EXAMINING THE TREATMENT UTILITY OF THE APPROACH-AVOIDANCE

MOTIVATION MODEL FOR SEXUAL INTEREST/AROUSAL DISORDER IN WOMEN

AND NON-BINARY INDIVIDUALS

by

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The following individuals certify that they have read, and recommend to the Faculty of Graduate

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Abstract

One third of cisgender women report experiencing low sexual desire and 8% of these women meet the diagnostic criteria for Sexual Interest/Arousal Disorder (SIAD), yet treatment research for SIAD remains scarce. Research on sexual concerns among transgender women and non-binary individuals is also scarce and requires further investigation to better inform clinical practice. The Approach-Avoidance Motivation Model may be relevant to addressing sexual concerns. This model posits that different motivations for sex can be classified as either pursuing desired outcomes (approach motivation) or avoiding unwanted outcomes or consequences (avoidance motivation), and these reasons are related to sexual outcomes. The treatment utility of the Approach-Avoidance Motivation Model for SIAD was tested in a sample of cis- and transgender women, and non-binary individuals, who either met criteria for SIAD or reported no sexual concerns. Sixty-seven participants with SIAD and 96 participants with no sexual concerns completed baseline measures of sexual motivation, sexual desire, sexual satisfaction, relationship satisfaction, and partnered sexual behaviours. Participants then completed an online assessment from home that involved a writing exercise previously found to increase the salience of approach or avoidance sexual motivation, or a control writing task, then viewed a nature film and erotic film while self-reporting levels of attention. Seventy-two hours following the online assessment participants completed sexual outcome measures again. A repeated measures MANOVA assessing the impact of SIAD status and writing task condition found that participants with SIAD in the approach condition significantly increased in approach sexual motivation immediately following the manipulation but these improvements did not persist at 72 hours follow up. Interestingly participants without SIAD were found to decrease in avoidance motivation, dyadic sexual desire, and partnered sexual behaviours 72 hours following the manipulation, regardless

of writing condition. There were no differences in self-reported attention to the erotic film between those with and without SIAD, or between writing condition groups. Overall, these findings did not show support for the treatment utility of this approach-avoidance motivation manipulation for SIAD given that increases in approach motivation were not maintained. Future studies might explore more long-term interventions targeting approach-avoidance motivation to address sexual difficulties.

Lay Summary

This study examined how a manipulation of approach-avoidance sexual motivation impacted sexual desire, sexual satisfaction, relationship satisfaction and partnered sex in a group of cis- and transgender women, and non-binary individuals with and without low sexual desire. Sixty-seven participants with low desire and 96 participants with no sexual concerns completed a writing task designed to increase levels of approach or avoidance reasons for sex, then viewed a nature and erotic film to assess attention, and completed sexuality questionnaires 72 hours after completing the writing task and viewing the films. Findings showed only short-term increases in approach reasons for sex, which did not last 72 hours after completing the writing task. Further, attention to the erotic film was not impacted by the writing task. The current study sheds light on the applicability of experimentally increasing approach reasons for sex as a potential treatment for low sexual desire.

Preface

   All of the work in the present document was conducted in the Sexual Health Research laboratory at the University of British Columbia where Dr. Lori Brotto is the Principal Investigator. I was primarily responsible for the study design, data collection, data analysis, interpretation, and preparation of the final thesis. Brett Makarenko primarily facilitated the recruitment of participants and assisted in data collection. Dr. Lori Brotto was the supervisory author of the current project for all components of the study including study design, data analysis and interpretation, and manuscript preparation. Committee member Dr. Alan Kingstone provided input and guidance in the adaptation of the attention task and post-attention questionnaires. The writing task manipulation used in this study, as well as the approach motivation booster used in the participant debriefing process is the work of Drs. Amy Muise, Gillian Boudreau, and Natalie Rosen.

   This project and methods were approved by the University of British Columbia's Behavioural Research Ethics Board (certificate # H19-04039). Due to the COVID-19 pandemic the initial approved in-person study design was amended to be entirely online (Post-Approval Activities ID: H19-04039-A002). None of the text of this thesis has been taken directly from previously published articles.

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Chapter One: Introduction

Sexual Interest/Arousal Disorder

Sexual health is a fundamental aspect of physical and mental wellbeing, and is

recognized as a human right (World Health Organization, 2015). People who are the most

physically and emotionally satisfied in their sex lives report greater life satisfaction, are

healthier, and live longer (Diamond & Huebner, 2012; Impett et al., 2014; Štulhofer et al., 2018).

Given the importance of sexual health, treatment of sexual problems is imperative to the

maintenance of global quality of life.

Sexual problems impact people of all genders and ages. Prevalence is especially high

among women, with population surveys showing that up to 50% of women[1] across ages self-

reported experiencing sexual difficulties for at least 3 months in a year. Low sexual desire is the

most commonly reported sexual concern, affecting twice as many women (34%) as men (15%)

(Mitchell et al., 2013). Approximately 8% of women who report low sexual desire experience

clinical levels of personal distress (West et al., 2008). Sexual Interest/Arousal Disorder (SIAD) is

defined as absent or reduced sexual interest or arousal, persisting for at least 6 months (American

Psychiatric Association, 2013). SIAD is expressed as any combination of at least three of the

following symptoms: reduced or absent interest in sexual activity, sexual thoughts or fantasies,

receptiveness or initiation of sexual activity, sexual excitement or pleasure, sexual

interest/arousal in response to internal or external sexual cues, and genital sensations or non-

genital sensations during sexual activity. SIAD also requires clinical levels of personal distress.

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[1]Previous research referring to participants as women often did not specify how many cis- versus transgender individuals were in that sample.

Limitations of SIAD Treatment Research

Research on treatment options for SIAD have largely focused on pharmacological interventions. This has been controversial in the sexual health field due to their limitations in addressing psychological or interpersonal problems, which have been recognized as important factors in sexual desire disorders for decades (Diamond & Huebner, 2012; Kaplan, 1979). Given that quality of relationships and feelings towards one's partner have been shown to be more predictive of women's sexual desire levels compared to hormonal factors (Dennerstein et al., 2001; Dewitte & Mayer, 2018; Guthrie et al., 2004), pharmacological interventions cannot help but fall short in addressing women's sexual problems. Further, randomized control trials for pharmacological interventions often do not assess relationship quality or satisfaction, aside from study inclusion criteria that participants must be in a "stable, monogamous" relationship for least one year (Kingsberg et al., 2019; Thorp et al., 2012).

Regardless, flibanserin (Addyi), a serotonin agonist-antagonist, was approved by the US Food and Drug Administration in 2015 (FDA; US Food and Drug Administration, 2015) despite objections from its clinical review team and concern around the lack of understanding of the mechanisms of its effects on desire (Woloshin & Schwartz, 2016), and by Health Canada in 2018 for the treatment of low sexual desire in pre-menopausal cisgender women (Health Canada, 2018). Meta-analyses on published and unpublished clinical trials for flibanserin found a mean increase (compared to placebo) of only 0.5 sexually satisfying events per month (Jaspers et al., 2016), as well as significant improvements in sexual desire and distress in both the flibanserin and placebo groups (Hassan Saadat et al., 2017). Although approved, flibanserin has a black label warning due to side effects such as syncope and must not be mixed with alcohol (US Food

and Drug Administration, 2019a). Flibanserin also has label warnings in Canada against use with alcohol and operating a vehicle within 6 hours of use (Health Canada, 2018).

Bremelanotide (Vyleesi) was also approved by the U.S. FDA for the treatment of low sexual desire in women in 2019 (US Food and Drug Administration, 2019b). It is self-injected subcutaneously and acts on an "as needed" basis by activating alpha melanocortin receptors, yet the precise mechanisms of its effects on desire are not fully understood (US Food and Drug Administration, 2019b). Phase II clinical trials found that the number of sexually satisfying events per month were only increased by 0.7 when treatment dosage groups were pooled, compared to placebo (Clayton et al., 2016). Additionally, 94% of women experienced mild reactions at the injection site and 22% of women who received bremelanotide experienced nausea. Given the marginal significance of flibanserin and bremelanotide over placebo, the contra-indication with alcohol (for flibanserin), and their notable side-effect profiles, the clinical utility of these treatments for women with sexual dysfunction has been seriously questioned (Both, 2017; Brotto, 2015). In order to improve upon current treatment options, more research is required to examine potential treatments that do not result in adverse effects. Treatments must also address factors that are most strongly associated with sexual desire levels, namely psychological and relational factors.

Research testing psychological treatments for SIAD is also limited. To date only a handful of randomized control trials (RCT) have been published testing the efficacy of psychological interventions for women's sexual dysfunction. These studies have found improvements in sexual outcomes across a number of treatment formats including individual and group interventions. One of the earliest RCTs to test the efficacy of cognitive behavioural group therapy for low sexual desire found that women's sexual desire and arousal improved post-

treatment (Hurlbert, 1993); however, this study had a number of limitations including stringent exclusion criteria regarding medication use and history of sexual trauma. Another study examining group cognitive-behavioural couple sex therapy for women with low sexual desire found significant reductions in symptom severity post-treatment, with improvements maintained in 64% of women at one-year follow up (Trudel et al., 2001). However, this study lacked a control group and had inclusion criteria regarding a minimum number of sexual acts per week. This has implications for generalizability of the findings to those whose desire and arousal concerns have resulted in avoidance of sexual behaviours.

To date only two studies have been published on the efficacy of individual CBT for treatment of low sexual desire. McCabe (2001) examined an individual CBT for mixed sexual dysfunction and found that 44% of women reported some improvement in symptoms, although CBT was least effective for women with low sexual desire. Another study tested individual CBT for women with sexual arousal, desire, and/or orgasmic dysfunction in comparison to taking Ginkgo biloba extract (GBE), which facilitates blood flow and relaxes smooth muscle tissue and was proposed to potentially improve sexual arousal (Meston et al., 2008). Women randomized to the combination of CBT and GBE condition experienced significantly greater improvements in sexual desire levels post-treatment compared to placebo, with no other group differences.

Currently only one randomized trial has examined the efficacy of group mindfulness-based cognitive therapy (MBCT) with sex education for the treatment of SIAD in women (Brotto et al., in press). Both the MBCT group and a sexual education comparison group improved in sexual desire levels post-treatment, while women in the MBCT group experienced significant reductions in sexual distress compared to the sex education comparison group. Given the scarcity of psychological treatment research for sexual desire concerns more work is needed. Further,

mechanisms underlying improvements in sexual desire from psychological interventions remains poorly understood and requires further examination. Lastly, research on treatment for sexual problems needs to broaden its focus beyond cisgender individuals given that interventions have not been tested on transgender women or non-binary individuals (Cocchetti et al., 2021).

Low Sexual Desire in Transgender Women and Non-Binary Individuals

Findings show that the prevalence of low sexual desire for transgender women is similar to cisgender women (Klein & Gorzalka, 2009), and that between 20-30% of transgender women experience personal or relational distress as a result of their low sexual desire (Kerckhof et al., 2019; Wierckx et al., 2014). To date, the prevalence of sexual concerns among non-binary individuals has not been studied. While transgender and cisgender women both experience similar rates of low sexual desire, transgender women, as well as non-binary individuals, are often excluded from treatment research on low sexual desire. Further, there are currently no clinical guidelines for treating low sexual desire in gender-diverse groups (Cocchetti et al., 2021). Given that sexual disorders are categorized by sex, using binary categories of male and female in the *Diagnostic and Statistical Manual of Mental Disorders 5th Edition* (DSM-5; American Psychiatric Association, 2013), this has implications for treatment of sexual concerns among transgender and non-binary individuals. Most research that focuses on sexual concerns among transgender people is limited to sexual function post gender-affirming surgery (Wylie et al., 2016). While hormonal therapy and gender-affirming surgery may affect sexual desire and arousal (Klein & Gorzalka, 2009), it is important to recognize that sexual concerns in transgender people may or may not be related to their transition. The lens from which sexual concerns among transgender people are examined should not be limited to transition experiences and other psychological and relational factors are important to consider (Holmberg et al., 2019).

Application of the Approach-Avoidance Motivation Model

One theoretical model that may inform our understanding of SIAD and its treatment by considering the impact of relational factors on sexual well-being is the Approach-Avoidance Motivation Model (AAMM). This model posits that different motivations can be classified as either pursuing desired outcomes (approach motivation), or avoiding unwanted outcomes or consequences (avoidance motivation). The AAMM resides within the broader Incentive Motivation Model (IMM; Toates, 2009). Incentive motivation theory proposes that sexual motivation arises from learned expectations that relate sexual stimuli to future sexual outcomes (Toates, 2014). The outcome of a sexual encounter strengthens expectations of future encounters and thereby influences sexual motivation. The AAMM has previously been used to examine the role of motivation in non-sexual relationships. Approach social goals have been found to be associated with more satisfying social bonds and less loneliness, while avoidance social goals were associated with more feelings of loneliness, negative social attitudes, and greater relationship insecurity (Gable, 2006). Sexual motivation has been studied extensively, with findings showing great diversity in the reasons why people engage in sex (one study identified 237 unique reasons; Meston & Buss, 2007), and the AAMM is now being applied to better understand the impact that these reasons have on sexual wellbeing, particularly relational approach and avoidance reasons for sex (Cooper et al., 2011).

There is considerable empirical support linking approach sexual goals to higher desire, sexual satisfaction, and relationship satisfaction, and avoidance goals to lower desire and satisfaction in the social science literature (Muise, 2017). Longitudinal daily diary methods have been commonly used to examine the relationship between sexual motivation and sexual wellbeing. Findings from a two-week daily diary study showed that the more often participants

had sex for avoidance reasons, the lower their relationship satisfaction and the more likely participants were to have broken up with their partners at a one-month follow up (Impett et al,, 2005). Another longitudinal daily diary study found that approach relationship goals buffered against declines in sexual desire over time even at 6 months follow up (Impett et al., 2008). These findings are limited in their generalizability to clinical contexts however, as most of this evidence is correlational and focussed on non-clinical undergraduate samples.

Sexual Motivation in Clinical Samples

The sexual goals of women with sexual problems have previously been investigated in comparison to women with no sexual complaints. A large sample of 446 heterosexual women with and without sexual concerns found that those with low sexual functioning were more likely to have sex for reasons related to feeling insecure as opposed to reasons related to physical pleasure (Watson et al., 2017). It should be noted that those with sexual problems were identified using an online self-report measure of sexual functioning, as opposed to being assessed for specific symptoms using a clinical screener, so there may be limitations to generalizing findings to those with a diagnosis of SIAD. Participants also had to have been sexually active within the past month, which would exclude many women with sexual problems.

Other research looking at sexual goals of women with sexual problems have focused more so on genital pain disorders than women with SIAD. A study examining women with provoked vestibulodynia (PVD), a genital pain disorder, and control women found that women with PVD reported lower approach and higher avoidance sexual goals than control women (Dubé et al., 2017). The relationship between sexual goals and sexual wellbeing of women with PVD, and their partners have also been examined (Rosen et al., 2015). Women with higher avoidance goals were found to report lower sexual and relationship satisfaction, and higher levels

of depressive symptoms. Their partner's avoidance goals for sex also negatively impacted relationship satisfaction, highlighting the need to better understand the relational context of their reasons for sex. These findings offer insight into approach-avoidance goals of clinical samples but have their limitations as they are cross-sectional and unable to establish temporal order in the sexual motivation-sexual outcomes relationship unlike many of the findings on healthy undergraduate samples.

Only a handful of studies have examined sexual motivation in women with SIAD. One compared women with and without SIAD, as well as their partners, finding those with SIAD to be lower in approach goals and higher in avoidance sexual goals compared with control women and their own partners (Bockaj et al., 2019). Another study found that when women with SIAD had higher levels of sexual communal strength (i.e., the motivation to meet a partner's sexual needs), they had more approach goals for sex and higher sexual satisfaction; however, when this motivation to meet their partner's needs was to the exclusion of their own needs, outcomes were more negative for couples who had sex frequently, which was defined as at least once a week (Hogue et al., 2019). While these studies are the first to apply the AAMM to women with SIAD, the results are correlational and cannot answer questions about causality about sexual motivation and low sexual desire. More work is needed to better understand the role that sexual motivation plays in low sexual desire.

Manipulating Sexual Motivation

Only one study has attempted to increase the salience of approach and avoidance sexual goals, which had subsequent effects on participants' sexual satisfaction, and desire (Muise et al., 2017). A community sample of participants were randomly assigned to recall their most recent sexual encounter where they had engaged in sex for either approach or avoidance sexual reasons,

and describe their thoughts, feelings, and motivations for this encounter as a means to manipulate their levels of approach or avoidance motivation. Those in the approach condition reported significantly higher levels of sexual desire and sexual satisfaction compared to avoidance and control conditions. The use of memory retrieval as a manipulation is applicable to the previously discussed IMM, shown in Figure 1. The IMM posits that external as well as internal sexual stimuli (such as a memory) influences sexual motivation, reward assessment, and decision making. This influence depends on the cognitive appraisal of those stimuli and the associations and meanings the stimuli evoke. The potential mechanisms underlying the changes in sexual outcomes were not evaluated by Muise et al., but the authors proposed that potential mechanisms may be related to increased approach motivation impacting positive affect, intimacy with a partner, or changes in attention to focus on more sexual sensations. Applying a manipulation of approach-avoidance sexual motivation through this mechanism may help address gaps in current treatment options. Further, examining the potential underlying mechanisms involved in approach-avoidance sexual motivation's relationship with sexual outcomes may also help inform future treatment options.

Sexual Motivation and Attention

Another component of the IMM is the role of attention, as shown in Figure 1. Attention to internal or external sexual stimuli is critical for sexual arousal to be triggered (Toates, 2009). The amount of attention towards sexual stimuli is influenced by the cognitive appraisal of the stimuli (Janssen et al., 2000; Toates, 2014), The amount of attention towards sexual stimuli is also found to influence the strength of sexual arousal (Janssen et al., 2000), which in turn triggers sexual desire. Disruptions in attention impact the entire sexual arousal-desire pathway. While cognitive appraisal of a sexual stimulus is found to prime initial sexual arousal, concurrent

activation of unrelated or worried-related thoughts interferes with sexual response (Janssen et al., 2000). Laboratory-based studies have shown even neutral distractions decrease sexual arousal (Elliott & O'Donohue, 1997; Prause & Heiman, 2010). The relationship between attention to sexual cues and sexual desire problems has been proposed for decades (Barlow, 1986). Yet there is little empirical research looking at attention to sexual cues in women with sexual problems. Within an incentive motivation framework, assessing attention is crucial to predicting whether manipulating the goals for sex may impact sexual desire.

Laboratory-Based Assessments of Attention to Erotic Cues

Some research has examined attention to sexual cues by adapting a dot detection task, a method that has been used more extensively in other research areas to assess differences in attentional biases (e.g., Hogarth et al., 2003; MacLeod et al., 1986). Dot detection tasks adapted to sexual cues involve neutral and sexual images displayed in pairs followed by a dot on either side of the screen, while reaction time to detect the dot is used as an indirect measure of attention to sexual cues. There are concerns about the interpretation of results for dot detection tasks using sexual stimuli as they are not as intuitive as findings from dot detection studies in other research areas (Prause et al., 2008). Faster detection times are usually interpreted as indicating a greater attentional bias to one type of stimulus over the other, so those with higher levels of sexual desire should detect the dot in the sexual stimuli area faster than those with low desire. Two studies have findings that contradict this interpretation. One study found that participants with lower levels of sexual desire detected the dot in the area of the sexual stimulus more quickly, while both high and low desire groups detected the dots more slowly for sexual images that were more explicit (Prause et al., 2008). Another study assessed attention and automatic affective associations to sexual stimuli in women with acquired hypoactive sexual desire disorder (HSDD)

and women with no sexual concerns by using a single target implicit association task and a dot detection task (Brauer et al., 2012). Women with HSDD were found to display less positive automatic associations with sexual stimuli compared to women with no sexual concerns, although women with HSDD did not display more negative automatic associations to sexual stimuli. Both HSDD and control participants were slower to detect the dots for sexual images during the dot detection task. The findings from these two studies highlight the need to use more direct measures of attention in order to better interpret attentional biases. Further these reaction time methods have been criticized for their limitations in only providing a discrete measure of attention and cannot capture how attention might change over the course of a sexual encounter (Velten et al., 2021).

Sex researchers have increasingly relied on objective measures of attention, such as eye tracking, as a way to overcome self-report bias (Chivers, 2017). Eye tracking is a valid measure of attention in sex research paradigms and can address the limitations of other methods such as concerns around interpretations of indirect measures of attention and retroactive reporting of attention during past sexual encounters (Chivers & Brotto, 2017; Rupp & Wallen, 2007). Very few eye-tracking studies have been conducted to assess sexual functioning, especially with clinical samples. One study tested how distractor objects that were edited into erotic scenes impacted the visual attention of women who experienced sexual problems such as low sexual desire and genital pain, compared to women with no sexual concerns (Lykins et al., 2011). Women with sexual problems looked at the sexual parts of the image fewer times and for shorter periods of time compared to controls. Another eye-tracking study found that women with clinical and subclinical sexual dysfunction visually attended to genital areas of erotic images less compared to women without sexual concerns (Velten et al., 2021). Little research has been

conducted on gender-diverse groups. One eye-tracking study compared visual attention to erotic and non-erotic images in androphilic cis- and transgender women and gynophilic cisgender men (Akhter, 2011). All groups showed greater gaze frequency and duration to erotic targets compared to non-erotic images; however, cisgender women were found to look at non-erotic images more than transgender women and cisgender men. Attention to sexual cues has not been studied in gender-diverse groups who experience sexual concerns and requires further exploration.

While eye-tracking provides a more objective and interpretable measure of attention to sexual cues compared to dot-detection tasks, it is primarily limited to laboratory-based contexts. Previous work has also shown that visual attention to sexual stimuli can be impacted when participants are aware of their eye movements being tracked and thus is not completely free from potential social desirability effects (Milani et al., 2019). Exploring methods to assess attention outside of the laboratory is of value particularly within sex research given concerns around ecological validity of laboratory-based studies (Bloemers et al., 2010; van Lankveld et al., 2014). Online methods that can measure attention to sexual cues from home may help address these issues. Further, online methods are valuable when studying populations where recruitment has been traditionally more difficult, such as gender-diverse individuals. Employing self-report methods of attention has the potential to address concerns around interpretation issues (as seen with dot-detection tasks) and extend research beyond the laboratory.

Assessing Attention via Self Report

While there is concern about bias in self-report methods in sexuality studies, self-report assessments of attention and distraction to sexual stimuli have been found to correlate with genital arousal in women (Hamilton & Meston, 2013). Specifically, post-stimuli quizzes and

self-report measures of distraction following the presentation of audio erotic stimuli have been used in laboratory settings (Hamilton & Meston, 2013). Both visual and written post-stimulus quizzes have been used to assess attention to audio-visual sexual stimuli, however the visual quiz was found to not be predictive of distraction level and had a ceiling effect for test scores (Anderson & Hamilton, 2015). The written post-stimulus quizzes were positively correlated with subjective and physiological sexual arousal for men but not for women. Self-report methods that assess attention to sexual cues has been used in a daily diary study examining daily sexual goals in women with genital pain (Rosen et al., 2018). Higher daily approach goals were associated with more attention to positive sexual cues (e.g., focusing on feelings of attraction to partner during sex), while higher avoidance goals related to more attention to negative sexual cues (e.g., focusing on bothersome thoughts during sex). While a daily-diary method helps to address some memory concerns around providing an account of past attention, retrospective self-report of attention has its limitations as reports may be sensitive to bias.

To address potential memory bias in retrospective reporting of attention to past sexual encounters or post-stimulus presentation, probe-caught methods can be adapted to assess attention to sexual stimuli. Probe-caught methods, which have been used extensively to assess mind wandering during tasks (Smallwood & Schooler, 2006), involves participants receiving a written or audio probe periodically throughout a task, which asks them to indicate whether their attention was directed to the task. Employing a probe-caught method to assess attention to erotic films may address the current limitations of reaction time methods as a probe-caught method may provide a more direct and interpretable measure of attention and could capture attention across time, rather than provide a discrete snapshot of attention. While primarily studied in laboratory settings, probe-caught methods have been employed in naturalistic settings to assess

mind wandering and distraction (Varao-Sousa et al., 2018; Varao-Sousa & Kingstone, 2019).

Using an online probe-caught method that participants complete from home is a way to assess attention to sexual cues in a non-laboratory setting which has implications for a more ecologically valid study and would expand recruitment to those who are traditionally hard to reach or have been excluded from research.

Limitations of Research on Gender-Diverse Groups

While there is evidence that approach-avoidance motivation is related to sexual outcomes in cisgender participants, to date there is no research extending the approach-avoidance literature to transgender and non-binary individuals. The IMM that approach-avoidance motivation model resides within proposes the applicability to both men and women, as it is not limited to sex-based perspectives of sexual response and can thus be applicable to gender-diverse groups (Toates, 2014). More work is needed to confirm the applicability of approach-avoidance motivation as well as the IMM to gender-diverse groups. Further, research on the underlying mechanisms of sexual response that the IMM proposes (such as the role of attention) has not been adequately explored in gender-diverse groups. Improving our understanding is imperative to inform clinical guidelines for transgender and non-binary individuals who experience sexual concerns.

The Current Research

Building on initial research that has successfully increased the salience of approach-avoidance sexual motivation (Muise et al., 2017), the main objective of the current study was to experimentally manipulate approach and avoidance sexual motivation in cis- and transgender women and non-binary individuals with and without SIAD. We aimed to measure the impact of the manipulation on sexual desire, sexual satisfaction, relationship satisfaction, and partnered sexual behaviours assessed 72 hours following the manipulation. While Muise et al. (2017) used

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a 7-day follow-up timepoint in their manipulation study, a 72-hour follow-up time point was used in the current study as previous work has used this timeframe and found changes in sexual response 72 hours following a task where participants viewed erotic stimuli (Velten et al., 2019). A shorter follow-up period also reduces participant burden as having a longer follow up period may have been a barrier to participation, particularly for those from marginalized groups. We also aimed to evaluate how the manipulation impacted self-reported attention to sexual cues using an online probe-caught method. Further, we aimed to explore the potential underlying mechanisms involved in how the manipulation impacted sexual well-being by examining the role of positive and negative affect and attention to sexual cues.

Given the high co-occurrence of depression with sexual concerns and the proposal of shared underlying contributors to both depression and sexual dysfunction (Forbes et al., 2016; Kalmbach et al., 2014), we assessed baseline depression symptoms to explore differences between SIAD and non-SIAD groups, as well as between gender groups. This study was conducted during the COVID-19 pandemic and thus COVID-19 stress was assessed as a means of accounting for potential history effects. Lastly, we assessed sexual aversion to examine to what extent measuring avoidance sexual motivation captured sexual aversion.

To our knowledge this is the first study to test a manipulation of approach-avoidance sexual motivation on a clinical sample with SIAD, as well as to test the potential mechanisms of the manipulation. The current study is also novel by recruiting a clinical and non-clinical sample across these gender groupings.

Hypotheses

Hypothesis 1. Participants randomized to the approach condition will show higher levels of sexual well-being as indicated by higher sexual desire, sexual satisfaction, and relationship

satisfaction at 72 hours follow-up, compared to the other two conditions.

Hypothesis 2. Participants randomized to the approach condition will show higher levels of sexual behaviour at 72 hours follow-up, compared to the other two conditions.

Hypothesis 3. Participants randomized to the approach condition will show more attention to erotic cues, as measured by self-reported attention to erotic videos, compared to the other two conditions. Participants in the avoidance condition will show less attention to erotic cues compared to the other two conditions.

Hypothesis 4. Of those randomized to the approach condition, participants with SIAD will show greater improvements in sexual wellbeing variables, sexual behaviour, and more attention to erotic cues (H1-3), compared to non-SIAD participants, while controlling for baseline outcome values. We proposed this as participants with SIAD may have more room for improvement compared to participants without sexual concerns.

Exploratory Mediation Hypotheses. Positive affect, negative affect, and attention to sexual cues will be examined as potential mediators of the sexual motivation manipulation on sexual wellbeing and behaviour outcomes.

Exploratory Gender Group Hypotheses. Potential differences between cisgender and transgender/non-binary participants will be examined in all analyses. Given the dearth of previous literature on gender diverse groups, directional hypotheses could not be established, and all analyses were considered exploratory.

Chapter Two: Methods

Participants

Participants were eligible to participate if they met the following inclusion criteria, which was assessed via telephone interview: (1) identified as a cisgender woman, transgender woman, or non-binary individual (there were no exclusion criteria based on sex); (2) were 19 years of age or older; (3) able to read and write English fluently; (4) had access to a computer with a physical keyboard (as opposed to only touchscreen) and internet; (5) were willing to temporarily download the Inquisit 6 Web Player to their computer (described below); and (6) were or were not experiencing difficulties with sexual arousal and/or sexual desire for the past 6 months. Eligible participants with SIAD met diagnostic criteria based on endorsing at least three symptoms accompanied with personal distress for at least six months, as outlined in the DSM-5 (American Psychiatric Association, 2013), while eligible participants for the control group did not report any sexual arousal and desire difficulties.

Participants were excluded if they reported identifying as asexual, meaning they did not experience sexual attraction in any context. Note that individuals who reported any experience of sexual attraction, such as demisexual and gray-asexual individuals, were still eligible to participate. The asexual exclusion criterion was implemented as there have been ethical concerns around asexual individuals receiving treatment for low sexual desire due to conflation with SIAD symptom presentation (Brotto & Yule, 2017). Participants were also excluded if they were currently experiencing a major depressive episode or other psychiatric disorders that interfered with daily functioning. We did not include any relationship status exclusion criteria, as our preliminary analyses from an ongoing study on women with SIAD showed no significant difference in baseline levels of sexual functioning and sexual distress between partnered and

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unpartnered women (Brotto et al., 2021).

Procedures

Participants were primarily recruited online using UBC Sexual Health Research's social media accounts (Facebook, Twitter, Instagram), as well as advertising in online community groups (e.g., Facebook LGBTQ+ groups). Different advertisements were employed highlighting sexual difficulties and the inclusion of transgender women and non-binary individuals. Participants were also recruited from a database of participants who had previously consented to be contacted via email about future studies conducted by UBC Sexual Health Research.

Interested participants completed a phone interview where a description of the study procedures was provided, and eligibility was assessed. Eligibility questions asked about gender identity, sexual orientation, age, major psychological disorders, and experience of sexual arousal and/or sexual desire difficulties. Those who endorsed sexual difficulties were asked additional questions during the phone screen to assess SIAD symptoms and severity of distress, based on DSM-5 diagnostic criteria (American Psychiatric Association, 2013). Specifically, participants were assessed for aspects of sexual interest and arousal that were reduced or absent, including: interest in sexual activity, sexual thoughts or fantasies, response to erotic or sexual stimuli, receptivity to or initiation of sexual activity, experience of sexual pleasure, and genital or non-genital sensations. Participants were also asked about their experience of personal distress in relation to their sexual concerns and the length of time they have experienced these concerns. Participants met criteria for SIAD if they endorsed at least 3 symptoms, reported personal distress, which persisted for at least 6 months. Following the phone screen individuals who were eligible for the SIAD group or non-SIAD group were sent an electronic copy of the consent form via email. Upon receiving the signed consent form, the researcher emailed participants a URL

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link to temporarily download the Inquisit 6 Web Player and another URL link to complete a set of online baseline questionnaires via Qualtrics Survey Software that included demographic variables, approach-avoidance sexual motivation, dyadic and solitary sexual desire, sexual aversion, sexual satisfaction, relationship satisfaction, sexual behaviours, depression symptoms, and gender role. The baseline questionnaire package took approximately 30 minutes to complete. Prior to completing the questionnaires, participants read a cover page stating that completing the questionnaires indicated they have read and understood the consent form and agreed to take part in the research study.

After completion of the baseline questionnaire package participants scheduled a time to complete an online assessment and were randomly assigned to one of three writing task conditions: (1) approach; (2) avoidance; or (3) control condition. Block randomization was used to ensure equal number of participants were assigned to each condition. Participants then completed an online assessment from home, which included the following tasks: (1) a writing manipulation task; (2) manipulation check questions, and measures assessing approach-avoidance sexual motivation, positive and negative affect, and sexual aversion; (3) an online attention task where participants watched a short nature film and an erotic film while periodically indicating their level of attention to the videos; (4) questions assessing interest level, motivation to watch films, subjective sexual arousal, and sexual explicitness were administered after each film; and (5) a post attention task questionnaire was administered after the completion of the attention task and its corresponding questions. Prior to beginning the online assessment tasks, participants received a phone call from the researcher who explained the assessment instructions and answered any questions before participants proceeded with the tasks, which took

approximately 5 minutes. Together the online assessments tasks took approximately one hour to complete.

Seventy-two hours after the online assessment was completed participants received an online questionnaire via Qualtrics, which assessed approach-avoidance sexual motivation, sexual desire, sexual aversion, sexual behaviours, sexual satisfaction, relationship satisfaction, and COVID-19 related stress. Together the questionnaire package took about 10 minutes to complete. After the completion of the final questionnaire package participants received a debriefing form that outlined the purpose of the manipulation and included an "approach motivation booster" from Muise et al (2017; see Appendix A), which was intended to allow those who did not receive the approach manipulation access to this and specifically to ensure that those in the avoidance condition were not left in a state that may be considered more negative compared to their pre-participation state. A Canada-wide mental health resource list was also provided at the end of participation or at any point throughout the participation process in the event that participants indicated distress related to mental health concerns.

Materials

Motivation Manipulation

Adopted from Muise et al. (2017), participants completed a writing task manipulation (See Appendix B), where they were instructed to think about a time when they engaged in a sexual encounter for the pursuit of a positive outcome (approach condition) or to avoid a negative outcome (avoidance condition) and to describe the experience in as much detail as possible, including their thoughts and feelings about the sexual encounter, for at least 5 minutes. Participants in the approach and avoidance condition were also asked to report how long ago the sexual encounter occurred, in days. Those in the control condition wrote about the room they

were in during the assessment and described another room that they were in earlier that day (based on Goldey & van Anders, 2012).

Measures of Interest

Attention Task

A self-report of attention to sexual cues was assessed by having participants view two 10-minute videos, one nature film and one erotic film. Before watching the videos, participants selected their preferred erotic film category from three options. Throughout each film 5 attention probes appeared below the video asking participants to report to what degree they were paying attention to the film right before the question appeared. These probes appeared at random intervals approximately every 90-120 seconds. Participants indicated their level of attention on a Likert scale from 0 (*not paying attention at all*) to 6 (*fully paying attention to the video*). Participants provided their response by pressing the number key on their keyboard that corresponded to their answer. The question then disappeared until the next probe was presented. The online attention task was completed using the Inquisit 6 Web Player, a web application developed by Millisecond Software that enables psychological and behavioural experiments over the internet.

Experimental Stimuli

Participants watched one nature film and one erotic film that were each approximately 10 minutes in length. The nature film was a documentary showing the germination and growth of plants in different climates. Participants selected their preferred erotic film category from three options that included: (1) one female and one male performer, (2) two female performers, and (3) two transgender women performers. The erotic films depicted consensual sexual activity between dyads that included kissing, touching, cunnilingus, fellatio, vaginal penetration, while

the erotic film option with two transgender women included anal penetration. Erotic films did not include depictions of aggression, violence, fetish, or degradation. All films were purchased for digital download and the Terms of Use for videos outlined use for non-commercial purposes only. Erotic films were purchased from production companies that outlined ethical production practices.

To ensure that the selected films were acceptable as neutral or erotic stimuli, participants were asked to rate how sexually explicit the nature and erotic films were after each film. There were no differences in mean sexual explicitness ratings of the nature and erotic films between SIAD status and writing task condition groups. There were also no differences found between erotic film choice options for sexual explicitness ratings. Mean sexual explicitness ratings for the nature and erotic films were significantly different, $t(107) = -34.02$, $p < .001$, $d = 3.27$, indicating that the presented films were adequate as neutral and sexual stimuli.

Measures

Demographics. The following demographic variables were assessed as a means of describing our sample: age, ethnicity, education, employment, income level, sex, gender identity, sexual orientation, religious affiliation, relationship status, current health status, medication use, sexual history, history of unwanted sexual contact, and province/territory of residence.

Sexual Motivation. *Motivations for Sex Measure* (MSMQ; adapted from Cooper et al., 1998), is a 19-item unvalidated measure, which rates the importance of approach and avoidance reasons for sex from 1 (*not at all important*) to 7 (*extremely important*). Mean scores for approach motivation and for avoidance motivation are calculated with higher scores indicating higher levels of motivation. The MSMQ was administered at baseline, after the writing task manipulation, and 72 hours follow up. At present a measure of approach and avoidance reasons

for sex has not been validated and the psychometric properties of the MSMQ have not been examined; however, unpublished data from an ongoing study found strong internal consistency for both the approach motivation scale ($\alpha = .91$) and avoidance motivation scale ($\alpha = .89$) in a sample of women with SIAD. In the current study one item from the approach motivation scale ("to please my partner") was removed due to negative inter-item correlation. One item from the avoidance motivation scale ("to prevent feeling sexually frustrated") was also removed due to negative inter-item correlation. The current study found strong internal consistency for the approach motivation scale ($\alpha = .84$) and avoidance motivation scale ($\alpha = .91$).

Sexual Aversion. The *Sexual Aversion Scales* (SAS; Katz et al., 1989) is a 30-item measure assessing sexual fears and avoidance of sexual behaviours on a scale from 1 (*not at all like me*) to 4 (*a lot like me*), with higher sum scores indicating greater levels of sexual aversion. The SAS was administered at baseline, after the manipulation check questionnaires during the online assessment, and at the 72-hour follow up time point. Due to changes in language use since the validation of the SAS, three items were adapted to include more accurate terminology (such as updating "AIDS" to "HIV/AIDS" and "sexually transmitted disease" to "sexually transmitted infection"). Item 27 was also adapted to be more inclusive of transgender women and non-binary participants, as well as participants who were not heterosexual. Specifically, the wording was changed from "I would go out of my way to avoid being alone with a member of the opposite sex" to "I would go out of my way to avoid being alone with a member of the sex/gender that I am attracted to. Strong internal consistency was determined in the current sample ($\alpha = .92$). Sexual aversion was measured to assess to what degree the MSMQ avoidance motivation scale might potentially assess sexual aversion. Sexual aversion was significantly correlated with approach sexual motivation, $r = -.26$, $p < .001$ and with avoidance sexual motivation, $r = .47$, $p <$

.001. Sexual aversion was also included as a covariate in the primary analyses to see if sexual aversion impacted avoidance motivation outcomes and was found to not change the results for avoidance motivation in the primary analyses described below.

Sexual Desire. The *Sexual Desire Inventory* (SDI-2; Spector et al., 1996) is a 14-item measure that assesses frequency and strength of solitary and dyadic sexual desire, with higher sum scores indicating higher levels of sexual desire. The SDI-2 was administered at baseline and 72 hours follow up. The SDI-2 has strong internal consistency for both the Dyadic scale ($\alpha = .86$) and the Solitary scale ($\alpha = .96$; Spector et al., 1996). The SDI-2 has a test-retest reliability of $r = .76$ over a one-month period (Carey, 1995, in Spector et al., 1998). Convergent validity has been assessed by looking at the correlations for solitary sexual behaviour ($r = .80$) and behaviour dyadic sexual behaviour ($r = .34$). Neither solitary nor dyadic sexual behaviour were found to perfectly correlate with solitary and dyadic sexual desire, which suggests that it would be inaccurate to measure desire directly through behaviour (Spector et al., 1998). Strong internal consistency was demonstrated in the current sample for both the Dyadic scale ($\alpha = .89$) and the Solitary scale ($\alpha = .87$).

Sexual Satisfaction. The *Sexual Satisfaction Scale for Women* (SSS-W; Meston & Trapnell, 2005) is a 30-item measure with five subscales (Contentment, Communication, Compatibility, Concern: Relational, and Concern: Personal), which asks participants to rate their sexual satisfaction and distress on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*). Higher sum scores indicate greater levels of sexual satisfaction. The SSS-W was administered at baseline and 72 hours follow up. Internal consistency is strong for total score ($\alpha = .94$), with subscales ranging from $\alpha = .74 - .90$. Test-retest reliability is high for total score ($r = .87$) over a 4 – 5-week period, although subscales ranged from. $R = .63 - .87$ (Meston & Trapnell, 2005).

Convergent validity was assessed with the Satisfaction domain of the Female Sexual Function Index, where the correlation with the total score was $r = .61$ and subscales ranged from $r = .38 - .63$. Discriminant validity was examined with the Marital Adjustment Test, which is a similar but different construct. Findings showed a correlation with total scores to be $r = .46$, with subscale correlations ranging from $r = .19 - .56$. In the current study one item of the SSS-W was modified to be more applicable to transgender women and non-binary participants. Specifically, item 23 was altered from "I'm worried that my partner views me as less of a woman because of my sexual difficulties" to "I'm worried that my partner views me as less of what my gender identity is because of my sexual difficulties." Participants who indicated being a cisgender woman received the original item, while participants who indicated being a transgender woman or non-binary received the modified item. This decision was made in consultation with a community advisory board made up of cis- and transgender women. In the current sample internal consistency was strong for total score ($\alpha = .95$), with subscales ranging from $\alpha = .77 - .92$.

Relationship Satisfaction. The *Relationship Assessment Scale* (RAS; Hendrick et al., 1998) is a 7-item measure of global relationship satisfaction and is suitable to use for any dyad (e.g., married couples, cohabiting couples, engaged couples, or dating couples). A mean score was calculated with higher scores indicating greater relationship satisfaction. The RAS was administered at baseline and 72 hours follow up. Internal consistency of the RAS is high ($\alpha = .86$), and test-retest reliability is $r = .85$ (Hendrick et al., 1998). The RAS correlates with longer measures of relationship satisfaction, such as the Dyadic Adjustment Scale ($r = .80$) (Hendrick, 1988). In the current sample, the RAS showed strong internal consistency ($\alpha = .88$).

Sexual Behaviour. The *Report of Behaviour and Feelings-Desire* (RBF-D; Velten et al., 2020) is an 18-item measure that assesses the extent to which participants engaged in sexual

behaviours or had the feeling of wanting to engage in sexual behaviours (responsive desire) in the past 3 days (72 hours), on a scale from 0 (*not at all*) to 5 (*5 times or more*). Factor 2 of the RBF-D, which assesses partnered sexual behaviours was used in analyses. The RBF-D was administered at baseline and 72 hours follow up. Internal consistency for factor 2 was high α =.86, while internal consistency ranged from α =.75 – .86 across all factors. Convergent validity has been assessed with other sexual desire measures, which were found to have small to medium correlations. Discriminant validity was assessed with a measure of sexual inhibition where no correlation was found (Velten et al., 2020). Strong internal consistency was determined in the current sample (α =.91).

Depression. The *Beck Depression Inventory-II* (BDI-II; Beck et al., 1996) is a 21-item measure where each item is rated along a 4-point scale from 0 (lower severity) to 3 (higher severity). The BDI-II was used to assess severity of depression symptoms at baseline. Internal consistency of the BDI-II was strong (α = .90) in a sample of college students, test-retest reliability ranged from 0.73 to 0.96, and convergent validity was good at (r = .76) (Wang & Gorenstein, 2013). In the current sample internal consistency was found to be strong (α = .89).

Gender Role. The *Traditional Masculinity-Femininity Scale* (TMF; Kachel et al., 2016) is a 6-item measure that assesses different aspects of self-ascribed masculinity and femininity on a scale from 1 (*very masculine*) to 7 (*very feminine*). The TMF was administered at baseline. Internal consistency was strong (α = .87) and test-retest reliability was r = .75 over a one-year period. The TMF was found to correlate with some gender-related measures (r = -.08 - .49), but correlations were smaller for measures that assessed attributes associated with femininity and masculinity, whereas the TMF measures those constructs directly (Kachel et al., 2016). Internal consistency was strong in the current sample (α = .84).

Manipulation Check. Following the writing task manipulation, participants in the approach condition were asked "To what extent did you pursue approach sexual goals in the situation that you wrote about?" and participants in the avoidance condition were asked "To what extent did you pursue avoidance sexual goals in the situation that you wrote about?" and respond on a Likert scale from 1 (*Not at all*) to 7 (*A great deal*). Participants in all conditions were presented with one item asking: "how difficult was it for you to think of the situation that you wrote about?" from 1 (*Very easy*) to 7 (*Very difficult*). All manipulation check items are adapted from Muise et al., (2017).

Positive and Negative Affect. The *Positive and Negative Affect Schedule* (PANAS; Watson et al., 1988) is a 20-item measure that has a Positive Affect Scale, which assesses the extent to which an individual feels enthusiastic, active, and alert/attentive and a Negative Affect Scale, which assesses the extent to which an individual feels distress and displeasure. The PANAS was administered following the manipulation check questions during the online assessment. Participants rated their positive and negative affect levels in the present moment on a scale from 1 (*Very slightly or not at all*) to 5 (*Extremely*). Internal consistency is found to be strong for the Positive Affect Scale (α = .89) and for the Negative Affect Scale (α = .89). The Positive and Negative Affect Scales are also found to be uncorrelated (r = -.09). Test-retest reliability over a two-month period was found to be r = .54 for the Positive Affect Scale and r = .45 for the Negative Affect Scale. Convergent and divergent validity has been evaluated with a measure of general distress and dysfunction, where a strong positive correlation was found with the Negative Affect Scale (r = .65) and a small negative correlation was found with the Positive Affect Scale (r = -.29). In the current sample internal consistency for the Positive Affect Scale (α = .89) and Negative Affect Scale (α = .83) was determined to be strong.

Self-Report of Attention. Participants were asked "How much attention were you paying to the video?" at five timepoints throughout each film to assess attention. Participants responded on a scale from 0 (*Not paying attention at all*) to 6 (*Fully paying attention*).

Interest Ratings. Participants were asked to "Please rate how interesting you found the video that you just watched" immediately following the nature film and following the erotic film. Participants responded on a scale from 0 (*Not interesting at all*) to 6 (*Very interesting*).

Motivation to Watch Films. Participants were asked to "Please rate how motivated you were to pay attention to the video that you just watched" immediately following the nature film and following the erotic film. Participants responded on a scale from 0 (*Not motivated at all*) to 6 (*Very motivated*).

Sexual Explicitness Ratings. Participants were asked to "Please rate how sexually explicit you found the video that you just watched (i.e., to what degree the video depicted sexual behaviour)" immediately following the nature film and following the erotic film. Participants responded on a scale from 0 (*Not sexual at all*) to 6 (*Very sexual*).

Subjective Sexual Arousal. Participants rated their subjective sexual arousal using two items that have been used in previous studies to assess arousal before and after the presentation of erotic stimuli (Heiman & Rowland, 1983). Participants were asked "How sexually aroused do you feel?" before and following the erotic film. In addition, they were asked "What was your highest level of sexual arousal during the video?" after the erotic film. Participants responded to both items on a scale from 0 (*Not sexually aroused at all*) to 9 (*Most sexual arousal I've ever felt, possibly level associated with orgasm*).

Post Attention Task Questionnaire. Participants' viewing experience and environment was assessed following completion of the attention task. Participants were asked to report

experience of any technical issues while downloading the Inquisit 6 Web Player or while watching the videos. Participants indicated if they were able to view one or both films, reported their screen size in inches, headphone use, whether volume was on, and rated the image quality for each video on a scale from 1 (*Totally unclear, very pixelated or blurry*) to 5 (*Totally clear, not pixelated/blurry at all*). Participants were also asked to indicate their level of distractedness while watching each video. Specifically, to what degree they were distracted by other content on their computer, phones, and others in their environment on a scale from 1 (*Not at all distracted*) to 5 (*Completely distracted*).

COVID-19 Stress. COVID-19-related stress was assessed with the 36-item *COVID Stress Scales* (CSS; Taylor et al., 2020a). The CSS was administered at the 72-hour follow up to assess potential history effects associated with the ongoing COVID-19 pandemic. The CSS is comprised of 5 factors assessing (1) danger and contamination fears, (2) fears about economic consequences, (3) xenophobia, (4) compulsive checking, and (4) traumatic stress symptoms related to COVID-19. Participants indicated their responses on a scale from 0 (*Not at all*) to 4 (*Extremely*) or on a scale from 0 (*Never*) to 4 (*Almost Always*). Higher sum scores indicate greater COVID-19-related stress. In the current sample internal consistency was determined to be excellent (α =.95), with internal inconsistency for the 5 factors ranging from α =.81 to .93.

Data Analysis

Power Calculation

Two power analyses were conducted using G*Power software (Faul et al., 2007) to determine the target sample size that would provide statistical power of ~0.95 to detect a medium effect size (d = .51) on the main outcomes in our study. The effect size used in the power analysis was derived from Muise et al.'s (2017) study. The first power analysis was calculated

for a repeated measures multivariate analysis of variance (MANOVA), between-within interaction, that determined a total sample size of $N = 187$. In order to secure our sample size, a 20% buffer for attrition was calculated, resulting in a total $N = 225$. This power analysis accounted for a total of 36 groups: 2(SIAD status) x 2(gender) x 3(writing conditions) x 3(film choices).

While the first power analysis accounted for gender as an independent variable there were anticipated challenges in recruiting transgender women and non-binary individuals, a challenge found in the larger field of transgender health research (Reisner et al., 2016), as well as study timeline constraints. A second power analysis was conducted to determine a target sample size for a repeated measures 2x3x3 MANOVA, accounting for 18 groups, where gender identity was not included as an independent variable. The second power analysis determined a total sample size of $N = 132$. In order to secure our sample size a 20% buffer for attrition was calculated, resulting in a total $N = 159$. Our goal was to recruit the target sample size derived from the first power analysis (N=225), with the secondary goal of oversampling transgender and non-binary individuals and run all analyses with gender groups together and separately to determine effect sizes, in the event that our resulting sample size of transgender women and non-binary individuals was not large enough to reach statistical power.

Group differences

A series of analyses of variance (ANOVA) and chi-square tests were conducted to determine whether there were significant differences in demographic variables between writing task condition groups (before the manipulation). Any resulting significant differences would be included as covariates in all analyses. As our goal was to recruit a gender diverse group, gender differences in demographic variables were assessed using t-tests and chi square tests where

applicable. Potential group differences in demographic variables based on SIAD status were compared as a means of describing our sample. Baseline sexual outcome variables were also compared using independent t-tests to examine group differences based on SIAD status and gender group.

Interrater reliability

To examine writing task compliance, two trained coders rated all writing tasks independently. Both coders, who were blind to the condition participants were randomized to, rated participant responses on three criteria (see Appendix C for coding instructions). The first criterion was whether participants followed part one of the writing task instructions, where participants were to describe a sexual encounter or the room they were in. Coders rated whether participants wrote about a sexual encounter, described a room, or were non-compliant (did not describe a sexual encounter or a room). The second criterion was whether participants followed the second part of the instructions of the writing task where participants were to describe their thoughts/feelings and motivations for engaging in the sexual encounter, or describe another room they had been in earlier that day. Specially, coders rated those who had described a sexual encounter as completely following the second part of the instructions (described their thoughts/feelings and motivations), or only partially followed the instructions (described either thoughts/feelings or sexual motivation). The third criterion applied to those who described a sexual encounter and rated whether participants wrote about approach motivation for sex, avoidance motivation, both approach and avoidance motivation, or neither type of motivation described. Interrater reliability was determined using Cohen's Kappa.

Manipulation check

The extent to which those in the approach condition pursued approach reasons for sex in

their described sexual encounter was compared between SIAD and non-SIAD groups, and between cisgender and transgender/non-binary groups using a series of independent t-tests. The same set of analyses were also carried to assess the extent to which those in the avoidance condition pursued avoidance reasons for sex in their described sexual encounter.

Mean answers to the writing task difficulty manipulation check question was compared across the groups using a 2x3 ANOVA, with SIAD status (SIAD and non-SIAD) and writing task condition (approach, avoidance, and control) as independent variables. Independent samples t-tests were conducted to compare writing difficulty between gender groups. Writing task difficulty was examined as a covariate in analyses testing the effect of the manipulation.

The number of days since the described sexual encounter was compared between SIAD and non-SIAD groups, and between cisgender and transgender/non-binary groups using a series of independent t-tests. Number of days since the described sexual encounter was examined as a covariate in analyses testing the effect of the manipulation.

Changes in approach and avoidance sexual motivation were compared from pre-assessment baseline to immediately following the writing task during the online assessment, using a repeated measures MANOVA with SIAD status, writing condition, and time as factors. Bonferroni corrections were used for all pairwise comparisons (where the *p*-value of the Least Significant Difference (LSD) is multiplied by the number of comparisons). A separate 4-factor MANOVA was conducted with gender group included as a factor.

Primary analyses

To test Hypotheses 1, 2 and 4, a repeated measures multivariate analysis of covariance (MANCOVA) was conducted with SIAD status (SIAD and non-SIAD), writing task condition (approach, avoidance, and control), and time (pre-assessment, 72 hour follow up) as the

independent variables, and with approach and avoidance sexual motivation, sexual desire, sexual

satisfaction, relationship satisfaction, and sexual behaviour as dependent variables. Gender role

was included as an *a* priori covariate to control for individual differences. Post Hoc analyses

were conducted using Bonferroni corrections. A separate 4-factor MANCOVA was conducted

with gender group included as a factor.

Attention task analyses

Participant viewing experience and viewing environment variables were assessed to test

for potential differences based on erotic film choice using a series of one-way ANOVAs and chi

square tests where applicable. To examine potential differences based on erotic film choice mean

attention to erotic films, interest ratings, motivation to watch, and subjective sexual arousal were

examined using a series of one-way ANOVAs with erotic film choice as the independent

variable (female-female, female-male, transgender-transgender).

To test Hypothesis 3 (i.e., that approach manipulation would increase attention and that

avoidance manipulation would decrease attention), two ANOVAs were conducted to compare

mean attention levels to the nature and erotic films between SIAD status and writing task

condition groups. To examine changes in attention across time, a repeated measures ANOVA

was conducted on mean levels of attention for each of the 10 attention probes (5 from nature film

and 5 from erotic film), with SIAD status and writing condition included as independent

variables. Bonferroni corrections were used for pairwise comparisons between each probe.

Exploratory analyses

To examine our exploratory hypotheses that positive affect, negative affect, and attention

would mediate outcomes, each of these were tested as separate potential mediators in a series of

mediation models, as shown in Figure 2. Specifically, writing task condition was included as a

predictor variable, and only those sexual outcome variables which significantly changed from pre-assessment to 72 hours following the manipulation were included as outcomes variables. Mediation analyses were conducted using ordinary least squares (OLS) path analysis in the PROCESS macro for SPSS (Hayes, 2017).

Chapter Three: Results

Sample Characteristics

A sample of 67 individuals with SIAD (M_{age} = 32.0, SD = 8.1), and 96 individuals with no sexual concerns (M_{age} = 31.1, SD = 9.8) were recruited online and primarily in Canada. Five participants' data were excluded due to reporting no history of sexual partners in their lifetime. Two participants' data were excluded due to attempting to participate twice. Twelve participants' data were excluded due to not following writing task instructions, specifically not writing about a sexual encounter nor describing a room (depending on the condition they were randomized to), or not writing about approach or avoidance sexual motivation. Attention task data were not collected for 44 individuals due to compatibility issues between Inquisit 6 Web Player and participants' operating system and/or web browser. There were no differences in demographic characteristics (age, sex, gender, ethnicity, sexual orientation, education level, employment status, annual income, and relationship status) between participants who successfully completed the attention task and those who experienced compatibility issues and were unable to complete the attention task. A series of chi square tests found that there were no group differences in the proportion of participants who experienced compatibility issues during the attention task based on SIAD status, gender group, writing task condition, nor erotic film choice. Those participants' data were included in analyses testing main hypotheses but excluded from exploratory hypotheses assessing attention.

Participants were on average 31.2 (SD = 9.1) years old, with the majority of participants identifying as women (84.0%), white (73.5%), in a relationship (52.8%), heterosexual (39.8%) or bisexual (31.1%), graduated from a 4-year college (39.1%) or completed a post-graduate degree (29.8%), and employed full time (41.7%). Writing task condition groups were not significantly

different from each other for any demographic variables. Participants with and without SIAD were similar in demographics, including age, sex, gender, ethnicity, sexual orientation, education level, employment status, annual income, length of current relationship, history of unwanted or non-consensual sexual contact, as shown in Table 1. Significantly more participants with no sexual concerns reported being never married ($p = .01$) and single ($p = .002$) compared to participants with SIAD, while there were no other significant differences in relationship status between these groups. A greater number of participants with SIAD reported having a significant medical condition compared to participants without sexual concerns ($p = .01$). Participants who met criteria for SIAD endorsed 4.3 ($SD = 0.9$) of the six SIAD symptoms on average, and experienced sexual concerns for an average of 3.7 ($SD = 4.9$) years. There was no difference in COVID-19 stress between SIAD ($M = 37.7$, $SD = 23.4$) and non-SIAD participants ($M = 33. 1$, $SD = 21.4$; $p = .22$, Hedges' g = 0.21). COVID-19 stress total scores from this sample were lower compared to total scores for female participants ($M = 46.6$, $SD = 29.5$) from a Canadian and American population-representative sample (Taylor et al., 2020b).

Gender Group Characteristics

To examine gender differences participants were grouped as either cisgender or as transgender/non-binary. Gender groups were similar in demographics, specifically age, ethnicity, education level, income, relationship status, current relationship length, history of significant medical condition, history of unwanted or non-consensual sexual contact. There were no significant differences in the proportion of participants with and without SIAD for cisgender and transgender/non-binary groups, $p = .19$. There were significant differences in sexual orientation based on gender groups, $\chi^2 (5, N = 160) = 41.12$, $p < .001$, as shown in Table 2. A significantly greater proportion of cisgender participants reported their sexual orientation as heterosexual

(48.1%) compared to transgender and non-binary participants (3.4%). A significantly greater

proportion of transgender and non-binary participants reported their sexual orientation as

demisexual (10.3% compared to 1.5% of cisgender participants), and pansexual (41.4%

compared to 9.1% of cisgender participants). A significantly greater proportion of transgender

and non-binary participants were self-employed (23.3%) compared to cisgender participants

(8.3%), χ^2 (1, $N = 162$) = 5.57, $p = .018$. A significantly greater proportion of transgender and

non-binary participants were also unemployed (23.3%) compared to cisgender participants

(8.3%), χ^2 (1, $N = 162$) = 5.57, $p = .018$. There were no other group differences for employment

status. There was no difference in COVID-19 stress between cisgender ($M = 34.2$, $SD = 22.7$)

and transgender/non-binary participants ($M = 38.0$, $SD = 20.0$; $p = .43$, Hedges' g = 0.17).

Baseline Outcome Variables

Participants with SIAD scored significantly lower on all sexual wellbeing variables

assessed at baseline compared to non-SIAD participants. Baseline depression symptoms were

significantly higher for SIAD participants ($M = 16.4$, $SD = 9.5$) compared to non-SIAD

participants ($M = 12.7$, $SD = 8.1$), $t(160) = 2.72$, $p = .007$, Hedges' g = 0.44. Both groups' mean

depression symptoms fell within the mild to moderate depression range (Beck et al., 1988). For

those with SIAD, depression symptoms were positively correlated with dyadic sexual desire ($r =$

.28, $p = .03$) and solitary sexual desire ($r = .28$, $p = .02$), while there was no correlation for non-

SIAD participants or for the total sample. There were no differences in depression scores

between cisgender and transgender/non-binary groups ($p = .13$). There was no difference in

traditional masculinity and femininity gender role between gender groups ($p = .11$; Hedges' g =

0.33), as well as between SIAD and non-SIAD groups ($p = .30$; Hedges' g = 0.17). Gender role

was included as a covariate in all initial analyses discussed below but since it was not found to be

associated with any outcomes, gender role was removed from all subsequent analyses.

Interrater Reliability

Cohen's κ was run to determine if there was agreement between two coders who evaluated compliance to writing task instructions. Agreement between coders was perfect for rating participant compliance regarding whether they wrote about a room or a sexual encounter, κ = 1.00, $p < .001$. Eight writing tasks responses were rated as non-compliant and were not included in analyses. Coders also rated to what degree participants wrote about their thoughts, feelings and motivations for sex, with agreement being strong between coders, κ = .898, 95% CI [.835, .961], $p < .001$. Coders rated 97.5% of participants as completely following the writing task instructions where they were instructed to write about their thoughts/feelings about the sexual encounter, and their motivations for engaging in that encounter. While 2.0% of participants were rated as only partially following the instructions and writing about only thoughts/feelings or only about their motivations. Coders then rated whether participants wrote about approach motivation, avoidance motivation, both types of motivation, or neither type of motivation. Agreement between coders regarding motivation was also strong, κ = .815, 95% CI [.748, .882], $p < .001$. Coders rated four responses (3.5%) as writing neither about approach or avoidance motivation (and were also removed from analyses for non-compliance), while 23.8% of participants were rated as writing about both approach and avoidance motivation.

Of the 54 participants randomized to the approach condition, 81.5% were rated as writing about approach motivation, 1.9% were rated as writing about avoidance motivation, 13.0% were rated as writing about approach and avoidance, and 3.7% were rated as writing about neither type of motivation. Of the 47 participants randomized to the avoidance condition, 57.4% were rated as writing about avoidance motivation, 3.2% writing about approach motivation, 36.2%

were rated as writing able both approach and avoidance, 3.2% as writing about neither type of motivation.

Manipulation Checks

Self-Reported Pursuit of Approach or Avoidance Reasons for Sex

Participants in the approach condition were asked to rate the extent to which they pursued approach reasons for sex in the sexual encounter they wrote about and participants in the avoidance condition were asked to rate the extent to which they pursued avoidance reasons for sex. The extent that participants randomized to the approach condition pursued approach reasons for sex in the sexual encounter they wrote about did not significantly differ between SIAD ($M =$ 5.3, $SD = 1.5$) and non-SIAD groups ($M = 5.7$, $SD = 1.3$; $p = .45$, Hedges' g = 0.34). Similarly, for those randomized to the avoidance condition, the extent that participants pursued avoidances reasons for sex in the encounter they described was not significantly different between SIAD ($M = 4.0$, $SD = 2.1$) and non-SIAD groups ($M = 4.1$, $SD = 1.8$; $p = .83$, Hedges' g = 0.07). Further cisgender participants did not differ in pursuit of approach reasons ($M = 5.5$, $SD = 1.5$) compared to transgender/non-binary participants ($M = 5.6$, $SD = 0.7$; $p = .93$, Hedges' g = 0.03). Cisgender ($M = 3.9$, $SD = 1.9$) and transgender/non-binary participants ($M = 5.0$, $SD = 2.3$; $p = .19$, Hedges' g = 0.59) also did not significantly differ in the extent that they pursued avoidance reasons for sex.

Writing Difficulty

An ANOVA examined writing task difficulty as the dependent variable, with SIAD status (SIAD and non-SIAD) and writing task condition (approach, avoidance, control) as the independent variables. There was no significant interaction between SIAD status and writing condition, $F_{(2.147)} = 0.55$, $p = .58$, partial $\eta^2 = .007$. There was a significant main effect of

writing task condition, $F(2,147)=14.26$, $p < .001$, partial $\eta^2 = .16$. There were five outliers

identified and a pair of ANOVAs which did and did not include outliers indicating a significant

main effect of writing task condition. Therefore, the outliers' data were included in the reported

analyses. There was homogeneity of variances, as assessed by Levene's test for equality of

variances, $p = .145$. Post-hoc tests with Bonferroni corrections found that participants in the

avoidance condition reported greater writing task difficulty ($M = 3.9$, $SD = 1.9$) compared to

those in the approach condition ($M = 2.7$, $SD = 1.7$; $p = .002$, Hedges' g = 0.69) and control

condition ($M = 2.1$, $SD = 1.5$; $p < .001$, Hedges' g = 1.05). There was no difference in writing

task difficulty between those in the approach and control conditions ($p = .25$, Hedges' g = 0.33).

There was also no difference in writing task difficulty between cisgender ($M = 2.9$, $SD = 1.8$)

and transgender/non-binary participants ($M = 2.8$, $SD = 1.9$; $p = .86$, Hedges' g = 0.03). Writing

difficulty was included as a covariate in all initial analyses discussed below. All analyses found

writing difficulty to be nonsignificant and therefore it was removed as a covariate from

subsequent analyses.

Days Since Sexual Encounter

An independent samples t-test examined differences in the number of days since the

described sexual encounter with SIAD status as the independent variable. Homogeneity of

variances were not assumed as Levene's test was significant ($p = .003$). There was a significant

difference in the number of days since the sexual encounter between SIAD ($M = 80.5$, $SD = 141.7$) and non-SIAD participants ($M = 247.7$, $SD = 586.5$), $t(62.094) = -2.04$, $p = .046$, Hedges'

g = 0.37. An independent samples t-test also examined differences in the number of days since

the described sexual encounter between gender groups. Homogeneity of variances were not

assumed as Levene's test was significant ($p < .001$). Results indicated no significant difference in

the number of days between cisgender ($M = 108.6$, $SD = 200.1$) and transgender/non-binary

participants ($M = 539.3$, $SD = 1018.0$), $t(14.20) = -1.63$, $p = .124$, Hedges' g = 0.99. Number of

days since the described sexual encounter was examined as a covariate in an initial repeated

measures MANCOVA. Approach and avoidance sexual motivation were included as dependent

variables, and SIAD status, writing task condition (approach and avoidance conditions only, as

days since encounter was not applicable to the control condition), and time (pre-assessment and

immediately following the writing task) as independent variables. Days since encounter was

found to be non-significant and removed as a covariate from subsequent analyses ($p = .71$).

Effect of Writing Task on Approach and Avoidance Motivation

A repeated measures MANOVA examined approach and avoidance sexual motivation as

dependent variables, and SIAD status, writing task condition, and time (pre-assessment and

immediately following the writing task) as independent variables. Pillai's Trace test is reported as

the assumption of homogeneity of covariance matrices was violated, as assessed by Box's M test

($p < .001$). There was homogeneity of variances for pre-assessment approach motivation ($p =$

.308), pre-assessment avoidance motivation ($p = .069$), and avoidance motivation following the

writing task ($p = .130$). However, homogeneity of variances was violated for approach motivation

following the writing task ($p = .006$). There were seven univariate outliers identified but results

were the same with and without the inclusion of outliers, thus outliers were included in the

reported analyses. There were no multivariate outliers, as assessed by Mahalanobis distance ($p =$

.574). There was a significant three-way interaction between SIAD status, writing condition, and

time, $F(4, 292) = 3.31$, $p = .011$, Pillai's Trace = .09, partial $\eta^2 = .04$. Estimated marginal means

are shown in Table 3.

Post-hoc tests with Bonferroni corrections found that SIAD participants in the approach condition significantly increased in their levels of approach sexual motivation from pre-assessment ($M = 4.6$, $SD = 1.1$) to immediately following the writing task, with a medium effect size ($M = 5.0$, $SD = 1.2$, $p = .001$, $d = 0.63$). There were no significant changes in mean approach sexual motivation for SIAD participants in the avoidance and control condition. Non-SIAD participants in the avoidance condition significantly increased in approach motivation, with a medium effect size ($M = 5.5$, $SD = 0.8$ to $M = 5.8$, $SD = 0.7$, $p = .02$, $d = .62$). Non-SIAD participants randomized to the approach and control condition did not significantly change in approach sexual motivation. Non-SIAD participants in the avoidance condition significantly increased in avoidance sexual motivation, with a large effect size ($M = 2.4$, $SD = 1.1M = 3.2$, $SD = 1.6$, $p < .001$, $d = 1.04$). There were no significant changes in avoidance sexual motivation for non-SIAD participants in the approach and control condition, nor for SIAD participants across conditions.

To explore potential differences among gender groups an additional repeated measures MANOVA was conducted with approach and avoidance sexual motivation as dependent variables, and SIAD status, writing task condition, time (pre-assessment and immediately following the writing task), and gender group (cisgender and transgender/non-binary) as independent variables. It should be noted that there was limited power to conduct a 4 factor MANOVA and results should be interpreted with caution. There was a significant four-way interaction between SIAD status, writing task condition, time, and gender group, $F(4, 278) = 2.41$, Pillai's Trace $= .07$, $p = .049$, partial $\eta^2 = .03$. Estimated marginal means are shown in Table 4. Post-hoc tests with Bonferroni corrections found that cisgender SIAD participants in the approach condition increased in approach sexual motivation from pre-assessment, with a

medium effect size ($M = 4.7$, $SD = 1.1$) to immediately following the writing task ($M = 5.1$, $SD = 1.2$; $p < .001$, $d = .68$). There were no other differences for those randomized to the approach condition. While cisgender non-SIAD participants in the avoidance condition significantly increased in approach motivation, with a medium effect size ($M = 5.4$, $SD = 0.8$ to $M = 5.7$, $SD = 0.7$; $p = .02$, $d = 0.64$).

Regarding changes in avoidance motivation, cisgender SIAD participants in the avoidance condition increased in avoidance motivation from pre-assessment, with a medium effect size ($M = 4.2$, $SD = 1.3$) to following the writing task ($M = 4.6$, $SD = 1.2$; $p = .045$, $d = 0.52$). Cisgender non-SIAD participants in the avoidance condition also increased in avoidance motivation, with a large effect size ($M = 2.5$, $SD = 1.1$ to $M = 3.3$, $SD = 1.7$; $p < .001$, $d = 1.29$), while transgender/non-binary SIAD participants in the avoidance condition decreased in avoidance sexual motivation, with a large effect size ($M = 2.9$, $SD = 0.5$ to $M = 1.6$, $SD = 0.8$; $p = .02$, $d = -3.55$, $n = 2$).

Effect of Sexual Motivation on Sexual Outcomes

Effect of Sexual Motivation on Sexual Desire, Sexual Satisfaction, and Sexual behaviours

To test our primary hypotheses that participants in the approach condition would improve in sexual motivation, sexual desire, sexual satisfaction, and sexual behaviours compared to those in the avoidance and control condition, and that participants with SIAD would see greater improvements in sexual outcomes variables compared to those without SIAD, a repeated measures MANOVA was conducted. Approach sexual motivation, avoidance sexual motivation, dyadic sexual desire, sexual satisfaction, and sexual behaviours were significantly correlated (as shown in Table 5), and therefore all outcomes were included in the MANOVA. Solitary sexual desire was significantly correlated with all dependent variables described above except for sexual

satisfaction but was also included in the MANOVA. SIAD status, writing task condition, and time (pre-assessment and 72 hours following the assessment) were included as independent variables. There were 16 univariate outliers and one multivariate outlier identified but results were the same with and without the inclusion of outliers, thus outliers were included in the reported analyses. There was homogeneity of covariance matrices, as assessed by Box's M test (p = .006). There was no significant interaction between SIAD status, writing condition, and time, $F(12, 242) = 0.50$, $p = .91$, Pillai's Trace $= .05$, partial $\eta^2 = .02$. However, there was a significant two-way interaction between SIAD status and time, $F(6, 120) = 2.25$, $p = .043$, Pillai's Trace $= .101$, partial $\eta^2 = .10$. Estimated marginal means are shown in Table 6.

Post-hoc tests using Bonferroni correction found that participants with SIAD decreased in approach motivation from pre-assessment ($M = 4.6$, $SD = 1.2$) to 72 hours following the assessment, with a small effect size ($M = 4.4$, $SD = 1.3$; $p = .047$, $d = -0.25$). Non-SIAD participants decreased in avoidance motivation with a medium effect size ($M = 2.4$, $SD = 1.1$ to $M = 2.1$, $SD = 1.1$; $p = .007$, $d = -0.46$). Non-SIAD participants also significantly decreased in dyadic sexual desire with a large effect size ($M = 40.7$, $SD = 9.4$ to $M = 37.4$, $SD = 9.8$; $p < .001$, $d = -0.75$). Lastly, Non-SIAD participants significantly decreased in partnered sexual behaviours with a small effect size ($M = 5.1$, $SD = 4.3$ to $M = 4.2$, $SD = 3.8$; $p = .03$, $d = -0.26$).

An additional 4-factor repeated measures MANOVA was conducted to explore potential differences between gender groups. Approach and avoidance sexual motivation, dyadic sexual desire, solitary sexual desire, sexual satisfaction, and partnered sexual behaviours were included as dependent variables, and SIAD status, writing task condition, time (pre-assessment and 72 hours following the assessment), and gender group (cisgender and transgender/non-binary) as independent variables. There was no significant interaction found between SIAD status, writing

condition, gender group, and time, $F(12, 228) = 0.90$, $p = .54$, Pillai's Trace = .091, partial $\eta^2 =$ .05. Results indicated only a main effect of time $F(6, 113) = 2.74$, $p = .02$, Pillai's Trace = .13, partial $\eta^2 = .13$. Specifically, participants decreased in avoidance motivation from pre-assessment ($M = 3.1$, $SD = 1.5$) to 72 hours following the assessment ($M = 2.9$, $SD = 1.6$; $p = .03$, $d = -0.23$) as well as decreased in dyadic sexual desire ($M = 33.0$, $SD = 13.2$ to $M = 30.7$, $SD = 12.9$; $p = .007$, $d = -0.38$), both with small effect sizes.

Effect of Sexual Motivation on Relationship Satisfaction

Relationship satisfaction was not included in the MANOVA as it was not highly correlated with the other sexually-related dependent variables aside from sexual satisfaction (refer to Table 5), and not correlated with dyadic sexual desire ($p = .17$). Further, not all participants were in a relationship, and so the sample size for relationship satisfaction was considerably smaller. A separate repeated measures ANOVA examined relationship satisfaction as the dependent variable, and SIAD status, writing task condition, and time as independent variables. There was homogeneity of covariance matrices, as assessed by Box's M test ($p = .05$) and homogeneity of variance, p-values ranged .25 - .53. There was no significant interaction between SIAD status, writing task condition, and time, $F(2,104) = 0.25$, $p = .78$, Pillai's Trace = .005, partial $\eta^2 = .005$ on relationship satisfaction, nor were there any significant main effects. An additional 4 factor ANOVA that included gender group was conducted, and this ANOVA was not significant for relationship satisfaction.

Effect of Writing Task on Attention to Sexual Cues

Participant viewing environments

To account for potential differences in viewing environment, a series of one-way ANOVAs were conducted with screen size and nature and erotic film image quality ratings as dependent

variables, and writing task condition as the independent variable. Results indicated no significant difference between writing task condition for any dependent variables. Participants viewed the films using a mean screen size of 15.1 inches ($SD = 4.3$). Image quality for the nature film was rated as very clear ($M = 4.8$, $SD = 0.5$) as well as the erotic films ($M = 4.9$, $SD = 0.4$). Chi square tests were conducted to examine potential differences in headphone use, whether volume was on, with writing task condition as the independent variable. There were no differences in headphone use and volume between writing task groups. Only one participant did not have their volume turned on for the nature film and all participants reported their volume turned on for the erotic film.

Distractions in the viewing environment were assessed in terms of non-attention task computer use, phone use, and environmental distractors such as another person, pet, noise, etc. There were no significant differences in distraction between groups for SIAD status, gender group, writing task condition nor erotic film choice options. The majority of participants did not use their computer for other purposes while viewing that nature film (98.1%), with only 1 participant reporting using their computer sometimes and 1 participant indicated using their computer during the nature film half of the time, as shown in Table 7. No participants reported using their computer for another purpose during the erotic film. Phone use during the attention task was more common with 24.5% of participants reporting that they used their phone during that nature video sometimes or half of the time. Phone use during the erotic film was lower with 13.2% reporting that they had used their phone sometimes or half of the time. Other environment distractions such as another person, pet, noise, etc. were reported by 24.5% of participants during the nature film and 25.5% of participants during the erotic film, with 84.6% of distracted participants being only somewhat distracted during the nature and 81.5% reported being

somewhat distracted during the erotic films. No participants reported being distracted more than half of the time for either film.

Self-Reported Attention to Nature and Erotic Films

To examine group differences in mean attention to the nature film, an ANOVA was conducted with SIAD status and writing task condition as independent variables. Findings indicated no significant difference in mean attention to the nature film between groups $F(5,102)$ = 1.19, p = .32, partial η^2 = .06. Due to data loss as a result of compatibility issues with the attention task, there were not enough transgender/non-binary participants' data remaining to conduct an ANOVA that included gender group as a factor. An independent samples t-test was conducted with gender group as the independent variable, which found no difference between cisgender (M = 4.7, SD = 1.2) and transgender/non-binary participants (M = 4.6, SD = 1.1) for mean level of attention to the nature film, $t(105)$ = 0.57, p = .57, Hedges' g = 0.14.

A one-way ANOVA examined the impact of erotic film choice on mean attention to the erotic films, and it was not significant, $F(2,105)$ = 1.92, p = .15. To further assess for potential differences in attention throughout the erotic films, a series of one-way ANOVAs were conducted with each of the 5 attention probes presented during the erotic film, and erotic film choice as the independent variable. There were no significant differences in attention for any of the 5 attention probes based on erotic film choice (p-values ranged from .07 to .69).

To examine our hypotheses that participants randomized to the approach condition would pay more attention to sexual cues compared to those in the avoidance and control condition, and of those randomized to the approach condition, SIAD participants would show more attention compared to non-SIAD participants, a two-way ANOVA was conducted with mean attention to the erotic film as the dependent variable, and SIAD status and writing task condition as

independent variables. The overall 3X2 ANOVA was not significant, $F(5,102) = 1.60$, $p = .17$, partial $\eta^2 = .073$. Mean attention for SIAD and non-SIAD groups are shown in Table 8. There was also no difference in mean level of attention to the erotic films between cisgender ($M = 5.2$, $SD = 1.1$) and transgender/non-binary participants ($M = 5.4$, $SD = 0,8$), $t(105) = -0.63$, $p = .53$, Hedges' g = 0.16.

A repeated measures ANOVA assessed changes in self-report attention throughout the nature and erotic films. The interaction between SIAD status and writing condition was not significant, $F(18, 182) = 0.67$, $p = .84$, partial $\eta^2 = .06$. There was a main effect of time, $F(9, 90) = 2.42$, Pillai's Trace $= .195$, $p = .02$, partial $\eta^2 = .20$, however, pairwise comparisons showing that mean attention reported at the fourth and fifth probe of the nature film were significantly lower than every attention probe of the erotic films, as shown in Figure 3. There were no other differences between attention probes.

Film Interest Ratings

Given the low number of non-SIAD participants in the avoidance condition who chose the trans lesbian film, we did not carry out a 2x3x3 ANOVA and opted for separate one-way ANOVAs instead. A one-way ANOVA determined there was a significant difference in erotic film interest ratings between erotic film choice, $F(2,105) = 3.29$, $p = .04$. However, post-hoc tests using Bonferroni correction found there were no significant differences in mean interest ratings between lesbian, straight, and transgender lesbian erotic films.

A two-way ANOVA examined interest ratings of the erotic film as the dependent variable and SIAD status and writing task condition as independent variables, and indicated no significant interaction, $F(1,102) = 0.25$, $p = .78$, partial $\eta^2 = .005$. There was a significant main effect of SIAD status, $F(1,102) = 4.19$, $p = .043$, partial $\eta^2 = .04$. However, assumption of

homogeneity of variances was violated as indicated by Levene's test ($p = .005$). An independent samples t-test with equal variances not assumed indicated no significant differences in erotic film interest ratings between SIAD and non-SIAD groups, $t(65.230) = -1.79$, $p = .08$. Hedges' g = 0.38. There was also no difference between cisgender ($M = 4.4$, $SD = 1.5$) and transgender/non-binary participants ($M = 4.9$, $SD = 1.5$) regarding mean interest rating of the erotic film, $t(105) = -1.35$, $p = .18$, Hedges' g = 0.34.

Motivation to Watch Films

A one-way ANOVA also determined that the different film choices elicited different levels of motivation to watch. Due to a homogeneity of variance violation, a Welch correction was used, *Welch's F*$(2, 18.809) = 4.217$, $p = .03$. Games-Howell post-hoc tests found that participants who viewed the lesbian erotic film indicated greater motivation to watch the film ($M = 5.4$, $SD = 1.0$) compared to those who viewed the straight film, with a medium effect size ($M = 4.6$, $SD = 1.5$; $p = .01$, Hedges' g = 0.56). There were no differences in motivation to watch between those who watched the transgender lesbian film and those who watched the lesbian and straight films.

A two-way ANOVA examined motivation to watch the erotic film as the dependent variable and SIAD status and writing task condition as independent variables, and found no significant interaction, $F(2,102) = 1.08$, $p = .34$, partial $\eta^2 = .02$. There was a significant main effect of SIAD status, $F(1,102) = 4.91$, $p = .03$, partial $\eta^2 = .05$. Post-hoc tests using Bonferroni correction determined SIAD participants reported less motivation to watch the erotic film ($M = 4.5$, $SD = 1.6$) compared to non-SIAD participants, with a medium effect size ($M = 5.2$, $SD = 1.2$; $p = .03$, Hedges' g = 0.48). There was also no difference between cisgender ($M = 4.9$, $SD =$

1.4) and transgender/non-binary participants ($M = 5.4$, $SD = 1.2$) regarding motivation to watch the erotic film, $t(105) = -1.39$; $p = .17$, Hedges' g $= 0.35$.

Subjective Sexual Arousal

There were no differences in highest level of subjective sexual arousal during the erotic film between erotic film choice options, $F(2, 105) = 2.10$, $p = .13$. A two-way ANOVA examined highest level of subjective sexual arousal experienced during the erotic film as the dependent variable and SIAD status and writing task condition as independent variables, and found no significant interaction, $F(2,102) = 1.48$, $p = 23$, partial $\eta^2 = .03$. There was a main effect of SIAD status for highest subjective sexual arousal experienced during the erotic film, $F(1,102) = 5.99$, $p = .02$, partial $\eta^2 = .06$. However, assumption of homogeneity of variance was violated as indicated by Levene's tests, $p = .04$. A follow up independent samples t-test with equal variances not assumed indicated that SIAD participants reported significantly lower subjective sexual arousal during the erotic film ($M = 4.9$, $SD = 2.4$) compared to non-SIAD participants, with a medium effect size ($M = 6.0$, $SD = 1.8$), $t(72.001) = -2.65$, $p = .01$, Hedges' g $= 0.55$. There was no difference in highest level of subjective sexual arousal during the erotic film between cisgender ($M = 5.5$, $SD = 2.2$) and transgender/non-binary participants ($M = 6.1$, $SD = 1.8$), $t(105) = -1.09$, $p = .28$, Hedges' g $= .27$.

There were also no differences in subjective sexual arousal after the erotic film between erotic film choice options, $F(2, 105) = 1.50$, $p = .23$. A two-way ANOVA examined subjective sexual arousal after the erotic film as the dependent variable and SIAD status and writing task condition as independent variables, and found no significant interaction, $F(2,102) = 2.12$, $p = .13$, partial $\eta^2 = .04$. There was a main effect of SIAD status for subjective sexual arousal following the erotic film, $F(1,102) = 9.58$, $p = .003$, partial $\eta^2 = .09$. Post-hoc tests using

Bonferroni correction found SIAD participants reported significantly lower subjective sexual arousal (M = 3.9, SD = 2.3) compared to non-SIAD participants, with a medium effect size (M = 5.3, SD = 1.8; p = .003, Hedges' g = 0.69). There was no difference between cisgender (M = 4.7, SD = 2.1) and transgender/non-binary participants (M = 5.1, SD = 2.1) regarding subjective sexual arousal after the erotic film, $t(105)$ = -0.64, p = .52, Hedges' g = 0.16.

Pearson correlations between attention to the erotic film, interest rating, motivation to watch the erotic film, and subjective sexual arousal are shown in Table 9. Mean attention to the erotic film had a large positive correlation with interest rating and motivation to watch the film. Attention to the erotic film had a medium positive correlation with subjective sexual arousal during and after the erotic film.

Positive Affect, Negative Affect, and Attention to Sexual Cues as Mediators

To examine our exploratory hypothesis of positive affect, negative affect, and mean attention to erotic films as potentially mediating the effect of the writing task on sexual outcome variables, a series of mediation models were conducted. Writing task condition was included as the predictor variable, and approach sexual motivation, avoidance sexual motivation, dyadic sexual desire, and partnered sexual behaviours were included as outcome variables, as these were found to significantly change from pre-assessment to 72 hours following the assessment. Mediation analyses were conducted using ordinary least squares (OLS) path analysis in the PROCESS macro for SPSS (Hayes, 2017). Analyses indicated no significant indirect effects of positive affect, negative affect, or attention to erotic films on any of the tested outcome variables, as 95% confidence intervals based on 10,000 bootstrap samples included zero.

Chapter Four: Discussion

Summary of Findings

      The aim of this study was to experimentally manipulate approach and avoidance sexual motivation in cis- and transgender women and non-binary individuals with and without SIAD, and assess the impact of the manipulation on sexual desire, sexual satisfaction, relationship satisfaction, and partnered sexual behaviours 72 hours following the manipulation. We found that immediately following the manipulation, approach sexual motivation significantly increased for SIAD participants in the approach condition, while avoidance sexual motivation increased for both SIAD and non-SIAD participants in the avoidance condition. However, when sexual motivation was assessed 72 hours following the manipulation approach, sexual motivation decreased for SIAD participants and avoidance sexual motivation decreased for non-SIAD participants regardless of writing condition. Dyadic sexual desire and partnered sexual behaviours also decreased for non-SIAD participants at 72 hours follow up. The current study also aimed to evaluate how the manipulation impacted self-reported attention to sexual cues using an online probe-caught method; we found no significant effect of the manipulation on attention to sexual cues for neither SIAD nor non-SIAD participants. The current study also aimed to explore the potential underlying mechanisms of the sexual motivation manipulation and its impact on sexual outcomes by examining positive affect, negative affect, and attention to sexual cues as potential mediators. Overall, we did not observe any significant indirect effects of positive affect, negative affect, or attention in mediating the effect of the manipulation on sexual motivation, dyadic sexual desire, or partnered sexual behaviours. The current study also aimed to explore potential differences between cisgender and transgender/non-binary participants for all the hypotheses described above. Overall, findings were consistent between cisgender and

transgender/non-binary participants in all analyses finding no effect of gender. One exception was that cisgender participants with SIAD in the avoidance condition increased in avoidance sexual motivation while transgender/non-binary participants with SIAD decreased in avoidance motivation immediately following the manipulation.

Interpretation

Effect of Manipulation on Approach and Avoidance Motivation

There was a significant three-way interaction between SIAD status, writing condition, and time on approach and avoidance sexual motivation immediately following the manipulation during the online assessment. Of those randomized to the approach condition, SIAD-participants significantly increased in approach sexual motivation from pre-assessment levels, while non-SIAD participants in the approach condition experienced no significant changes in sexual motivation. This is contrary to Muise et al.'s (2017) finding where those from a community sample with no sexual concerns who were assigned to the approach condition increased in approach sexual motivation. The manipulation used in the current study alone may not have been salient enough for non-SIAD participants who were already significantly higher in approach motivation compared to SIAD participants at the pre-assessment timepoint. Those with SIAD who were in the approach condition may have had more room for improvement in their approach sexual motivation levels.

Of those randomized to the avoidance condition, non-SIAD participants increased in both approach sexual motivation (medium effect size) and avoidance sexual motivation (large effect size). There were no significant changes in avoidance sexual motivation for SIAD participants across writing task conditions. Non-SIAD participants randomized to the avoidance condition reporting higher approach motivation is inconsistent with Muise et al.'s (2017) findings, where

participants in the avoidance condition did not experience an increase in approach motivation. Our finding that both types of sexual motivation increased for non-SIAD participants in the avoidance condition might be due to one third of participants in the avoidance condition writing about both approach and avoidance reasons for sex (as rated by two independent coders). Those in the avoidance condition also reported significantly greater writing difficulty compared to approach and control conditions, which was consistent with Muise et al. (2017) findings. A possible explanation may be that avoidance reasons for sex are not commonly pursued independently to approach reasons. A previous qualitative study, which assessed approach and avoidance reasons for sex in a group of women with SIAD, found that more than 90% of women endorsed at least one approach reasons for their last sexual encounter, while only 8% of women had no reasons or only avoidance reasons for sex (Jabs & Brotto, 2018). Given that in the current study we found this unexpected finding for non-SIAD participants, pursuit of only avoidance reasons for sex might be even less prevalent among individuals without sexual concerns.

We found no significant changes in avoidance sexual motivation for SIAD participants who were randomized to the avoidance condition, and this may be due to collapsing cisgender and transgender/non-binary participants into one group in the 3-factor MANOVA. In exploring potential gender group differences regarding the impact of the manipulation of sexual motivation, a significant four-way interaction between SIAD status, writing task condition, time, and gender group was found, although it should be noted that the model was close to the somewhat arbitrary significance threshold of $p = .05$ ($p = .049$). Results for cisgender participants were consistent with the 3-factor MANOVA, where cisgender SIAD participants in the approach condition increased in approach sexual motivation, and cisgender non-SIAD participants in the avoidance condition significantly increased in both approach and avoidance

sexual motivation. However, cisgender SIAD participants in the avoidance condition increased in avoidance sexual motivation from pre-assessment to immediately following the writing task (as expected), whereas somewhat unexpectedly the transgender/non-binary SIAD participants in the avoidance condition decreased in avoidance sexual motivation. The mean avoidance motivation for SIAD transgender/non-binary participants may have skewed the findings when both gender groups were collapsed together. This gender group difference is likely due to inadequate statistical power to examine the transgender/non-binary group separately from cisgender participants. Caution should be taken when interpreting these group differences, given the small sample size of transgender and non-binary participants. Further, the lack of previous research prevents comparing the current findings to the broader literature.

Effect of Sexual Motivation Manipulation on Sexual Outcomes

We hypothesized that participants randomized to the approach condition would show higher levels of sexual desire, sexual satisfaction, relationship satisfaction, and partnered sexual behaviours at 72 hours following the manipulation, compared to the other two conditions, and of those randomized to the approach condition, participants with SIAD would show greater improvements in these sexual outcome variables compared to non-SIAD participants. Contrary to our hypotheses, we did not observe a significant interaction between SIAD status, writing condition, and time. Results indicated a significant interaction between SIAD status and time where participants with SIAD decreased in approach sexual motivation from pre-assessment to 72 hours follow up (although this finding was close to the significance threshold, $p = .047$). A possible explanation for the decrease in approach sexual motivation at the 72-hour timepoint may be that the approach manipulation was not salient enough for a lasting impact in a clinical sample. It might also be the case that for SIAD participants the outcome of the described sexual

outcome was not motivating enough. The incentive motivation model proposes that incentive is consolidated and maintained partially by the consequences of the sexual encounter (Toates, 2009). Recalling a sexual encounter that while was for approach reasons, may have not been emotionally or physically rewarding enough to consolidate approach motivation even at 72 hours later.

Non-SIAD participants significantly decreased in avoidance sexual motivation, dyadic sexual desire, and partnered sexual behaviours from pre-assessment to 72 hours following the manipulation, regardless of writing condition. Muise et al. (2017) found participants significantly increased in sexual desire immediately following the approach manipulation and at one week follow up. It might be possible that participating in the study brought some awareness to relational or sexual concerns for non-SIAD participants, which impacted their sexual motivation, desire, and partnered sexual behaviours. This decrease in dyadic sexual desire and partnered sexual behaviours could also be explained by the inclusion of the attention task in the current study. While a decrease in sexual behaviours following the presentation of erotic stimuli contradicts previous work that has found that participating in studies where erotic stimuli is viewed increases partnered sexual activity following participation (Both et al., 2004), it might be possible that the erotic films elicited negative feelings or social comparisons from participants, which interfered with the manipulation. Previous work has found that viewing erotic stimuli impacts mood and perceptions of oneself or partner, although findings are inconsistent in the literature in terms of how positive or negative these impacts are (Staley & Prause, 2013). Given that positive and negative affect was assessed following the manipulation and before the attention task, the impact of the erotic films on mood cannot be assessed in the current study.

Results also found no significant changes in relationship satisfaction across groups and writing conditions, which is consistent with Muise et al. (2017). This consistent finding might suggest that targeting sexual motivation may not be as useful in improving relationship satisfaction. Future studies might examine how improving relationship satisfaction might impact approach-avoidance sexual motivation.

Effect of Manipulation on Attention to Sexual Cues

Contrary to our hypotheses that participants randomized to the approach condition would pay more attention to sexual cues compared to those in the avoidance and control condition, and of those randomized to the approach condition, SIAD participants would show more attention compared to non-SIAD participants, no interaction was found. There were also no group differences in how distracted participants were during both films. This finding is consistent with previous work that found women with and without sexual concerns did not differ in their attention to distractor objects while viewing erotic images (Velten et al., 2021). While there were no differences in self-reported attention to the erotic film between groups, we could not distinguish between to what extent attention was paid to erotic vs. non-erotic content (such as the background) of the erotic films. Perhaps SIAD and non-SIAD participants differed in their attention to the sexual parts of the video images. This might account for why there was no difference in self-reported attention to erotic films between SIAD and non-SIAD participants but there were significant differences in motivation to watch the erotic films and lower subjective sexual arousal reported by SIAD participants. An eye-tracking study found differences in viewing patterns between women with and without sexual dysfunctions, where women with sexual concerns looked less at the genital area of erotic videos, and that visual attention on the genital area elicited subjective and physiological sexual arousal equally in women with and

without sexual dysfunctions (Velten et al., in press). Given that SIAD participants in the current study reported less subjective sexual arousal, but did not self-report less attention to the erotic film, it might be that SIAD participants were paying equal attention to the erotic film compared to non-SIAD participants, but they paid less attention to the more sexually explicit content (such as the genital areas of the films). The use of a self-report method to assess attention may have also accounted for no differences in attention between SIAD and non-SIAD participants. The probe-caught attention task may have not been sensitive enough to detect group differences in attention. Mean attention rates for the nature and erotic film probes were high (all attention probes had a mean of at least 4.5 out of 6) and a ceiling effect may have resulted. This could have been a result of demand effects, which are a concern in sexuality studies (Huberman et al., 2013). It might also be that only using a self-report method could only capture what participants were aware of in terms of their attention.

Potential Mediating Variables

Our exploratory analyses which tested positive affect, negative affect, and attention as potential mediators of the effect of the motivation manipulation on sexual outcome variables were all found to not have a significant indirect effect on the outcome variables. The mediating effects of these three variables were likely not detected given that the effects of writing condition did not persist from immediately after the manipulation to the 72 hour follow up time point. As previously discussed, the attention task may not have been sensitive enough to adequately measure attention and might have played a role in not finding a significant indirect effect of attention. Another consideration is that assessing the cognitive appraisal of the erotic stimuli may help understand the role of attention as a potential underlying mechanisms between sexual motivation and sexual outcome variables (Toates, 2009). Positive and negative affect after the

manipulation may have not been the mediating factor and rather affect elicited from the attention task may have played a larger role.

Clinical Implications

These findings show that the writing manipulation temporarily increased approach and avoidance sexual motivation. However, effects were not maintained at 72 hours follow up and in fact, approach and avoidance sexual motivation, as well as dyadic sexual desire and partnered sexual behaviours decreased from pre-assessment levels. Given this, we would not recommend this writing manipulation task as a tool to be used in the clinical setting with individuals with low sexual desire. Rather than rely on memory retrieval of a previous sexual experience (which is what we did in this study), it may be that increasing approach motivation through other components of the IMM might more effectively increase sexual outcome variables long term. For example, previous work has examined the impact of participants focusing on their sexual ideals rather than their duties or obligations, which facilitated an open processing style of sexual stimuli that was directed toward positive outcomes and rewards (Dewitte & Kindermans, 2021). The IMM posits that both experience and imagination play a role in triggering sexual response (Toates, 2009). For individuals with sexual concerns, relying on previous sexual experiences may not effectively elicit sexual response. Given that attention to sexual cues was not increased through manipulating sexual motivation, targeting the cognitive appraisal of sexual cues might be a way to impact the relationship between sexual motivation and attention. For example, instructing those with sexual concerns to focus on what they like about a sexual cue or sexual encounter might increase attention to sexual cues and approach sexual motivation, which could have impacts on behaviours or outcomes of sexual encounters.

Given that the IMM proposes sexual motivation arises from learned expectations,

addressing those expectations through the inclusion of psychoeducational materials outlining the benefits associated with approach motivation and the consequences of avoidance motivation might be more beneficial for individuals with SIAD than the writing manipulation. Testing the clinical utility of the approach motivation booster (refer to Appendix A), used in Muise et al.'s (2017) follow-up study, on a sample of individuals with SIAD might help us better understand the role of psychoeducational material in a clinical sample.

Limitations and Future Directions

A limitation of the current study was the small sample of transgender and non-binary participants, particularly those with SIAD. This resulted in limited power to compare cisgender and transgender and non-binary participants. The interpretation of the multifactorial analyses where gender group was included as an independent variable should be interpreted with caution given inadequate statistical power. While a community advisory board was established to improve recruitment of transgender and non-binary participants, future studies would benefit from more collaboration, such as working with a patient partner, in order to better recruit gender-diverse individuals with sexual concerns.

Another limitation of the current study was that we did not assess who participants wrote about in the writing task. Whether participants wrote about a current or past sexual partner may have impacted the manipulation or even potentially explain the decreases in sexual motivation, dyadic sexual desire, and partnered sexual behaviours at 72 hours follow up. Future studies should take this into account to better understand the context of these described sexual encounters. Future work could also examine the impact of applying a sexual motivation manipulation to couples with sexual concerns to better understand the interpersonal component of approach and avoidance sexual motivation and its impact on sexual wellbeing outcomes.

Partners of individuals with sexual concerns might benefit from increasing approach sexual motivation given that previous work has found that partners of individuals with SIAD reported poorer sexual communication, lower sexual satisfaction, orgasmic and erectile concerns, and higher sexual distress compared to those whose partners did not have SIAD (Rosen et al., 2019).

While assessing attention outside of a laboratory setting may have potential implications for ecological validity, our probe-caught attention task has not been previously tested, and further testing is required to determine its psychometric properties. Participants may have paid attention in a more "natural" way given they completed the task at home; however, it is unclear how attention using this paradigm would be different compared to in-lab settings. Further, using a self-report method may have resulted in demand characteristics that were not accounted for, such as indicating greater attention. It is also unclear what role social presence or implied social presence played during the attention task. Social presence may have been a factor based on who was in participants' viewing environment, as well as the knowledge of their attention being assessed may have influenced responses, which has been shown in lab-based eye tracking studies (Milani et al., 2019). Future studies should include a measure of social desirability to better determine if there was biased responding when using this method.

Lastly, a potential limitation of the current study was collecting data during the COVID-19 pandemic, which may have impacted our findings in a way that was not captured with the COVID stress scales. Specifically, the COVID stress scales did not assess relational stress or conflict as a result of the pandemic. Testing the treatment utility of a sexual motivation manipulation in a SIAD sample post-pandemic would allow us to better understand to what extent these data were impacted by the pandemic.

Conclusions

To our knowledge, the current study was the first to test a manipulation of sexual motivation in a sample of individuals with SIAD, as well as the first study to replicate previous work that experimentally increased the salience of approach-avoidance sexual motivation. These findings are also the first to examine the relationship between approach-avoidance sexual motivation and sexual wellbeing variables in a sample of transgender women and non-binary individuals with and without SIAD. This has implications for better understanding sexual concerns in gender diverse individuals, who have been excluded from previous work on sexual concerns. To our knowledge this was also the first study to adapt a probe-caught method to assess attention to erotic stimuli remotely. These findings highlight that more work is needed to better assess attention remotely. This study showed that approach motivation could be experimentally increased in a sample with SIAD, which raises questions about how this manipulation might be adapted to further improve its treatment utility for long-term improvements in sexual wellbeing.

Table 1

Baseline characteristics of participants with SIAD and participants with no sexual concerns.

Measure	SIAD	Non-SIAD	Total
Number of Participants	67	96	163
Age (years), mean ± SD	32.0 ± 8.1	31.1 ± 9.8	31.2 ± 9.1
Sex, N (%)			
Female	65 (97.0)	90 (93.8)	155 (95.1)
Male	1 (1.5)	6 (6.3)	7 (4.3)
Prefer not to respond	1 (1.5)	0	1 (0.6)
Gender identity, N (%)			
Woman	58 (86.6)	79 (82.3)	137 (84.0)
Indigenous or other cultural gender identity (e.g., two-spirit)	1 (1.5)	0	1 (0.6)
Non-binary, gender fluid	8 (11.9)	17 (17.7)	25 (15.3)
Relationship status, N (%)			
Never married*	4 (6.0)	19 (19.8)	23 (14.1)
Single*	6 (9.0)	28 (29.2)	34 (20.9)
Dating	10 (14.9)	20 (20.8)	30 (18.4)
In relationship	40 (59.7)	46 (47.9)	86 (52.8)
Common-law	11 (16.4)	7 (7.3)	18 (11.0)
Married	17 (25.4)	15 (15.6)	32 (19.6)
Separated	1 (1.5)	1 (1.0)	2 (1.2)
Divorced	1 (1.5)	5 (5.2)	6 (3.7)
Widowed	0	2 (2.1)	2 (1.2)
Other	4 (6.0)	6 (6.3)	10 (6.1)
Length of relationship (years), mean ± SD	6.7 ± 6.6	5.1 ± 4.8	5.9 ± 5.8
Ethnicity, N (%)			
Arab/West Asian (Afghan, Iranian, etc.)	1 (1.5)	1 (1.0)	2 (1.2)
Black (African, Afro-Caribbean, etc.)	2 (3.0)	2 (2.1)	4 (2.5)
Chinese	1 (1.5)	2 (2.1)	3 (1.9)

Measure	SIAD	Non-SIAD	Total
Filipino	1 (1.5)	1 (1.0)	2 (1.2)
Hispanic or Latin American	2 (3.0)	5 (5.2)	7 (4.3)
Indigenous (First Nations, Métis, Inuk, American Indian, or Alaska Native)	4 (6.1)	2 (2.1)	6 (3.7)
Japanese	1 (1.5)	0	1 (0.6)
Korean	1 (1.5)	0	1 (0.6)
South Asian (East Indian, Pakistani, Sri-Lankan, etc.)	2 (3.0)	5 (5.2)	7 (4.3)
Southeast Asian (Cambodian, Laotian, Malaysian, Vietnamese, etc.)	1 (1.5)	0	1 (0.6)
White	47 (71.2)	72 (75.0)	119 (73.5)
Other	3 (4.5)	6 (6.3)	9 (5.6)
Sexual orientation, N (%)			
Asexual	0	1 (1.1)	1 (0.6)
Bisexual	23 (34.8)	27 (28.4)	50 (31.1)
Demisexual	1 (1.5)	4 (4.2)	5 (3.1)
Heterosexual	28 (42.4)	36 (37.9)	64 (39.8)
Lesbian/Gay	5 (7.6)	12 (12.6)	17 (10.6)
Pansexual	9 (13.6)	15 (15.8)	24 (14.9)
Education, N (%)			
Attended some high school	1 (1.5)	0	1 (0.6)
Graduated high school	2 (3.1)	3 (3.1)	5 (3.1)
Attended some college	6 (9.2)	20 (20.8)	26 (16.1)
Graduated 2-year college	8 (12.3)	10 (10.4)	18 (11.2)
Graduated 4-year college	29 (44.6)	34 (35.4)	63 (39.1)
Post-graduate degree	19 (29.2)	29 (30.2)	48 (29.8)
Years of education, mean ± SD	17.2 (2.7)	17.1 (2.5)	17.1 (2.6)
Annual income, N (%)			
Less than $20,000	8 (12.1)	12 (13.0)	20 (12.7)
$20,000 to $39,999	11 (16.7)	11 (12.0)	22 (13.9)
$40,000 to $59,999	12 (18.2)	21 (22.8)	33 (20.9)

Measure	SIAD	Non-SIAD	Total
$60,000 to $79,999	2 (3.0)	13 (14.1)	15 (9.5)
$80,000 to $99,999	12 (18.2)	8 (8.7)	20 (12.7)
$100,000 to $119,999	8 (12.1)	7 (7.6)	15 (9.5)
$120,000 to $139,999	5 (7.6)	6 (6.5)	11 (7.0)
$140,000 to $159,999	0	2 (2.2)	2 (1.3)
$160,000 to $179,000	2 (3.0)	4 (4.3)	6 (3.8)
$180,000 to $199,000	2 (3.0)	1 (1.1)	3 (1.9)
$200,000 to $219,999	0	2 (2.2)	2 (1.3)
$220,000 to $239,999	1 (1.5)	0	1 (0.6)
$240,000 to $259,999	2 (3.0)	0	2 (1.3)
$260,000 to $279,000	0	0	0
$280,000 to $299,000	0	2 (2.2)	2 (1.3)
More than $300,000	1 (1.5)	3 (3.3)	4 (2.5)
Employment, N (%)			
Full time	25 (37.3)	43 (44.8)	68 (41.7)
Part time/casual	19 (28.4)	30 (31.3)	49 (30.1)
On disability	4 (6.0)	2 (2.1)	6 (3.7)
Retired	1 (1.5)	2 (2.1)	3 (1.8)
Self employed	9 (13.4)	9 (9.4)	18 (11.0)
Student	16 (23.9)	26 (27.1)	42 (25.8)
Stay at home parent	2 (3.0)	2 (2.1)	4 (2.5)
Homemaker	2 (3.0)	2 (2.1)	4 (2.5)
Unemployed	8 (11.9)	10 (10.4)	18 (11.0)
Other	3 (4.5)	4 (4.2)	7 (4.3)
Significant medical history [a], N (%)*	27 (40.9)	21 (22.3)	48 (30.0)
History of non-consensual sexual contact, N (%)			
As an adult	41 (61.2)	47 (49.0)	88 (54.0)
As a child	20 (29.9)	27 (28.1)	47 (28.8)
Received past treatments for sexual dysfunction, N (%)	8 (12.1)	2 (2.1)	10 (6.1)

Reported medical conditions listed from most to least endorsed: anxiety, depression, attention-deficit/hyperactivity disorder, asthma, hypothyroidism, irritable bowel syndrome, chronic pain, endometriosis, obsessive-compulsive disorder, polycystic ovary syndrome, post-traumatic stress disorder, yeast infection, arthritis, colitis, herpes, migraines, overactive bladder, insomnia, gender dysphoria, genito-pelvic pain/penetration disorder, traumatic brain injury, cysts, autoimmune disorder, sarcoidosis, bipolar disorder, borderline personality disorder, cerebral palsy, chronic shoulder instability, congenital heart defect, connective tissue disorder, COVID-19, Crohn's disease, cyclic vomiting syndrome, digestive issues, Ehlers Danlos syndrome, epilepsy, fatigue, gender-affirming surgery recovery, high cholesterol, histamine intolerance, immune thrombocytopenia, intersex, interstitial cystitis, lichen planus, lipedema, lymphedema, morbid obesity, osteopenia, post-SSRI sexual dysfunction, psoriasis, recto-vaginal fistula, Reynaud's syndrome, scoliosis, small intestine bacterial overgrowth, staph infection, tendonitis, uterine prolapse, vertigo.

*Indicates significant difference between groups, $p < .05$.

Table 2

Sexual orientations of cisgender and transgender/non-binary participants.

Sexual Orientation	Cisgender (n = 131) n (%)	Transgender/Non-Binary (n = 29) n (%)
Asexual[a]*	0 (0)	1 (3.4)
Bisexual	43 (32.8)	7 (24.1)
Demisexual*	2 (1.5)	3 (10.3)
Heterosexual*	63 (48.1)	1 (3.4)
Lesbian/Gay	11 (8.4)	5 (17.2)
Pansexual*	12 (9.2)	12 (41.4)

[a] Participants who selected asexual as their sexual orientation reported experiencing sexual

attraction in certain contexts during eligibility phone screen and thus were included.

*Indicates significant difference between groups, $p < .05$.

Table 3

Estimated marginal means for approach and avoidance sexual motivation reported by SIAD and non-SIAD participants at pre-assessment and assessment (immediately following the manipulation) timepoints, M (SE).

SIAD-status	Condition	Approach motivation[a]		Avoidance motivation[a]	
		Pre-assessment	Assessment	Pre-assessment	Assessment
SIAD					
	Approach	4.59 (0.21)	5.02 (0.21)*	3.83 (0.29)	3.98 (0.32)
	Avoidance	4.70 (0.20)	4.51 (0.20)	4.08 (0.27)	4.16 (0.31)
	Control	4.73 (0.20)	4.62 (0.20)	3.97 (0.27)	3.95 (0.31)
Non-SIAD					
	Approach	5.45 (0.17)	5.65 (0.17)	2.32 (0.23)	2.44 (0.26)
	Avoidance	5.47 (0.19)	5.76 (0.19)*	2.41 (0.26)	3.21 (0.29)*
	Control	5.57 (0.16)	5.49 (0.17)	2.50 (0.22)	2.42 (0.25)

Note. Possible range of scores: [a]1 to 7. Adjusted for multiple comparisons using Bonferroni correction.

*Indicates significant difference from pre-assessment to assessment time points, $p < .05$.

Table 4

Estimated marginal means for approach and avoidance sexual motivation for cisgender and transgender/non-binary participants with and without SIAD at pre-assessment and assessment (immediately following the manipulation) timepoints, M (SE).

SIAD-status	Condition	Approach motivation[a]		Avoidance motivation[a]	
		Pre-assessment	Assessment	Pre-assessment	Assessment
Cisgender					
SIAD					
	Approach	4.67 (0.23)	5.13 (0.22)*	3.92 (0.30)	3.98 (0.33)
	Avoidance	4.68 (0.22)	4.56 (0.22)	4.23 (0.30)	4.60 (0.32)*
	Control	4.72 (0.23)	4.59 (0.22)	4.04 (0.30)	4.03 (0.33)
Non-SIAD					
	Approach	5.48 (0.20)	5.68 (0.19)	2.36 (0.26)	2.51 (0.29)
	Avoidance	5.36 (0.21)	5.65 (0.21)*	2.51 (0.29)	3.34 (0.31)*
	Control	5.63 (0.19)	5.49 (0.19)	2.44 (0.26)	2.42 (0.28)
Transgender/Non-Binary					
SIAD					
	Approach	3.90 (0.67)	4.00 (0.67)	3.00 (0.91)	4.00 (0.99)
	Avoidance	4.60 (0.67)	5.05 (0.67)	2.93 (0.91)	1.57 (0.99)*
	Control	4.78 (0.48)	4.78 (0.47)	3.64 (0.64)	3.57 (0.70)
Non-SIAD					
	Approach	5.36 (0.36)	5.51 (0.36)	2.18 (0.49)	2.22 (0.53)
	Avoidance	6.03 (0.48)	6.30 ((0.47)	1.89 (0.64)	2.61 (0.70)
	Control	5.38 (0.34)	5.49 (0.33)	2.68 (0.45)	2.43 (0.50)

Note. Possible range of scores: [a]1 to 7. Adjusted for multiple comparisons using Bonferroni correction.

*Indicates significant difference between timepoints, *p* < .05.

Table 5

Pearson correlations between baseline sexual outcome variables.

Variable	1	2	3	4	5	6
1. Approach Sexual Motivation	1					
2. Avoidance Sexual Motivation	-.29**	1				
3. Dyadic Sexual Desire	.57**	-.39**	1			
4. Solitary Sexual Desire	.40**	-.27**	.53**	1		
5. Sexual Satisfaction	.40**	-.45**	.41**	0.10	1	
6. Partnered Sexual Behaviours	.33**	-.23**	.54**	.21**	.51**	1
7. Relationship Satisfaction	.30**	-.22*	0.12	-0.01	.58**	.23*

Correlation is significant, *$p < .05$, **$p < .01$.

Table 6

Estimated Marginal Means of Primary Outcomes by SIAD status and Time, M (SE).

	SIAD		Non-SIAD	
Outcome	**Pre-assessment**	**72 hours follow up**	**Pre-assessment**	**72 hours follow up**
Approach sexual motivation[1]	4.63 (0.13)	4.44 (0.15)*	5.55 (0.12)	5.47 (0.13)
Avoidance sexual motivation[1]	4.03 (0.17)	3.90 (0.18)	2.43 (0.15)	2.12 (0.16)*
Dyadic sexual desire[2]	22.44 (1.31)	21.85 (1.36)	40.88 (1.18)	37.57 (1.22)*
Solitary sexual desire[3]	8.44 (0.81)	9.07 (0.76)	14.22 (0.73)	14.31 (0.68)
Sexual satisfaction[4]	66.63 (2.28)	65.94 (2.53)	89.77 (2.04)	90.46 (2.27)
Sexual behaviours with partner[5]	1.54 (0.46)	1.51 (0.41)	4.85 (0.41)	4.12 (0.37)*

Note. Possible range of scores: [1]1 to 7; [2]0 to 62; [3]0 to 23; [4]24 to 120; [5]0 to 20.

*Indicates mean difference between timepoints is significant, $p < .05$.

Table 7

Self-reported distraction while viewing nature and erotic films.

Measure, n (%)	SIAD	Non-SIAD	Total
Number of Participants	41	65	106
Used computer during nature film	0	2 (3.1)	2 (1.9)
Sometimes	0	1 (1.5)	1 (0.9)
Half of the time	0	1 (1.5)	1 (0.9)
Used computer during erotic film	0	0	0
Used phone during nature film	10 (24.4)	16 (24.6)	26 (24.1)
Sometimes	8 (19.0)	13 (19.7)	21 (19.4)
Half of the time	2 (4.8)	3 (4.5)	5 (4.6)
Used phone during erotic film	4 (9.8)	10 (15.4)	14 (13.2)
Sometimes	2 (4.8)	10 (15.2)	12 (11.1)
Half of the time	2 (4.8)	0	2 (1.9)
Environment distractions during nature film	8 (19.5)	18 (27.7)	26 (24.5)
Not distracted at all	0	2 (3.0)	2 (1.9)
Somewhat distracted	7 (16.7)	15 (22.7)	22 (20.4)
Distracted half of the time	1 (2.4)	1 (1.5)	2 (1.9)
Environment distractions during erotic film	11 (26.8)	16 (24.6)	27 (25.5)
Not distracted at all	2 (4.8)	0	2 (1.9)
Somewhat distracted	7 (16.7)	15 (22.7)	22 (20.4)
Distracted half of the time	2 (4.8)	1 (1.5)	3 (2.8)

Table 8

SIAD and non-SIAD participants' mean attention and film ratings for erotic film.

	SIAD, M (SD)	Non-SIAD, M (SD)
Attention[a]	5.07 (1.21)	5.33 (0.97)
Interest rating[a]	4.12 (1.84)	4.70 (1.25)
Motivation to watch[a]*	4.55 (1.61)	5.20 (1.18)
Subjective sexual arousal during film[b]*	4.90 (2.37)	6.05 (1.84)
Subjective sexual arousal post-film[b]*	3.90 (2.28)	5.29 (1.83)

Note. Possible range of scores: [a]0 to 6; [b]0 to 9.

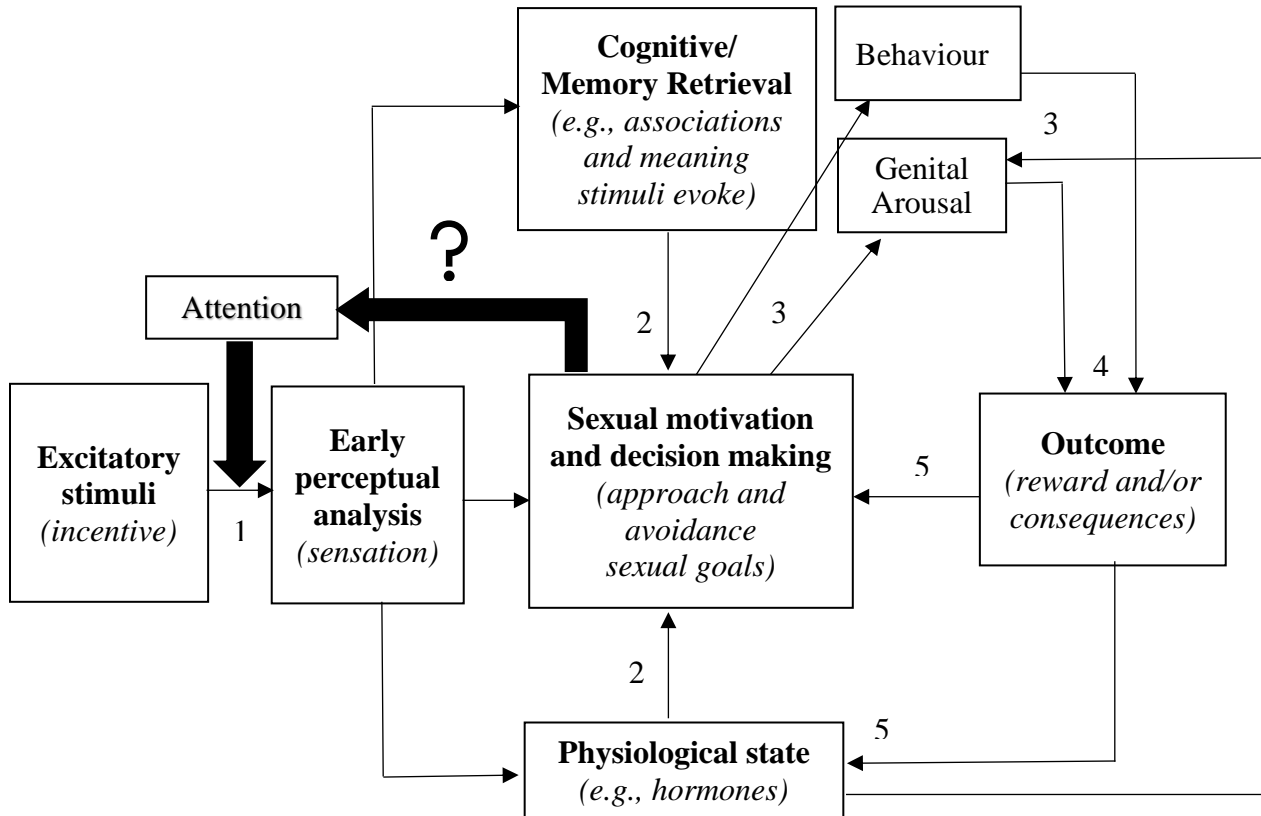*Indicates mean difference between groups is significant, $p < .05$.

Table 9

Pearson correlations for mean attention to erotic film and erotic film ratings.

Variable	1	2	3	4
1. Attention	1			
2. Interest rating	$.65^{**}$	1		
3. Motivation to watch	$.77^{**}$	$.73^{**}$	1	
4. Subjective sexual arousal during film	$.47^{**}$	$.64^{**}$	$.53^{**}$	1
5. Subjective sexual arousal post-film	$.46^{**}$	$.71^{**}$	$.53^{**}$	$.90^{**}$

** Correlation is significant, $p < .01$ level.

Figure 1

Incentive Motivation Model.

Note. Adapted from Toates (2009): (1) A sexual incentive is perceived and affects sexual motivation, cognitive appraisal of stimuli, and physiological state; (2) cognitive appraisal and physiological state both affect sexual motivation; (3) sexual motivations affect behaviour and genital arousal, and physiological state also affects genital arousal; (4) behaviour and genital arousal affect the outcome; (5) the rewards and/or consequences of the outcome affect sexual motivation and physiological state.

Figure 2

Three mediation models illustrating positive affect, negative affect, and attention as separate

mediating the pathway from writing task manipulation to sexual outcomes.
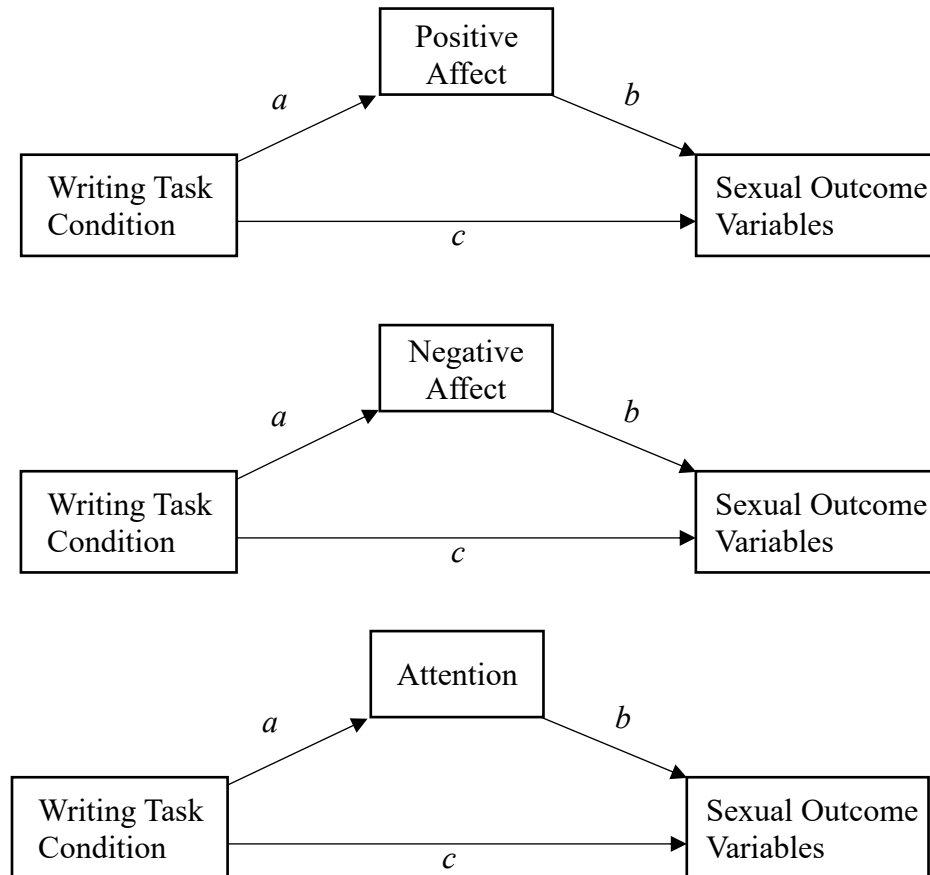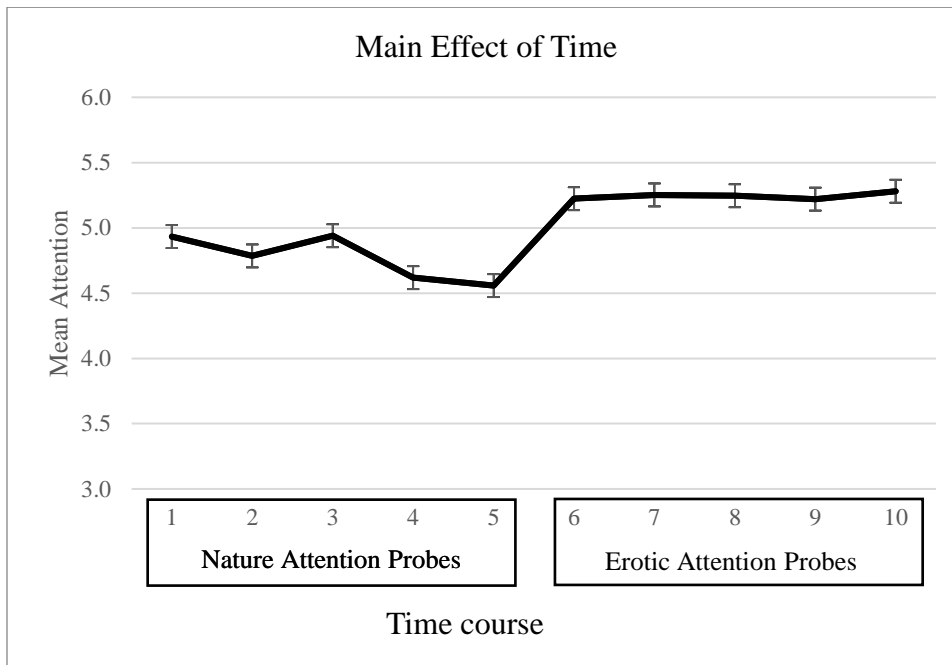
Figure 3

Time course of mean attention to nature and erotic films.

Note. Mean attention for probe 4 (*p*-values ranged .01 to .03) and probe 5 (*p* = .008 to .02) of the nature film were both significantly lower than mean attention for all erotic film attention probes. Adjusted for multiple comparisons using Bonferroni correction. Error bars represent standard error.

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Appendices

Appendix A: Approach Motivation Booster

What relationship and sexual outcomes are related to reasons for having sex?

Reasons for having sex

There are many different reasons that people have sex. These reasons can be placed into one of two categories: (1) approach goals and (2) avoidance goals. When you have sex to pursue a positive outcome, such as increasing intimacy with your partner, or to make your partner feel desired, this is called an approach goal. When you have sex to try to avoid a negative outcome, such as not wanting to make your partner feel badly or avoiding an argument, this is called an avoidance goal. Few decisions are purely approach motivated or avoidance motivated, but are often a mix of the two types of goals, with one type being more important to you in that particular situation.

How do my reasons for engaging in sex affect my life?

Researchers are interested in how these approach and avoidance reasons for having sex affect people's relationships and sexual lives. Recently, researchers from the University of Toronto published a study in the highly respected academic journal called *Personality and Social Psychology Bulletin.* In this study, they found that when people have sex for approach goals they experience more positive feelings about sex in general, including greater sexual desire both in the short and long term in their relationships (Muise, Impett, & Desmarais, 2013). Approach goals have also been shown to be related to greater satisfaction in people's sexual lives and their overall relationships, as well as less conflict between partners (Impett, Peplau, & Gable, 2005; Muise et al., 2013). Taken together, this research suggests that holding stronger approach goals for having sex can improve people's sex lives and relationships!

We invite you to think about your approach reasons for sex using the prompts below. This is an exercise purely for yourself and we will not ask you to share these answers with our research team.

Briefly list the three approach goals that you most often hold for having sex with your partner:

1.

2.

3.

Over the next week, we invite you to focus on your approach goals for engaging in sexual activity with your partner.

How can I increase my approach goals for sex?

There are many different ways that you can enhance your approach goals for sex. Here are some ideas:

- Write down some of your common approach goals for sex with your partner and post them on a note beside your bed.

- Spend a few minutes each day thinking about the positive aspects of your sexual experiences or about the positive memories from past sexual events with your partner. What sensations felt pleasurable? What positive emotions were you feeling? What did you enjoy about your partner's response?

- Send your partner a text, email, or note describing an approach reason for having sex with him or her.

- During sex, focus on having a good time and the pleasurable aspects of the sexual experience, such as connecting with your partner, the pleasurable sensations and positive emotions you are feeling.

In detail, write down how you plan to focus on your approach sexual goals in the coming week?

Appendix B: Approach-Avoidance Sexual Motivation Manipulation

Approach Condition

People engage in sexual activity with their partner for many different reasons.

Think about the most recent time when you engaged in sexual activity with your current or most recent partner to pursue a **positive outcome**, such as to feel closer to your partner, to make your partner happy, or to enhance intimacy in your relationship.

1) How long ago, in days, was this sexual interaction? _____

Try to remember as many details as you can about this situation. For example, where were you? What time of day was it? What were the circumstances surrounding the sexual interaction? What was your partner's reaction in the sexual situation?

Please describe this experience using as many details as possible in the space provided.

Essay-style text box

Thinking about the **positive outcomes** that you were pursing for this sexual situation (e.g., to feel closer to your partner, to make your partner happy, or to enhance intimacy), please describe your specific reasons for engaging in sexual activity in this situation in the space provided.

Please provide as much detail as possible about **your reasons,** as well as your **thoughts and feelings** about the sexual situation. If you are able to write for 5 minutes, please do so.

Essay-style text box

Avoidance Condition

People engage in sexual activity with their partner for many different reasons. Think about the most recent time when you engaged in sexual activity with your current or most recent partner to **avoid a *negative* outcome**, such as to avoid disappointing your partner, to avoid declining your partner's sexual advances, or to avoid conflict in the relationship.

1) How long ago, in days, was this sexual interaction? _____

Try to remember as many details as you can about this situation. For example, where were you? What time of day was it? What were the circumstances surrounding the sexual interaction? What was your partner's reaction in the sexual situation?

Please describe this experience using as many details as possible in the space provided.

> Essay-style text box

Thinking about the **negative outcomes** that you were trying to avoid for this sexual situation (e.g., to avoid disappointing your partner, to avoid making your partner feel unattractive, or to avoid conflict in your relationship), please describe your specific reasons for engaging in sexual activity in this situation in the space provided.

Please provide as much detail as possible about **your reasons**, as well as your **thoughts and feelings** about the sexual situation. If you are able to write for 5 minutes, please do so.

> Essay-style text box

Control Condition

In as much detail as possible, first describe the room/location that you are currently located in in the box below.

> Essay-style text box

Next, in the second box, please describe another room you were in today.

If you are able to write for 5 minutes, please do so.

> Essay-style text box

Appendix C: Writing Task Coding Instructions

Part 1 compliance rating (Did they write about a sexual encounter or a room)?

0 = control, non-sexual writing task about a room

1 = described a sexual encounter

-77 = Noncompliance, did not write about a sexual encounter nor a room

Part 2 compliance rating (Did they write about motivations for sex and thoughts/feelings?)

0 = control, non-sexual writing task about a room

1 = Wrote about their motivations, AND thoughts/feelings about the experience.

2 = Wrote about their motivations, OR thoughts/feelings about the experience

-77 = Noncompliance, did not write anything related to sexual encounter nor a room

**Note that if participants wrote information in different text boxes but still described a sexual encounter, and discussion of motivation, thoughts/feelings they would get the full compliance rating for both part 1 and 2 regardless of which box the information was entered.

Motivation rating (Did they write about either approach or avoidance reasons for sex?)

0 = control, non-sexual writing task about a room

1 = Wrote about their **Approach** motivation/reasons. Defined as engaging in sex to pursue positive outcomes (e.g., for pleasure, make partner feel good, feelings of closeness).

2 = Wrote about their **Avoidance** motivation/reasons. Defined engaging in sex to avert negative outcomes (e.g., avoid feeling guilty, avoid disappointing partner, avoid argument).

3 = Both approach and avoidance motivations/reasons described (any amount of writing for each)

4 = Neither approach nor avoidance motivations/reasons described (but still wrote about a sexual encounter)

-77 = Noncompliance, did not write about reasons for sexual encounter nor a room