had a positive result.

To evaluate the effect of key demographic variables such as age, gender, educational level etc. sub-group analyses was considered. However, due to the small numbers in some of the demographic categories, such analyses would have been underpowered and so it was not meaningful to undertake sub-group analysis (see Appendix IV for demographic category frequencies).

Sexual Risk-Taking, Anxiety and Depression (Hypotheses 1a and 2a)

Spearman's Correlation Coefficients were conducted to explore the association between HADS-A, and HADS-D scores with each of the five SRT factors (see Table 8). Significant negative correlations were found for both HADS-A and HADS-D with number of times a person had sex within the last week (-.188, p=.020 and -.215, p=.009 respectively), and

positive correlations with the number of one night stands in a lifetime (.163, p=.038 and .338, p<.001, respectively). All other correlations were non-significant.

To explore the differences between the three groups on HADS-A and the two groups on HADS-D for each of the five SRT measures non-parametric omnibus tests were first conducted.

An independent samples Kruskal-Wallis test indicated that there was a significant difference in the number of one-night stands for HADS-A ($H(2) = 9.49$, $p < .01$). All other tests were non-significant ($p > .05$). Multiple pairwise comparisons, with an adjustment of the alpha level were performed across the three categories of HADS-A and found a statistically significant difference in the number of one-night stands in a lifetime between those categorised as asymptomatic on the HADS-A scale and those categorised as borderline ($p<.01$), with the difference between those categorised as asymptomatic and symptomatic just failing to reach significance ($p=.054$).

Independent samples Mann-Whitney U test indicated that those categorised as depressed on the HADS-D scale reported significantly more one night stands in a lifetime than those categorised as asymptomatic ($U=3.00$, $p<.01$). All other tests were non-significant ($p > .05$).

Anxiety, Depression, and Impulsivity (Hypotheses 1b and 2b)

Spearman's correlation coefficients were calculated for HADS-A and HADS-D with the six SUPPS-P factors (see Table 8). Significant positive correlations were found between HADS-A scores and the composite impulsivity score, and three of the subscales. Similarly, positive correlations were found between HADS-D scores and the composite impulsivity score, and two of the subscales, with one subscale approaching significance. To explore the differences between the three groups on HADS-A and the two groups on HADS-D for each of the six SUPPS-P factors non-parametric omnibus tests were conducted.

Table 8

Spearman's rho correlations for all variables explored

	SRT					SUPPS-P					
	SRT 1	SRT 2	SRT 3	SRT 4	SRT 5	Comp	NegUrg	PosUrg	Premed	Persev	S-S
HADS-A	r_s=-.188, p=.020	r_s=-.11, p=.127	r_s=-.026 p=.390	r_s=.163, p=.038	r_s=.077 p=.202	r_s=.453 p=.000#	r_s=.629 p=.000#	r_s=.436 p=.000#	r_s=.269 p=.001#	r_s=-.017 p=.428	r_s=-.009 p=.461
HADS-D	r_s=-.215, p=.009*	r_s=-.149 p=.053	r_s=.053 p=.281	r_s=.338, p=.000*	r_s=.123 p=.090	r_s=.299 p=.000#	r_s=.416 p=.000#	r_s=.281 p=.001#	r_s=.141 p=.063	r_s=.030 p=.374	r_s=.022 p=.405
AnxDes	r_s=.117 p=.103	r_s=.104 p=.129	r_s=*.283,* p=.001*	r_s=*.232,* p=.006*	r_s=*.283,* p=.001*	r_s=.262 p=.002#	r_s=.118 p=.101	r_s=.259 p=.002#	r_s=.201 p=.014#	r_s=.142 p=.062	r_s=.145 p=.057
DepDes	r_s=-.005 p=.477	r_s=.067 p=.234	r_s=.064 p=.245	r_s=.109 p=.119	r_s=.054 p=.279	r_s=.345 p=.000#	r_s=.344 p=.000#	r_s=.290 p=.002#	r_s=.157 p=.044#	r_s=.067 p=.268	r_s=.173 p=.030

Note:

*denotes significance with adjusted *p*-value for SRT # denotes significance with adjusted *p*-value for SUPPS-P

SRT 1: frequency of sexual activity (not necessarily intercourse) in the last week; SRT 2: Frequency of sexual activity with a partner (not necessarily intercourse) in the past 12 months; SRT 3: Number of different partners with who sexual intercourse occurred in the past 12 months; SRT 4: Number of one-night-stands with different partners in the lifetime; SRT 5: Number of different partners with who unprotected sex was had in past 12 months

Independent samples Kruskal-Wallis tests indicated that there were significant differences for HADS-A groups in terms of SUPPS-P composite score, and the negative urgency, positive urgency, and premeditation subscales (see Table 9). All other tests were non-significant (p>.05). Multiple pairwise comparisons with an adjustment of the alpha level were performed across the three categories of HADS-A for each significant outcome (see Table 9).

Table 9

Significant outcomes for analysis of HADS-A groups on scores derived from SUPPS-P

Impulsivity measure	Kruskal-Wallis test	Post-hoc comparisons
SUPPS-P total score	H(2)=20.748 p<.001	Asymptomatic v. Symptomatic, p<.001 Borderline v. Asymptomatic, p=.054
Negative Urgency	H(2)=38.996 p<.001	Asymptomatic v. Symptomatic, p<.001 Borderline v. Asymptomatic, p=.001
Premeditation	H(2)=6.378 p=.041	Asymptomatic v. Symptomatic, p=.035
Positive Urgency	H(2)=21.357 p<.001	Asymptomatic v. Symptomatic, p<.001 Borderline v. Asymptomatic, p=.026

Independent samples Mann-Whitney U tests indicated that those categorised as symptomatic on HADS-D had a significantly higher SUPPS-P composite score (U=2.236, p=.025) and negative urgency subscale score (U=2.771, p=.006), than those categorised as asymptomatic. All other tests were non-significant (p > .05).

Mood-Related Sexual Desire, and Anxiety and Depression (Hypotheses 1c and 2c)

Spearman's correlation coefficients were calculated for AnxDes and DepDes scales with the five SRT measures (see Table 8). Significant positive correlations were found between AnxDes and the number of different partners in the past 12-months (r_s=*.283*, p=.001) the

number of one night stands in a lifetime (r_s=*.232, p*=.006), and the number of times having had unprotected sex in past 12-months (r_s=*.283, p*=.001). All other correlations were non-significant. There were, however, no significant correlations between DepDes and any of the SRT measures (*p*>.05).

Independent samples Mann-Whitney U tests indicated that those categorised as high on AnxDes reported significantly higher numbers of sexual partners in the last week (U=2.045, *p*=.041), the number of different sexual partners in the past 12-months score (U=2.656, *p*=.008), and number of occasions of unprotected sex in the past 12-months (U=2.838, *p*=.005) than those categorised as low. All other tests were non-significant (*p*>.05).

Independent samples Mann-Whitney U tests indicated that those categorised as high on DepDes reported significantly higher numbers of different sexual partners in the past 12-months (U=2.041, *p*=.041) than those categorised as low. All other tests were non-significant (*p*>.05).

Mood-Related Sexual Desire and Impulsivity (Hypotheses 1d and 2d)

Spearman's correlation coefficients were calculated for AnxDes and DepDes scales with the six SUPPS-P factors, identifying a number of significant positive correlations (see Table 8)

Independent samples Mann-Whitney U tests indicated that those categorised as high on AnxDes reported significantly higher SUPPS-P composite scores (U=2.654, *p*=.008), and premeditation (U=2.057, *p*=.040) and positive urgency subscale scores (U=2.840, *p*=.005) than those categorised as low. All other tests were non-significant (*p*>.05).

Independent samples Mann-Whitney U tests indicated that those categorised as high on DepDes reported significantly higher SUPPS-P composite scores (U=2.458, *p*=.014),

negative urgency (U=2.876, *p*=.004) and positive urgency subscale scores (U=2.155, *p*=.031) than those categorised as low. All other tests were non-significant (*p*>.05).

Discussion

This study aimed to explore the relationship between negative affect (anxiety, and depression symptoms) and sexual risk-taking (SRT), along with two key variables mood-related sexual desire (MRSD) and impulsivity. The determination of conditions under which negative affect and personality factors are associated with SRT is crucial in supporting further conceptual and theoretical development, but also in clinical application leading to the creation of interventions for individuals at greatest risk of contracting STIs.

The findings presented in this exploratory study align with the wider literature in many respects, demonstrating the complex nature of the association between SRT and negative affect (anxiety and/or depression). First, the presence of at least one significant correlation or group difference between the various measures of SRT and negative affect offers further evidence suggestive of a paradoxical relationship between anxiety and depression and SRT, such that it may demonstrate a negative association under some circumstances, and a positive association under others (e.g. Bancroft et al., 2004). Secondly, given the higher MRSD in those experiencing negative affective states suggests an increased desire for sex during negative affective states. Thirdly, the greater levels of reported impulsivity were associated with greater levels of SRT. In particular, the findings from the subscales demonstrated the need to treat impulsivity as a multi-dimensional construct. Finally, higher levels of reported desire for sex during anxious and depressive states were associated with greater levels of impulsivity, which raises important questions for the influence of these variables on SRT as potential moderators. Each of the hypotheses is addressed in relation to the findings.

Relationship Between Sexual Risk-Taking and Negative Affect

Two of the five measures of SRT were found to have an association with both anxiety and depression: frequency of sexual activity in the last week demonstrated negative associations, and number of one night stands with different partners in a lifetime demonstrated positive associations. These findings appear to highlight temporal specificity for two SRT behaviours, and no associations for the other three, which reflects the contradictory evidence in the literature (see Crepaz & Marks, 2001). However, careful reflection is warranted when interpreting these findings. Most notably, the strength of interpretation is limited beyond the two-week time frame in which negative affect was measured against SRT behaviours spanning over 12-months and a lifetime. However, this paradoxical pattern of associations highlights the multifaceted nature of SRT (see Slaymaker, 2004). Indeed, the null or significant associations found in previous studies could be attributed to the use of different measures of SRT, within different population samples, and with varied temporal measurements of negative affect. Moreover, a potential explanation for the negative association found, may be because a proportion of the participants in this study may have been attending a return or follow up appointment for STI medical treatments (e.g. anti-biotics). The efficacy of a STI treatment is dependent upon abstinence from sexual contact with a partner, of which patients are routinely advised upon commencement of treatment.

The between groups comparison shed further light on the nature of the relationships, but in both cases the only significant difference was for number of one night stands with different partners in the lifetime. For this difference was between the asymptomatic and borderline levels of anxiety and between the asymptomatic and symptomatic levels of depression. However, given the small numbers in the depressed symptomatic group (n=3) which resulted in utilising the alternative cut-off to create two groups, the majority of participants in the new depressed symptomatic group would have previously been

categorised as borderline. Thus there is a degree of congruence between the finding for levels of anxiety and depression, which is reported in the wider literature (e.g. Turner et al., 2011; Roberts et al., 2003). This may reflect high rates of co-morbidity among anxiety and depressive disorders, with relatively few people receiving a single diagnosis in isolation (Singleton et al., 2001).

Moreover, in their meta-analysis Crepaz and Marks (2001) concluded that there was no evidence of any link between SRT and negative affect. They did, however, note that the reviewed studies may have adopted statistical models that failed to account for the possibility that individuals experiencing moderate anxious/depressive symptoms may be more likely to engage in SRT behaviour than those experiencing low or high levels of anxiety or depression. The proposed explanation was that those with more severe symptoms may experience lower levels of sexual libido (e.g. MRSD), such that it may preclude engagement in sexual activity (e.g. Bancroft et al., 2005). Using the clinically-relevant three group categorisation method for anxiety scores as proposed by the HADS (Zigmond & Snaith, 1983) the findings of this study fit with the proposal that those with moderate levels of anxiety and depression are more likely to engage in SRT. Despite the fact that the depression scores were categorised into two groups, one could argue that the symptomatic category in the present study captures mostly individuals with low-moderate levels of depression. Thus, it could be argued that for both moderate levels of anxiety and depression the relationship with the number of one night stands in a lifetime may be explained by the self-medicating hypothesis linking the calming effects of orgasm for anxiety and self-validation, need for intimacy, and mood regulation for depression (Bancroft et al., 2003). Consequently, it may be that individuals with low-moderate symptoms may be less affected by the inhibitory effects associated with elevated levels of anxiety and depression, which may influence the inclination to seek out sexual contact with a partner. This outcome further indicates that individuals experiencing moderate

levels of negative affect did not have reduced frequency of sexual experiences compared to those with no anxiety and depression symptoms. This lends itself to the hypothesis that individuals experiencing symptoms of anxiety and/or depression may experience no change or potentially increased sexual libido (sees also Bancroft et al, 2004; Ware et al., 1996).

It is acknowledged that this pattern is only evident for one measure of SRT in this study (i.e. number of one-night stands with different partners within the lifetime); however, this may simply be an artefact of the type of linear analysis that was undertaken. Indeed, Crepaz and Marks (2001) recommend the use of curvilinear analysis to assess the inverted U hypothesis of the association between SRT and negative affect. Despite this researchers have asserted that the findings of Crepaz and Marks (2001) may actually be the result of the failure of earlier studies to account for various moderator variables (Janssen & Bancroft, 2006). Moreover, this research has continued to adopt linear statistical models in the analysis of the relationship between negative affect and SRT. Thus, two lines of future enquiry should consider curvilinear forms of analysis as well as the role of moderator variables in order to explore the hypotheses proposed, and further develop the understanding of the association between negative affect and SRT.

Relationship Between Negative Affect and Impulsivity

In support of the hypothesis that individuals with anxiety and depressive symptoms would exhibit increased levels of impulsivity, the correlational analysis highlighted significant positive associations with the composite impulsivity score and three of the five factors of impulsivity. This translates to a tendency to act rashly in both negative and positive emotional contexts (i.e. negative and positive urgency) for individuals with higher levels of anxiety and depression, and a propensity to not think through potential consequences of

one's actions (i.e. premeditation factor) during higher levels of anxiety only. There was an association between the composite score of impulsivity and depression only.

In the group comparison analysis the same three factors of impulsivity and composite score were also significant. For depressive symptoms the impulsivity composite score was found to be significant between non-depressed and depressed individuals, indicating a clear distinction on the low and high points of a broad impulsivity continuum. For individuals classified as both anxious and depressed there was increased tendency to act rashly in negative emotional contexts (i.e. negative urgency). These outcomes may be best explained by an escape strategy whereby individuals experiencing anxiety/depressive symptoms often take immediate action, by engaging in avoidance behaviour, to escape anxiety provoking or low-mood triggering stimuli. In the context of SRT, one could hypothesise that engaging in sexual practices, including SRT, serves as a function to avoid triggers of unpleasant symptomatology associated with anxiety and depression.

A similar pattern of group comparisons were found for a tendency to act rashly during positive emotional states (i.e. positive urgency) for both anxious and depressed individuals. It may be that when anxious or depressed individuals engage in actions to capitalise upon the enjoyment and pleasurable effects of positive affect whilst it is experienced. Thus, rash action following positive emotional states may serve as a function to avoid re-entering a negative mood state.

Finally, there was a significant difference found between the non-anxious and anxious groups for a tendency not to think through consequences of one's behaviour (i.e. premeditation factor). This factor is an indicator of low self-control (Latzman & Vaidya, 2013), and the findings here may reflect the impact that anxiety disorders can have upon cognitive processing including risk appraisal and problem solving deficits, which can impair self-directed positive and protective behaviour (Canin et al. 1999).

Relationship Between Sexual Risk-Taking, and Mood-Related Sexual Desire and Impulsivity

Positive associations were found between anxiety-related sexual desire and three SRT measures: number of different sexual partners in the past 12 months; one night stands in the lifetime; and unprotected sex in the past 12 months. Although no significant correlations were found for depression-related sexual desire, comparing groups indicated significance with number of different sexual partners in the past 12 months. Taken in conjunction this outcome supports the hypothesis that individuals who experience increased MRSD during negative affective states, engage in sex with multiple partners.

In addition, it was found that individuals with elevated sexual-desire when anxious were more likely to engage in unprotected sex. This may be explained by the experience of anxiety symptoms prior to engaging in the process of social interaction needed to negotiate condom use with a partner (Brooks-Gunn & Paikoff, 1997). Indeed, individuals with anxiety disorder may experience heightened levels of negative arousal following condom negotiation with a partner leading to loss of erection, which may mediate attempts at safe sex (e.g. Bancroft et al., 2003). The differences in findings pertaining to MRSD when anxious or when depressed may be accounted for by additional factors not explored here (e.g. relationship status) or methodological considerations such as the limited variation across depressed groups, with the majority of participants classified as non-depressed. Future research could investigate these associations through employing greater sample sizes and more sophisticated forms of statistical analysis such as regression analyses.

A tendency to act rashly following negative (negative urgency) and positive emotional contexts (positive urgency), as well as difficulties with thinking through consequences to actions (premeditation factor) were found to be significantly associated to MRSD when anxious. A similar finding was observed with MRSD when depressed, where there was a tendency to act rashly following negative (negative urgency) and positive (positive

urgency) emotional states, although the composite impulsivity score was significant. In this instance it may be logical to hypothesise that at a simplistic level, anxious and depressive symptoms trigger a desire to escape from unpleasant negative affect (i.e. negative urgency) and desire to avoid re-entering a negative affective state when experiencing positive emotion (i.e. positive urgency), thereby precipitating action toward sex for the purpose of 'self-medication'.

Study Strengths and Limitations, and Future Directions

The results of this study extend extant findings on the relationship between negative affect and SRT, including a consideration of impulsivity and MRSD. As far is the author is aware, it is the first time these relationships have been explored collectively. Thus, while there are a number of strengths of the study, it is acknowledged that there are a number of limitations, which present avenues for future research.

First, the study included the use of specialised measures developed from the latest theoretical and empirical findings pertaining to impulsivity and MRSD (Cyders et al., 2014; Janssen et al., 2013), and is of the first to use these measures in a research context. In particular, the use of the 5-factor impulsivity measure has further highlighted the importance of accounting for the multi-dimensional nature of this personality construct (Birthrong & Latzman, 2014), beyond the focus of single facets (e.g. sensation-seeking). Furthermore, the variability in MRSD experienced by depressed and anxious individuals highlighted the influence of various impulsivity characteristics. However, there are a number of other potentially important variables that have been identified as moderating the association between negative affect and SRT (Janssen & Bancroft, 2006) that warrant further empirical study in order to better understand the nature of the association. For instance, the Dual Control model developed by the Kinsey Institutes suggests that the interactive processes of inhibition and excitation may offer a fruitful area for future

exploration (Janssen & Bancroft, 2006). These two constructs are multi-dimensional and incorporate considerations of MRSD and impulsivity, so would present a logical next step following from the current study. Moreover, an important consideration, which has not been evaluated in this study, is the potential influence of anti-depressant/anxiety medications on SRT outcomes. Selective serotonin-reuptake inhibitors (SSRIs) and beta-blockers for instance, can affect a person's subjective desire/interest to engage in sex, their physiological arousal (e.g. ability to obtain/maintain an erection), and their sexual performance (e.g. ability to achieve orgasm) (Clayton et al., 2002). Participants in this study were not asked to report on whether they had received a formal diagnosis and if they were taking prescribed medications. It is possible that participants may have experienced libido-suppressing effects of anti-depressant/anxiety medications, which may have altered their typical pattern of sexual practices and potential for engagement in SRT behaviours. This important issue should be considered in future research.

Secondly, a degree of caution is required when interpreting the findings of the study, as specific aspects of the design may be prone to risk of bias. For instance, it was not always possible to undertake the planned analysis to explore differences between groups. The most notable instance was for the depressed groups where there were insufficient numbers of people (n=3) classified as symptomatic according to the recognised cut-offs (score >11; Zigmond & Snaith, 1983). At the risk of the loss of variability (by reducing the number of groups from three to two), in order to maximise statistical power an alternative categorisation was used according to a cut off of >8, which has been validated for use in primary care (e.g. Wilkinson & Barczak, 1988) and out-patient samples (e.g. Olsson, Mykletun, & Dahl, 2005). This is a particular limitation of utilising a convenience sample, whereby the study is dependent upon those whom are inclined to participate. This is associated with increased risk of participation bias whereby certain types of individuals will choose to participate while others will not.

Thirdly, the timing and location of completion of the survey may have influenced responses. For example, it is possible that participants who completed the survey in the clinic waiting room may have experienced elevated situational anxiety compared to participants who chose to complete at home. Additionally, participants who completed the survey prior to their clinic appointment may have experienced anticipatory anxiety; alternatively those whom completed after their appointment may have experienced anxiety and/or low mood in response to knowledge acquired about a health or treatment outcome. These factors may have introduced a degree of bias to the data, but were not accounted for in the analysis.

Fourthly, the demographics of the sample demonstrate bias toward white, female, young adults. While it wasn't the intention to recruit a specific sample, which has been the case in many of the studies exploring the effect of negative affect on sexuality within specific risk groups (i.e. homosexual males, see Bancroft et al., 2003, 2004; drug-users, see Marks et al., 1998), when taken in isolation the findings lack generalizability. However, given that there is beginning to amass a number of studies supporting the "paradoxical relationship" between negative affect and sexuality in a variety of different cohorts, taking the evidence-base as a whole suggests that the finding might be generalizable beyond the specific study samples. Nonetheless, future research would benefit from a more purposive sampling strategy that would overcome the risk of participation bias, enabling the appropriate analyses to be undertaken, and increasing the generalizability of the findings to the wider population.

In addition, studies in the field of negative affect and SRT have tended to employ cross-sectional designs. While such designs are appropriate during the initial exploratory stages of a field, as they require relatively little resources and are not very labour intensive, they are limited in terms of understanding the causal nature of an association. Thus, it is not possible to infer whether the symptoms of anxiety and depression caused the increased

SRT, or vice versa. Indeed, both are plausible. This in particular requires further work, as it is here that the clinical implications of the association lie in terms of understanding with whom and how to intervene. In order to better understand the causal nature of the association it would be necessary to consider other epidemiological study designs: initially, case-control studies would provide a better understanding before moving on to more resource- and labour-intensive prospective, longitudinal studies.

Finally, as with all self-report methods, particularly when they require retrospective recall, it is necessary to consider the risk of response and recall bias. In particular, the extent of one's anxious and/or depressive symptoms may inhibit an objective assessment of SRT, especially when required to recall such behaviours over an extended timeframe (i.e. one night stands in a lifetime). Moreover, the way in which constructs were measured in this study limits the ability to draw conclusions because of a mismatch between state and trait measures over different time periods. The issue of temporal incongruence between measures such that, for example the HADS measures state anxiety and depression (i.e. over the past 2 weeks) whereas some of the SRT behaviours used were measured over longer periods (i.e. 12-months and lifetime). Indeed, the multi-factor impulsivity construct, as measured by the SUPPS-P, can be considered a trait measure. Thus, it is not possible to associate directly the experience of negative affect or impulsivity factors with the occurrence of SRT. In order to address this issue, it would be necessary to use a trait measure of anxiety and depression; however, no such scale exists that also accounts for the confounding effect of the clinical environment on responses in the same way that HADS does (see Zigmond & Snaith, 1983). Thus, until such a measure is devised the issues associated with temporal incongruence will continue to blight the evidence base. Although it is recommended that the behavioural indicators used to measure SRT be varied across different temporal parameters (see Slaymaker, 2004), future investigations should address the issue of temporal incongruence to increase study validity.

Clinical Implications

The current findings when considered alongside the wider evidence base suggest that individuals experiencing moderate levels of anxiety and depression, and increased desire for sex, and impulsivity during these negative affective states, may be more likely to engage in SRT behaviours, placing them at increased risk for contracting a STI. In routine clinical practice screening for these factors may enable sexual-health practitioners to identify and focus on those at greatest risk. For example, knowing that a patient experiences elevated sexual desire and difficulties with impulse control and/or thinking through the potential consequences of one's actions during anxious and/or depressive states may support formulation of a patient's STI risk. This information may guide practitioners in their selection and use of appropriately tailored interventions to support patients in their awareness of the risks they face.

Conclusion

Personality factors and mood states can go only part of the way in explaining SRT behaviour. As has been illuminated by the findings here, the "paradoxical relationship" frequently reported within the literature may be best examined in relation to a dual control perspective highlighting the interactive processes of inhibition and excitation. The present study has shown that relationships exist between SRT and anxiety, depression, MRSD and impulsivity; however it may be time to approach a practice-based evidence approach to further support understanding of theoretical development. Thus, both offering guidance and support to those at risk, and providing much needed supplementary evidence to feed into future theoretical construction.

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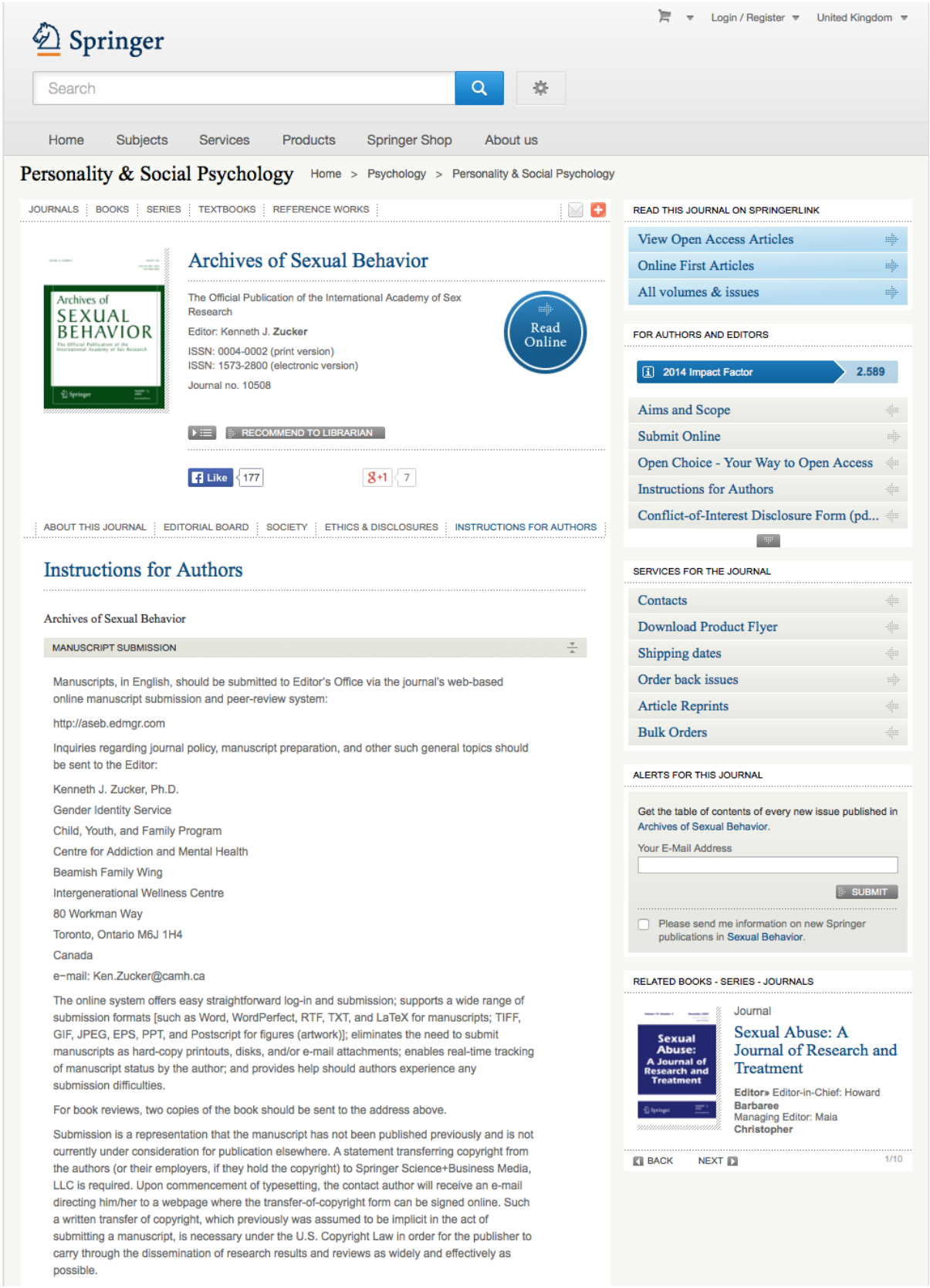

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Illustrations (photographs, drawings, diagrams, and charts) are to be numbered in one consecutive series of Arabic numerals and cited in numerical order in the text. Photographs should be high-contrast and drawings should be dark, sharp, and clear. Artwork for each figure should be provided on a separate page. Each figure should have an accompanying caption. The captions for illustrations should be listed on a separate page.

Tables should be numbered consecutively with Arabic numerals and referred to by number in the text. Each table should be typed on a separate page and should have a descriptive title. Center the title above the table, and type explanatory footnotes (indicated by superscript lowercase letters) below the table.

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List references alphabetically at the end of the paper and refer to them in the text by name and year in parentheses. References should include (in this order): last names and initials of all authors, year published, title of article, name of publication, volume number, and inclusive pages. The style and punctuation of the references should conform to strict APA style -- illustrated by the following examples:

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Meston, C. M., & Frohlich, P. F. (2000). The neurobiology of sexual function. Archives of General Psychiatry, 57, 1012−1030.

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Bem, D. (2000). The exotic−becomes−erotic theory of sexual orientation. In J. Bancroft (Ed.), The role of theory in sex research (pp. 67−81). Bloomington, IN: Indiana University Press.

FOOTNOTES

Footnotes should be avoided. When their use is absolutely necessary, footnotes should be numbered consecutively using Arabic numerals and should be typed at the bottom of the page to which they refer. Place a line above the footnote, so that it is set off from the text. Use the appropriate superscript numeral for citation in the text.

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The 2009 Publication Manual of the American Psychological Association (Sixth Edition) should be used as the style guide for the preparation of manuscripts, particularly with respect to such matters as the citing of references and the use of abbreviations, numbers, and symbols. Manuscripts departing significantly from the Sixth Edition style will not be reviewed until a corrected manuscript has been received.

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Appendix II. STROBE Statement Checklist

	Item.	Recommendation	Page	Relevant text from manuscript
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract		
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found		
Introduction				
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported		
Objectives	3	State specific objectives, including any prespecified hypotheses		
Methods				
Study design	4	Present key elements of study design early in the paper		
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection		
Participants	6	(*a*) *Cohort study*—Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up *Case-control study*—Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls *Cross-sectional study*—Give the eligibility criteria, and the sources and methods of selection of participants		
		(*b*) *Cohort study*—For matched studies, give matching criteria and number of exposed and unexposed *Case-control study*—For matched studies, give matching criteria and the number of controls per case		
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable		
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is		

		more than one group
Bias	9	Describe any efforts to address potential sources of bias
Study size	10	Explain how the study size was arrived at
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding
		(*b*) Describe any methods used to examine subgroups and interactions
		(*c*) Explain how missing data were addressed
		(*d*) *Cohort study*—If applicable, explain how loss to follow-up was addressed *Case-control study*—If applicable, explain how matching of cases and controls was addressed *Cross-sectional study*—If applicable, describe analytical methods taking account of sampling strategy
		(*e*) Describe any sensitivity analyses
Results		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed
		(b) Give reasons for non-participation at each stage
		(c) Consider use of a flow diagram
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders
		(b) Indicate number of participants with missing data for each variable of interest
		(c) *Cohort study*—Summarise follow-up time (eg, average and total amount)
Outcome data	15*	*Cohort study*—Report numbers of outcome events or summary measures over time
		Case-control study—Report numbers in each exposure category, or summary measures of exposure

		Cross-sectional study—Report numbers of outcome events or summary measures
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included
		(*b*) Report category boundaries when continuous variables were categorized
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses
Discussion		
Key results	18	Summarise key results with reference to study objectives
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability	21	Discuss the generalisability (external validity) of the study results
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Appendix III: Ethical Approval Letter

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Greater Glasgow and Clyde

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Ground Floor, Tennent Building
Western Infirmary
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G11 6NT
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Dr Ross White
Institute of Health and Wellbeing
College of Medical, Veterinary & Life Sciences
Admin Building, Gartnavel Royal Hospital
1055 Great Western Road
Glasgow
G12 0XH

Date 27 February 2015
Direct line 0141-211-1722
Fax 0141-211-1847
e-mail Wosrec4@ggc.scot.nhs.uk

Dear Dr White

Study title:	**An exploratory study examining the relationship between symptoms of depression, anxiety, and sexual risk-taking behaviour**
REC reference:	**15/WS/0023**
Protocol number:	**4**
IRAS project ID:	**158662**

Thank you for your email dated 23 February 2015. I can confirm the REC has received the documents listed below and that these comply with the approval conditions detailed in our letter dated 13 February 2015

Documents received

The documents received were as follows:

Document	*Version*	*Date*
Other [Poster]	3	18 February 2015
Participant information sheet (PIS) [Paper Version]	4	18 February 2015
Participant information sheet (PIS) [Electronic Version]	4	18 February 2015
Validated questionnaire [Questionnaire Booklet]	5	18 February 2015

Approved documents

The final list of approved documentation for the study is therefore as follows:

Document	*Version*	*Date*
Copies of advertisement materials for research participants [Site advertising poster]	2	02 December 2014

Covering letter on headed paper [Sponsorship authorisation]	1	23 January 2015
Other [Poster]	3	18 February 2015
Participant information sheet (PIS) [Paper Version]	4	18 February 2015
Participant information sheet (PIS) [Electronic Version]	4	18 February 2015
REC Application Form [REC_Form_26012015]		26 January 2015
Research protocol or project proposal [Research Protocol]	4	21 November 2014
Summary CV for Chief Investigator (CI) [CV Ross White (CI)]	1	22 December 2014
Summary CV for student [CV Claire Johnson (PI)]	1	24 December 2014
Summary CV for supervisor (student research) [CV Alexandrea MacPherson (local researcher)]	1	22 December 2014
Validated questionnaire [Questionnaire Booklet]	5	18 February 2015

You should ensure that the sponsor has a copy of the final documentation for the study. It is the sponsor's responsibility to ensure that the documentation is made available to R&D offices at all participating sites.

15/WS/0023 **Please quote this number on all correspondence**

Yours sincerely

Evelyn Jackson
REC Manager

Copy to: *Claire Johnson*
Dr Karen Bell, NHS Ayrshire and Arran

Appendix IV: Sub-group Category Frequencies

Participant demographic and HADS score frequencies

		HADS-A			HADS-D	
	Total	Asymptomatic	Borderline	Symptomatic	Asymptomatic	Symptomatic
Gender						
Male	41	9	14	18	22	14
Female	79	24	15	40	62	17
Education level						
1	13	1	4	8	11	2
2	21	2	4	15	12	9
3	44	14	13	17	28	16
4	42	17	7	18	38	4
Income level						
1	62	19	11	32	54	8
2	25	2	8	15	15	10
3	14	5	5	4	10	4
4	8	3	3	2	3	5
5	9	3	1	5	5	4
6	2	2	0	1	1	0
Age						
1	21	6	4	11	19	2
2	57	17	11	29	51	6
3	24	11	5	8	11	13
4	12	1	7	4	6	6
5	6	1	2	3	1	5

Participant demographic and SUPPS-P total score frequencies

		SUPPS-P total		
	Total	None	Low	Moderate/High
Gender				
Male	41	6	15	20
Female	79	15	45	19
Education level				
1	12	4	3	6
2	21	4	7	10
3	44	5	30	9
4	42	8	20	14
Income level				
1	62	8	34	20
2	25	5	8	12
3	14	4	9	1
4	8	2	3	3
5	9	1	5	3
6	2	1	1	0
Age				
1	21	2	7	12
2	57	8	38	11
3	24	4	9	11
4	12	6	4	2
5	6	1	2	3

Participant demographic and negative urgency score frequencies

		SUPPS-P negative urgency			
	Total	None	Low	Moderate	High
Gender					
Male	41	6	10	17	8
Female	79	15	23	26	15
Education level					
1	12	0	4	6	2
2	21	1	2	10	8
3	44	5	15	18	6
4	42	15	12	9	6
Income level					
1	62	12	17	20	13
2	25	4	8	8	5
3	14	4	3	6	1
4	8	0	0	6	2
5	9	0	5	3	1
6	2	1	0	0	1
Age					
1	21	5	6	7	3
2	57	8	19	19	11
3	24	5	4	9	6
4	12	2	4	4	2
5	6	1	0	4	1

Participant demographic and perseveration score frequencies

		SUPPS-P perseveration		
	Total	None	Low	Moderate/High
Gender				
Male	41	17	11	13
Female	79	33	37	9
Education level				
1	12	5	5	2
2	21	9	7	5
3	44	19	16	9
4	42	16	20	6
Income level				
1	62	23	30	9
2	25	12	8	5
3	14	7	4	3
4	8	5	1	2
5	9	3	3	3
6	2	0	2	0
Age				
1	21	6	8	7
2	57	24	28	5
3	24	11	7	6
4	12	6	4	2
5	6	3	1	2

Participant demographic and premeditation score frequencies

		SUPPS-P premeditation		
	Total	None	Low	Moderate/High
Gender				
Male	41	17	9	15
Female	79	22	40	17
Education level				
1	12	4	4	4
2	21	6	9	6
3	44	20	18	6
4	42	9	18	15
Income level				
1	62	16	29	17
2	25	6	11	8
3	14	9	4	1
4	8	5	0	3
5	9	2	4	3
6	2	1	1	0
Age				
1	21	1	9	11
2	57	22	23	12
3	24	7	11	6
4	12	5	6	1
5	6	4	0	2

Participant demographic and sensation seeking score frequencies

		SUPPS-P sensation-seeking			
	Total	None	Low	Moderate	High
Gender					
Male	41	0	6	20	15
Female	79	13	11	36	19
Education level					
1	12	0	3	6	3
2	21	7	2	8	4
3	44	4	5	22	13
4	42	2	7	19	14
Income level					
1	62	8	8	23	23
2	25	0	4	17	4
3	14	4	3	6	1
4	8	0	0	6	2
5	9	0	2	3	4
6	2	1	0	1	0
Age					
1	21	2	0	9	10
2	57	5	10	25	17
3	24	4	2	13	5
4	12	2	5	4	1
5	6	0	0	5	1

Participant demographic and positive urgency score frequencies

	Total	None	Low	Moderate	High
Gender					
Male	41	11	11	14	5
Female	79	33	29	8	9
Education level					
1	12	3	6	3	1
2	21	7	1	4	9
3	44	15	16	12	1
4	42	19	17	3	3
Income level					
1	62	20	26	9	7
2	25	10	3	5	7
3	14	7	6	1	0
4	8	2	2	4	0
5	9	4	2	3	0
6	2	1	1	0	0
Age					
1	21	6	7	4	4
2	57	24	22	6	5
3	24	6	6	7	5
4	12	7	3	2	0
5	6	1	2	3	0

Appendix V: MRP Proposal

Major Research Project Proposal

Date of submission: 11th August 2014

An exploratory study examining the relationship between symptoms of depression, anxiety and sexual risk-taking behaviour

Claire Evans (nee Johnson)

Trainee Clinical Psychologist

Research Supervisors

Dr Ross White – academic supervisor

Dr Alexandrea Macpherson – field supervisor

Abstract

Background: Depression and/or anxiety can contribute to sexual risk-taking behaviour. This is associated with unintended pregnancies and sexually transmitted infection, which constitute a significant public health concern. Sexual risk-taking may result from an association between depression and/or anxiety symptoms and impulsivity. In addition, there is evidence to suggest that depression and/or anxiety symptoms may increase sexual activity for some individuals as a means to regulate mood. To the best of the author's knowledge, there has been no study examining the relationship between depression and/or anxiety symptoms and how this relates to sexual risk-taking behaviour, impulsivity and sexual interest.

Aims: The aims of this study are to: 1. explore the association that depression and/or anxiety symptoms have with sexual risk-taking, sexual interest and impulsive behaviours, and 2. Investigate how these factors relate to various participant socio-demographic variables.

Methods: Individuals aged 16 years and over, attending an inner-city sexual health clinic, will be asked to anonymously complete a survey booklet containing questionnaires measuring depression and/or anxiety symptoms, impulsivity and sexual interest during negative mood states. Completion will be paper-based whilst in the waiting room, at home or electronically using an internet link.

Applications: Effective screening of depression and/or anxiety symptoms within sexual health clinic settings may provide an opportunity for assessment and intervention for both mental health difficulties and sexual risk-taking behaviour.

Introduction

Depression and/or anxiety symptoms can contribute to sexual risk-taking behaviour.[1,2,3] For instance, a prospective study in the U.S explored the relationship between depression, sexual risk-taking behaviour and sexually transmitted infection (STI) by home-interviewing a cohort of white and black young adults.[2] It found that when controlling for demographic, socioeconomic, adolescent STI risk, and substance use variables, the association between depression and sexual risk-taking behaviour remained. This suggests that depression may influence STI risk independently of these other important factors. They further highlighted that gender and ethnicity-specific dimensions mediate a strong link between depression and STI risk. They highlighted the need to step up integration of mental and sexual health screening and prevention programmes for young adults amongst the general public especially those of black ethnicity. The link between anxiety and sexual risk-taking is somewhat more tentative, with limited evidence suggesting that individuals with anxiety disorders may be more likely to report STIs and engage in increased sexual risk-taking.[4,5]

It has been proposed that sexual risk-taking behaviour encompasses a range of sexual practices such as, condom non-use and multiple sexual partners which are associated with unintended pregnancies and STI,[6] including Human Immunodeficiency-Virus (HIV) infection.[7] It would, therefore seem that both screening and diagnosis for anxiety and depression are necessary not only because these conditions constitute a significant public health concern in themselves but also because addressing anxiety and depression may lead to improved physical health, including reduced risk for STI.

Sexual risk-taking behaviour may be due to an association between depression and/or anxiety symptoms and the trait construct of impulsivity.[8] Research indicates that individuals identified as anxious can be higher on impulsivity scores than individuals who are not anxious.[9] Similarly, there is evidence to suggest that depressed individuals can rate

higher on levels of impulsivity than non-depressed individuals.[10,11] Furthermore, there is evidence to suggest impulsivity may underlie other risk-taking behaviours, including drug misuse, physical violence in addition to sexual risk-taking behaviour.[12,13] Historically, the construct of impulsivity has received numerous inconsistent conceptualisations within the literature resulting in the development of a host of measurements.[14,15] This has resulted in varying outcomes when researchers have investigated the link between impulsivity and risk-taking behaviour.[16] Confirmatory factor analysis has indicated that impulsivity encompasses five distinct facets with the inclusion of sensation seeking, lack of premeditation, lack of perseverance, and both negative and positive urgency.[14,17] In particular, sensation seeking and sexual risk taking appear to be strongly associated and it is therefore important to include an impulsivity measure which can capture this facet in research studies (e.g. The Short English Version of the UPPS-P Impulsive Behavior Scale [SUPPS-P].[14]

The link between depression and/or anxiety symptoms and sexual risk-taking behaviour may be mediated by increased sexual interest during depressive and/or anxious mood states, for the purpose of mood regulation, need for intimacy and self-validation.[18,19] Research has tended to find that depression[20, 21] and anxiety symptoms [22, 23,24] reduced sexual desire and response. However, a body of evidence indicates that sexual desire and response may actually increase for some individuals when depressed [18, 25, 26,] and anxious.[27,28] For instance, in a study with men who have sex with men (MSM), sexual activation (i.e. appetitive sexual affect) increased sexual risk-taking, whereas on days when higher levels of positive mood ensued there was an associated decrease in STI/HIV risk-taking behaviour (i.e. non-use of condoms).[4]

This suggests that there are individual differences in the impact of mood on sexual interest and sexual risk taking, with depression and/or anxiety symptoms mediating a reduction in sexual interest for some, but no change or increased interest for others.

Recently, a study found that when using the Revised Mood and Sexuality Questionnaire (MSQ-R) heterosexual women were less likely than heterosexual and homosexual men to experience increased sexual desire when anxious.[29] Also, homosexual men and heterosexual women were less likely to experience increased desire when depressed.[29] This further highlights the intricate variability in individual differences between mood and sexual interest.

Depression and/or anxiety symptoms, impulsivity and risk-taking behaviour have been shown to co-occur with multiple psychological disorders such as personality disorder, eating disorder, addictions and bipolar-affective disorder.[30] Consequently, a simple, yet effective strategy of routinely screening for depression and anxiety symptoms within sexual health clinical settings may provide a significant opportunity to target this population group for assessment and intervention to address both mood problems and sexual risk-taking behaviour. In addition, identifying the individual variability in mood, sexual interest, impulsivity and behavioural response may play a role in determining which kind of media-based message will be most effective in public health promotion campaigns.[31]

There is little research evaluating outcomes of negative mood states, impulsivity and sexual interest on sexual risk-taking behaviour. Previous studies of clinical and non-clinical population samples have focused on specific sub-groups, including: specific ethnic groups,[3] adolescents only,[32] men or women only,[18] heterosexuals or homosexuals only,[8] and most studies, to some degree, have concentrated on substance use.[33] The interplay between a broader clinical sample with a range of ages, ethnic groups, sexual orientations and genders with depression and/or anxiety symptoms, impulsivity and sexual interest has not been considered, as far as the author is aware. As a result of these limitations the existing findings are limited in terms of informing clinical practice and public health policy.

This study is exploratory in nature and seeks to address gaps in the evidence base relating to depression and anxiety with sexual risk-taking, sexual interest and impulsivity within a clinical group sample.

Aims and Hypotheses

Aims

This research project aims to explore the association that:

1. Depression and/or anxiety symptoms have with sexual risk-taking and impulsive behaviours among patients attending an inner-city sexual health clinic.

2. Socio-demographic factors (age; gender; ethnicity; sexual orientation; marital status; socio-economic status; employment status; and educational attainment) have with depression and/or anxiety symptoms, sexual risk-taking and impulsive behaviours.

Hypotheses

Hypothesis 1a: Individuals with depression symptoms will exhibit increased levels of sexual risk-taking behaviour compared to non-depressed individuals.

Hypothesis 1b: Individuals with depression symptoms will exhibit increased levels of impulsive behaviour compared to non-depressed individuals.

Hypothesis 1c: Individuals with depression symptoms who rate highly on sexual interest will exhibit higher levels of sexual risk-taking and impulsivity than individuals with depression symptoms who rate low on sexual interest when depressed.

Hypothesis 2a: Individuals with anxiety symptoms will exhibit increased levels of sexual risk-taking behaviour compared to non-anxious individuals.

Hypothesis 2b: Individuals with anxiety symptoms will exhibit increased levels of impulsive behaviour compared to non-anxious individuals.

Hypothesis 2c: Individuals with anxiety symptoms who rate highly on sexual interest will exhibit higher levels of sexual risk-taking and impulsivity than individuals with anxiety symptoms who rate low on sexual interest when anxious.

Plan of Investigation

Participants

All individuals attending an inner-city sexual health clinic (i.e. Sandyford Central), situated within NHS Greater Glasgow and Clyde (NHSGGC) in Glasgow will be invited to participate. Criteria for participation include:

Inclusion Criteria

- All individuals attending Sandyford Central Sexual Health Clinic
- All students of the University of Glasgow (only in the event that participation numbers are below predicted requirements for adequate power from Sandyford Central)

Exclusion Criteria

- Inability to read/understand English language
- Visual impairment that would compromise an individual's ability to view/read the research material
- Inability to provide implied consent e.g. an individual with a defined learning disability as qualified by DSM-V.
- Below age 16 years

Recruitment Procedures

Primary recruitment method

Attendees to an inner-city sexual health clinic will be requested to anonymously complete a survey booklet containing four brief questionnaires.

Sandyford is the largest integrated sexual, reproductive, and emotional health service within Scotland. The clinic is staffed with a range of specialist medical consultants, advanced nurse practitioners and psychotherapists, and offers a range of services. Individuals wishing to seek the services of Sandyford make contact with the clinic receptionist following walk-in or scheduled appointment to register their attendance for appointment. Following standard procedure the clinic receptionist will book the patient in, confirming their appointment with the relevant health professional. They will then be offered a Participant Information Sheet (PIS) so that they may make an informed decision to take part in this research study requiring anonymous completion of a brief survey booklet while they wait to be called for their appointment. The PIS will detail the aims of the study, their required involvement and how they can proceed with taking part. Due to the anonymous nature of this study, participation will require *implied* consent. The PIS *and* the eligibility screening form at the beginning of the survey booklet will explain that participants *do not* have to provide personal information or a signature to offer consent, but rather, completion of the survey booklet will provide implied consent. To confirm understanding of implied consent each participant will be required to mark a tick box, which must be completed should they wish to participate. Patients will be informed that they can opt out of the study at any time without reason, but given the anonymous nature of the survey, their data will not be able to be removed at a later date.

Attendees to the clinic will be informed by the receptionist the location where the survey booklets will be situated (e.g. on a table next to the reception, easily accessible to clinic attendees). All clients will be provided with the main researcher's email address and

telephone number, included in the survey booklet in the event they wish to ask any questions pertaining to the study and participation. If the client's wait time is 15 minutes or longer participants will be encouraged to complete the questionnaire on site prior to appointment. If the wait time is less than 15 minutes, or the client does not wish to complete the questionnaire prior to their appointment three options will be available for all to choose from if they wish to take part (1) completion of questionnaire after their appointment on site (2) completion of questionnaire off site, which can be returned using a free postal addressed envelope enclosed or (3) if they have access to the internet they can go online to complete the survey booklet by copying and following a link on the PIS (Please see *Figure 1* to view participant recruitment pathway).

Participants who complete the survey booklet on site will be asked to place them in an attached envelope and into sealed boxes located close to reception in the clinic waiting area.

Participation in the study will not affect subsequent care or treatment (e.g. sexual health assessment or review). Individuals not eligible for participation or those who choose not to participate will receive routine care and treatment. Likewise, those who complete the survey booklet will be seen by the relevant health professional as per routine clinic protocol for their visit.

Secondary Recruitment Method

As a contingency, in the event that response rate in the primary recruitment site is low, a secondary recruitment method will be used. This would involve seeking participants from the University of Glasgow student population. This would require advertising for voluntary participation via posters, email and media networking websites, for completion of the survey booklet by internet web link.

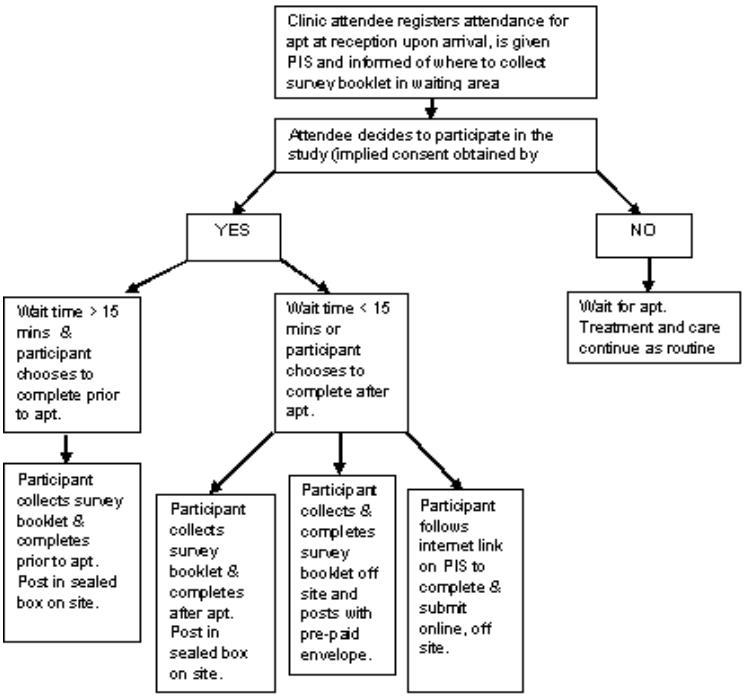

Figure 1. Flow chart illustrating participant recruitment process

Measures

Each participant will be given a small survey booklet containing an eligibility-screening sheet and four self-report questionnaires.

(1) Eligibility screening sheet: Completion time approximately 1-2 minutes. Questions will include 4 items based upon the exclusion criteria and will require participants to circle a yes/no response. Those who respond with a 'yes' indicating that they fall under the exclusion criteria will be thanked for their time and informed that they will be unable to proceed to full participation. Participants will also be required to confirm that they understand informed consent is implied when they complete the survey booklet. This will require each participant to mark a tick box at the bottom of the eligibility sheet.

(2) *Demographic and sexual information questionnaire*. Completion time approximately 2-3 minutes. This questionnaire will seek to capture a range of

demographic and historical data including age, gender, ethnicity, education level, employment status, sexual orientation, relationship status; sexual partner number in last year; single occasion sexual contact partners in lifetime; and number of sexual partners with whom safe-sex was not practiced.

(3) *Hospital Anxiety and Depression Scale (HADS)*[34] Completion time approximately 2-3 minutes. HADS is a commonly used 14-item self-administered assessment measure which screens for symptom severity and caseness of anxiety disorders and depression in somatic, psychiatric and primary care patients and in the general population. It was designed for the purpose of detecting state-level depression, anxiety and emotional distress in patients undergoing clinical treatment and therefore reduces interference of possible confounding somatic symptoms associated with physical health conditions e.g. fatigue. It is not intended for use as a clinically diagnostic tool. Patients are asked to complete 14 questions (7 from the anxiety and 7 from the depression subscale) with four response options ranging from 'not at all' to 'most of the time'. A point is allocated for each answer which can be totalled to provide an anxiety score, a depression score and an overall emotional distress score. The measure yields good reliability and validity (e.g. correlations between the subscales that varies from .40 to.74 (mean.56) and Cronbach's alpha for HADS-A varies from .68 to.93 (mean .83) and for HADS-D from .67 to.90 (mean.82).

(4) *Short English version of the UPPS-P Impulsive Behaviour Scale (SUPPS-P)*[14] Completion time approximately 3-4 minutes. The SUPPS-P is a 20-item self-report measure that assesses five subscales (Sensation Seeking, Lack of Perseverance, Lack of Premeditation, Negative Urgency, and Positive Urgency) which are used to measure five distinct personality dimensions of impulsive behaviour in adults and adolescents. It is designed to measure impulsivity across the dimensions of the Four

Factor Model of Personality: Premeditation (lack of), Urgency, Sensation Seeking, Perseverance (lack of).[35] The subscales have criterion related associations with risk-taking behaviours including binge eating, gambling, drug and alcohol use and sexual risk-taking. Each item on the SUPPS-P is rated on a 4-point scale ranging from 'strongly agree' to 'strongly disagree' with a point allocation for each answer which can be totalled to form a subscale score (i.e. sensation seeking and an overall impulsivity score). Each subscale on the short version (SUPPS-P) has adequate reliability - similar compared to long version (UPPS-P).[14] The SUPPS-P inter-correlations were generally comparable to the UPPS-P version inter-correlations. The SUPPS-P generally replicated the internal consistency (0.74-0.88 across subscales) and inter-scale correlations of the original UPPS-P.

(5) Revised Mood and Sexuality Questionnaire (MSQ-R).[29]

Completion time approximately 5 minutes. The MSQ-R is a self-report trait measure that asks respondents to indicate what typically happens to their sexual interest and response when in a particular mood. It was designed to identify how moods influence sexual desire and arousal, sexual behaviour and the reciprocal effects of sexual activity on mood (e.g. the effect of anxiety/stress, sadness/depression, and happiness/cheerfulness on overall sexual desire, arousal, masturbation frequency, and sexual behaviours that may be later regretted). The internal consistency of the subscales has been found to be sufficiently high[29] with eight subscales, of which six (21-items in total) will be used in this study.

Design

This study will employ a cross-sectional design to explore the association between symptoms of depression and/or anxiety, sexual interest, sexual risk-taking behaviour and impulsivity within a sexual health clinic population sample.

Research Procedures

Participants will be recruited from Sandyford Central (see recruitment section). Each survey booklet will contain the main researcher's contact information to allow participants to ask questions about the study and self-help material for common mental health difficulties which participants can take home with them and use if required. Participants will also be given contact details for NHS24 and self-help organisations (e.g. The Samaritans and SAMH).

The survey booklets will be collected by the researcher bi-weekly over the 8-week recruitment phase.

Data Analysis

Correlational analysis will be conducted to determine the associations between variables. A post-hoc analysis using Bonferoni adjustment will be used to correct the p-value to reduce the likelihood of type 1 errors due to multiple comparisons. Between groups comparisons (e.g. t-tests) will be used to compare those who score above clinical cut-offs for depression and anxiety respectively, with those who did not, on the variables being analysed.

Justification of sample size

This study is an explorative study, and to the author's knowledge no similar study exists in the examination of depression and/or anxiety symptoms, sexual interest, impulsivity and sexual risk-taking. It is therefore not possible to estimate effect size. The results of this study will be used to generate effect sizes that will facilitate sample size estimate for future research. However assuming that anxiety or depression had a correlation with sexual risk-taking ($r = 0.4$) the following sample sizes would be required (assuming alpha of 0.025 to account for multiple comparisons) with the following power values.

*Table 1. Power and effect size calculation obtained using G*Power 3.*[36]

Power	0.60	0.65	0.70	0.75	0.80	0.85	0.90
Sample size	52	58	65	73	82	93	109

It is the author's aim to recruit as many participants as possible within the 8-week recruitment phase between September and October 2014. Sandyford Central was visited by 7334 attendees during this time-frame in 2013.[37] Less than 1% of this figure will be required to achieve a sample size necessary to yield a moderate effect.

Settings and Equipment

Survey booklet completion will be undertaken within two sites, the first being an NHS setting, in an open-plan waiting area. The second setting will be dependent upon where the participant chooses to complete the survey booklet off site or has access to the internet (e.g. in the participant's home), as the survey booklet will also be accessible for completion and submission online. This is to enable increased access to the study and facilitate good response rates. Home visits will not be undertaken at any time and the researcher and participant will not be in an isolated environment.

Screening measures and questionnaires

Two of the questionnaires (SUPP-S and MSQ-R) being used in this study are accessible only on request of the authors and publishers. The main researcher has received written permissions from the authors and authorised use has been granted for the purpose of this research project. One other measure being used is within the public domain (e.g. HADS) and use is permitted for research purposes. All other stationary materials will be purchased.

Computer device (laptop)

All data obtained from the survey booklets will be transferred onto an NHS encrypted laptop computer obtained from the Institute of Health and Wellbeing, Doctorate in Clinical Psychology Programme.

Health and Safety Issues

Researcher Safety Issues

It is expected that there will be low levels of risk to the researcher. The researcher will have no face-to-face contact with participants.

Participant Safety Issues

Due to the intimate nature of some of the questions being asked, it is possible that participants may experience a degree of distress from completing the survey booklet. Participants will be informed via the PIS prior to taking part, that questions which will require self-reflection on their current mental health status and sexual history. All participants will be provided with self-help material including contact details of supportive organisations (e.g. Samaritans, SAMH etc.), NHS-24, and useful information on how to obtain 1-to-1 support from the Sandyford Listening Ears Counselling Service. Participants will be encouraged to make contact with their G.P with any issues of concern, anxieties or worries surrounding their physical or mental health which may have arisen following their participation in the study.

Participants will be reminded of their choice to opt out of completing the survey booklet at any time and measures will be taken at all times to ensure participant comfort and safety.

Ethical Issues

All questionnaires will be completed anonymously and participants will be reminded that any information provided by them will not contain any personal identifiers. As such,

participant understanding of implied informed consent will be sought via tick-box confirmation on the eligibility screening form.

Ethical approval for the study will be sought from the Institute of Health and Well-being Ethical Review Committee and via an application to the National Research Ethics Service, via the Integrated Research Application System.

Timetable

Ethical approval will be sought August-September 2014. Study set up will follow late September 2014, with recruitment ongoing from early October 2014. Survey completion will run from October-November 2014 and analyses undertaken by late November/early December 2014. Write up of the study will continue from December-January 2014 with amendments being made in February 2015 for final submission in March 2015.

Practical Applications

Information about depression and/or anxiety symptoms, impulsivity and sexual interest and sexual risk-taking behaviour can be used to identify populations at risk for both depression and/or anxiety and health-risk behaviour which may help to inform prevention and intervention practices.

Symptoms of anxiety and/or depression, and possible associated impulsive behaviours should be addressed if interventions to reduce sexual risk-taking behaviour are to be improved[18]:

(1) Given that mood may play a role in sexual interest and impulsivity it offers the opportunity to identify those who are not yet engaging in sexual risk-taking behaviour who may be at risk of doing so in the future.

(2) The relationship between mood, sexual interest and impulsivity may illustrate their importance in indicating/mediating sexual risk-taking behaviours, and offer

effective prognostic utility in forecasting the response outcome (appropriateness to fit) of a particular intervention.

(3) The relationship among mood, sexual interest, impulsivity (i.e. sensation seeking) and sexual risk-taking factors may determine which kind of public-health promotion campaign is going to be most effective in any intervention mapping exercise. One study has demonstrated that high sensation seekers are likely to respond to communication styles and practices that would be ineffective or even counter-productive in low sensation seekers.[31] This evidence suggests that using more than one message in public-health promotion campaigns may be more effective.

(4) Understanding the interplay between personality factors and mood may provide a crucial role in designing appropriate, tailored one-to-one interventions. For example, interventions specifically targeting those who are more likely to engage in sexual risk-taking when depressed and/or anxious, or who use sex as a form of mood regulator. It has been suggested that behavioural analysis of the relationship between mood and sexual behaviour (i.e. using a dairy format), can address emerging patterns and a focus upon motivation for change, followed by a cognitive-behavioural approach to aid in the development and maintenance of alternative methods of mood regulation.[18]

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Appendix VI: Advanced Clinical Practice I.

Reflective Account

(abstract only)

Developing Understanding of the Clinical Psychologist's Role:

A trainee's critical reflection of Existentialism in a medical-model led NHS

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Abstract

‘Evidence-based practice’ and ‘integrated, joined up working’ are two key professional principles that I consider to form part of the Clinical Psychology trainee’s mantra. Throughout training it is expected that trainee's recognise, adopt, and advocate these important working practices, and are encouraged to refer to relevant professional guidelines, and reflect upon how these can inform and improve practice. My understanding of evidence-based practice and integrated joined-up working arose largely from experiential learning during training and, more recently, through wider reading and discussion on Existential philosophy in the psychological therapies. Over the course of my training I have experienced what I have come to term as ‘doubts of faith’ in *how* Clinical Psychology can enrich an existentialist, medical model-led NHS. This account will highlight and reflect upon the various factors that have contributed to my ‘doubts of faith’, and how they have shaped my learning, enabled me to develop new insights, and moulded my hopes and aspiration for Clinical Psychology within the NHS. I will also discuss the philosophical movement termed ‘Post-existentialism’ which has recently gained momentum within the profession, and provide a framework to reflect upon my personal challenge of balancing the reality of clinical practice and my aspirations toward a professional ideology of psychological therapy without foundations (Loewenthal, 2011). This has motivated my utilisation of critical and reflective practice to evaluate where I (trainee clinical psychologist) and how we (Clinical Psychology profession) operate in today’s constrained NHS.

Appendix VII: Advanced Clinical Practice II.

Reflective Account

(abstract only)

Critical Reflection on Learning; the use of a Transformational Learning Model to Understand Competency Development in the Context of Supervision

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Abstract

The process of learning is a unique venture. It can vary according to mixed experiences (e.g. work-related and/or personal), numerous sources of knowledge (e.g. literary or individual), and over different time trajectories (i.e. short- v. long-term). I have discovered learning is not a linear process for me, but rather an iterative process of self-exploration and piecing-together of information over time. Throughout training I have identified that my preferred method of learning is in a shared social context, or 'social-connectivity' (Carroll, 2010b) because I recognise the effectiveness of a learning partnership with others. The reciprocal pooling and sharing of resources (e.g. knowledge and experience) has enabled me to experience transformational learning through critical reflection. This reflective account will discuss the pathways through which my approach to learning has developed during D.Clin.Psy. training. Of great significance in this journey was the learning acquired during supervision. My experiences from key supervision events will be structured around Schon's (1991) In-On-action model. By integrating Loop- (Argyris & Schon, 1972), and Transformational Learning models (Carroll, 2010) I then evaluate each stage of my learning to highlight how I have evolved to become a critical reflector through a process of transformational learning.