

Beyond Positive Affect: Enhancing our Understanding of Diminished Positive Emotions and
Experiences in Social Anxiety

by

Kevin Barber

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Examining Committee Membership

The following served on the Examining Committee for this thesis. The decision of the Examining Committee is by majority vote.

External Examiner	Charles Taylor, Ph.D.
Supervisor	David Moscovitch, Ph.D.
Internal Members	Jonathan Oakman, Ph.D. Uzma Rehman, Ph.D.
Internal-External Member	Steven Mock, Ph.D.

AUTHOR'S DECLARATION

This thesis consists of material all of which I authored or co-authored: see Statement of Contributions included in the thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Statement of Contributions

Kevin Barber was the sole author for the general introduction, bridging sections, and general discussion which were written under the supervision of Dr. David Moscovitch and were not written for publication.

This thesis consists in part of three manuscripts written for publication. Exceptions to sole authorship of material are as follows:

Research presented in Study 1:

This research was conducted at the University of Waterloo by Kevin Barber under the supervision of Dr. David Moscovitch. Dr. David Moscovitch contributed to study design, Maggie Michaelis assisted with data collection. Kevin Barber and Dr. David Moscovitch collaboratively conceptualized the data analyses. Kevin Barber conducted the data analyses and wrote the draft manuscripts, which were reviewed and edited by Dr. David Moscovitch. All co-authors contributed intellectual input.

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Research presented in Study 2:

This research was conducted at the University of Waterloo by Kevin Barber under the supervision of Dr. David Moscovitch. Dr. David Moscovitch contributed to study design, Maggie Michaelis assisted with data collection. Kevin Barber and Maggie Michaelis were the

primary coders, contributing to the development of the coding scheme and analysis of all videos. Kevin Barber and Dr. David Moscovitch collaboratively conceptualized the data analyses. Kevin Barber conducted the data analyses and wrote the draft manuscripts, which were reviewed and edited by Dr. David Moscovitch. All co-authors contributed intellectual input.

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Citation: Barber, K.C., & Moscovitch, D. A. (In prep) Positive Affect Reactivity to Pleasant Social and Non-Social Stimuli in Social Anxiety Disorder

As lead author of these three studies, I was responsible for contributing to conceptualizing study design, carrying out data collection and analysis, and drafting manuscripts. My coauthors provided input during each step of the research and provided feedback on draft manuscripts.

Abstract

Social anxiety disorder (SAD) has been found to be associated with decreased positive affect (PA) that is not attributable to depression or comorbidity with other disorders (e.g., Kashdan, 2007). Despite this, little is known about the biological, behavioural, cognitive and contextual variables implicated in diminished PA and positive experiences in SAD. The purpose of the current research was to advance our understanding of the psychological and contextual factors that contribute to and detract from the experience of positive emotions in social anxiety. Study one was designed to examine relations between motivational variables (affiliative social goals), cognitive factors (curiosity, authenticity, attentional focus), and positive emotional and interpersonal outcomes among high and low socially anxious participants within a dyadic modelling framework. Participants high and low in social anxiety completed a 45-minute semi-structured conversation with a low anxiety stranger, during which relevant predictor and outcome variables were measured repeatedly across time. Dyadic analyses using structural equation modelling revealed that participants' affiliative social goals, curiosity, and authenticity, as well as partner social goals significantly contributed to participants' experiences of positive emotions and interpersonal outcomes. Curiosity and authenticity were found to significantly mediate the relationship between affiliative social goals and interpersonal outcomes, with curiosity emerging as the sole mediator of the relationship between affiliative goals and PA. In addition, results illuminated key factors associated with positive outcomes for conversation partners. In study two, we coded the video recordings of the dyadic interactions in study one to examine the role of observable behavioural variables (empathy, warmth, emotional expressivity, reciprocity, and asking questions) on positive experiences, again within a dyadic framework. Results showed that reciprocity was of key importance in predicting positive experiences for

both members of the dyad, emerging as a significant mediator of the relationship between affiliative goals and PA experienced by conversation partners, in addition to interpersonal outcomes for both members of the dyad. In study three, we sought to investigate the conditions under which positive affect deficits might emerge in response to standardized pleasant social and non-social stimuli in a clinical sample of individuals with SAD. Community participants diagnosed with SAD and healthy controls (HC) completed an online study where they were exposed to neutral (music and images) and positive (pleasant music, social imagery, non-social imagery) stimuli. Results demonstrated no differences between individuals with SAD and HCs in state PA, or PA reactivity when PA was measured as a global unitary construct based on the positive affect subscale of the Positive and Negative Affect Schedule. However, when PA was conceptualized and measured based on discrete subtypes of positive emotionality, global deficits emerged in relaxed and content PA for participants with SAD, suggesting that the operational definition and circumstances of measurement of positive emotions may be of key importance to understanding the nature of positivity deficits in social anxiety. The results of these studies are discussed within the context of theoretical models of positive emotions and social anxiety, with a focus on methodological strengths and limitations, future directions, and implications for enhancing our understanding and treatment of SAD.

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General Introduction

Social anxiety disorder (SAD) is a common and debilitating mental disorder, afflicting approximately 12.1% of the population over the course of their lifetime (Kessler et al., 2005). Individuals with SAD display significant fear and avoidance of a variety of social situations, which can lead to severe impairments in academic, social, romantic, and occupational functioning. Individuals with social anxiety are more likely to drop out of school (Stein & Kean, 2000) and have lower levels of education (Weiller et al., 1996), are more likely to be single and unemployed (Norton et al., 1996; Witchen & Beloch, 1996; Lecrubier & Weiller, 1997), and have broad impairments in social and leisure activities (Lochner et al., 2003). Contemporary cognitive models of social anxiety emphasize fear of negative evaluation, and fear of the consequences of such evaluation as a central feature of SAD (Clark & Wells, 1995; Rapee & Heimberg, 1997; Hofmann, 2007). Others posit that the central fear in SAD is a fear of exposing perceived personal flaws to public scrutiny (Moscovitch, 2009). All of these models emphasize anxiety/fear reduction as the primary target for treatment.

Indeed, Cognitive Behavioural Therapy (CBT) for SAD is effective at facilitating symptom reduction, with medium to large effect sizes at immediate follow-up when compared to control or waitlist conditions (Hofmann & Smits, 2008; Rodebaugh, Holaway, & Heimberg, 2004). However, a meta-analysis of 84 treatment studies estimated response rates (i.e., the percent of people that meaningfully benefited from treatment) to CBT for SAD to be approximately 45% at post-treatment and 55% at follow-up (Loerinc et al., 2015). Moreover, despite CBT treatment being effective for SAD, symptoms never fully disappear for many, even after treatment (Jazaieri, Goldin, & Gross, 2017), suggesting that there is room for improvement. Furthermore, many people with SAD never seek treatment. Indeed, a large multi-site

longitudinal study found that less than 37% of patients with SAD were accessing cognitive or behavioural treatments at 6 months after initial assessment, with that number reducing to 14% at 8-year follow-up (Keller, 2006). Other studies have found that individuals typically only pursue treatment for SAD ten years after symptom onset (Grant et al., 2005).

In addition to the relatively low rate of treatment seeking among individuals with SAD, attrition from therapy remains a noteworthy issue. In a review of meta-analyses, it was found that up to 20% of individuals drop out of CBT treatment programs, which further tempers our conclusion about the efficacy rates as the majority of outcome studies are based on completer rather than intent-to-treat samples (Rodebaugh et al., 2004). Taken together these results suggest that although CBT for social anxiety is efficacious and effective, there is significant room for improvement. Among the individuals that respond to CBT, the majority will not achieve full remission of symptoms. Among the minority of people with SAD who access CBT, a notable portion will discontinue prior to completion, and among those who complete therapy, a minority will experience high end-state outcomes. Although the contributing factors to each of these issues may be diverse and complex, investigation into what may be missing from current conceptualizations of SAD and approaches to treatment may yield more positive outcomes.

One possibility highlighted by several authors is that outcome research in CBT may ignore the role of positive emotions in favour of an emphasis on reduction of anxiety and other negative symptoms (e.g., Fredrickson, 2001; Fredrickson, 2013; Taylor, Pearlstein, & Stein, 2017). Broadening research and treatment on social anxiety from an exclusive focus on the presence of negative symptoms to include the potential impact of an absence or reduction of positive emotions may help researchers and clinicians arrive at a more complete understanding

of SAD, and may provide insight into ways to improve access to, tolerability of, and response to CBT interventions.

Positive Affect and Positive Emotions in Social Anxiety

The role of positive affect (PA) in social anxiety disorder has received relatively sparse attention until recently. Clark and Watson's (1991) seminal tripartite model of anxiety and depression postulated that lower PA was primarily implicated in mood disorders rather than anxiety, with higher negative affect being a feature of both anxiety and mood, and autonomic arousal primarily implicated in anxiety disorders. However, research has revealed that SAD was the exception to this rule among the anxiety disorders. A study by Watson, Clark, and Carey (1988) found social phobia to be the only anxiety disorder at the syndrome level to be associated with lower PA, a finding that was later replicated (Clark & Watson, 1991). Even earlier studies made note that social anxiety was more highly associated with parasuicidal acts than agoraphobia (Amies, Gelder, & Shaw, 1983), and described depression as part of the "social phobic syndrome", demonstrating that clinical researchers were beginning to recognize that social anxiety had unique parallels to depression not observed in other anxiety disorders. Independent groups of researchers expanding and replicating research on the tripartite model have similarly reported that SAD is the only anxiety disorder to be consistently linked with lower PA (e.g., Brown, Chorpita, & Barlow, 1998).

These consistent findings raised a new question about whether low PA in SAD is a distinct feature of social anxiety, or can be accounted for by overlap with mood disorders. Social anxiety is highly comorbid with major depressive disorder, with nearly 20% of socially anxious individuals meeting criteria for a concurrent major depressive disorder in a study that assessed a very large sample of about 19,000 participants (Ohayon & Schatzberg, 2010). Despite this high

overlap, a meta-analysis of 19 studies on social anxiety and PA supported a moderate to large relationship between social anxiety and diminished PA; importantly, the relations were not mediated by comorbidity with depressive symptoms, depressive disorders, or any other emotional disturbances (Kashdan, 2007). These results seem to suggest that diminished PA may truly be a feature of social anxiety, and not a secondary consequence of developing depressive symptoms in the context of SAD. Despite this, diminished PA is not directly addressed in cognitive behavioural models of SAD, and rarely directly addressed in treatment protocols.

Broader Impact of Social Anxiety on Positive Experiences

Research on diminished PA in SAD, as compared to other anxiety disorders or healthy populations, has recently begun to expand in scope from a targeted focus on reduced PA to investigating the impact of social anxiety on a broader array of positivity deficits (e.g., Farmer, Kashdan, & Weeks, 2014). Indeed, social behaviours that are thought to be innately associated with hedonic pleasure seem to be impacted by social anxiety. For example, socially anxious individuals tend to rate their sexual encounters as less pleasurable, and report lower feelings of connectedness to their partners during sexual episodes (Kashdan et al., 2011).

In addition to the diminished positive feelings experienced during events that are typically seen as pleasurable, and in addition to the lower frequency of exposure to pleasurable activities, socially anxious individuals provide and receive less capitalization support for positive experiences they do encounter (Kashdan, Ferssizidis, Farmer, & Adams, 2013). Capitalization support refers to the ability to share and respond to the good news of romantic partners, and social anxiety has been found to be associated with less enthusiastic responses to partners' shared positive experiences and in turn, partners in that study reported responding less enthusiastically to socially anxious partners' shared positive events. Moreover, individuals with SAD have been

shown to engage in less self-disclosure, less emotional expression, and reported lower levels of intimacy with their significant others as compared to community controls (Papsdorf & Alden, 1998; Sparrevohn & Rapee, 2009). These results suggest that, in addition to their well-documented experiences of heightened negative affect and distress, socially anxious individuals may fail to leverage opportunities to experience increased PA within a social or interpersonal context.

Thus, diminished positive experiences for socially anxious individuals are not strictly restricted to low PA. Furthermore, the phenomenon appears to be more than a downstream consequence of anxious avoidance resulting in limited exposure to opportunities for pleasurable experiences, as socially anxious individuals who do have such opportunities do not perceive their experiences with close others as enjoyable to the same degree as non-socially anxious individuals, and do not seem to capitalize on opportunities within these relationships to experience positive emotions. In fact, these diminished positive emotions in socially anxious populations appears to not be restricted only to social situations, as would be expected by anxious avoidance. Studies using a daily-diary approach have demonstrated that social anxiety contributes to fewer and less intense positive emotions across both social and non-social situations (Kashdan & Collins, 2010). Although prior studies have documented a clear and reliable phenomenological pattern linking social anxiety with positivity deficits, they have not conclusively addressed *why* socially anxious individuals may be experiencing less PA and pleasure despite the presence of appropriate opportunities, and why these deficits in PA are occurring outside of the social context. Moreover, it is unclear whether behavioural explanations, – such as socially anxious individuals failing to seize opportunities to experience pleasure – can account for these outcomes, or whether socially anxious individuals are not engaging in

pleasurable social experiences because they fail to derive pleasure in the same way that non-anxious individuals do. This issue has become a recent topic of debate in the literature (described in more detail in subsequent sections of this dissertation), and has spawned several competing and complementary theories about the underpinnings of PA impairments in SAD, as reviewed below. Despite the uncertainty around the neurological, biological, cognitive, behavioural, and interpersonal variables implicated in the experience and expression of PA, growing recognition of the importance of positive emotions has led to more research targeting and measuring positive emotions in treatment of SAD.

Targeting Positive Affect in Social Anxiety Treatment

As noted above, cognitive behavioural models of SAD emphasize the role of anxiety, avoidance, and safety behaviours in the maintenance of the disorder (Clark & Wells, 1995; Rapee & Heimberg, 1997; Hofmann, 2007; Moscovitch, 2009), and therefore CBT treatments typically emphasize the reduction of avoidance and anxiety as primary outcomes. However, extant treatment models for SAD do not address the role of positive emotions in the onset and maintenance of symptoms. Mounting research evidence has demonstrated that the importance of positive emotions should not be understated. Individuals with high levels of trait PA tend to have more friends, are more likely to marry, and have greater physical health and career success than those with low PA (Fredrickson, 2011; Fredrickson & Joiner, 2002; Lyubomirsky, King, & Diener, 2005). Indeed, Fredrickson (1998) posited that positive emotions serve to broaden and build an individual's thought-action repertoire, which allows for the individual to have more variety of choice and opportunity, which subsequently translates into improvement of physical, intellectual, and social resources. To this end, there has been burgeoning recognition within the

social anxiety literature of the need to address positive affectivity within the context of SAD models and treatment.

Beyond increased awareness of the phenomenon and impact of low PA and experiences in SAD, recent studies are suggesting that changes in positive emotions are important predictors of subsequent adaptive behaviours. In an interpersonal model of SAD (Alden & Taylor, 2004) the authors note that approach deficiencies may need to be addressed in treatment protocols, but concede that future research is needed to understand how to address these issues, and to what extent current treatment paradigms already do. Following this conceptual thread, Taylor and colleagues (2017) had treatment seeking participants diagnosed with SAD complete a getting-acquainted task with a confederate. Results suggested that participants experienced both reductions in anxiety and increases in positive emotions throughout the task, but it was the changes in positive emotions that were most predictive of their perception of connectedness to their social partner and desire to engage the partner in future social activities. These results held true above and beyond that explained by reductions in anxiety. This study demonstrated that positive emotions are important predictors of desired social outcomes that cannot be simply explained by anxiety reduction.

A minority of SAD treatment studies have investigated broader outcomes than just anxiety reduction. For example, CBT for social anxiety had a positive impact on quality of life as measured by the domains in the Quality of Life Inventory (QOLI) (Safren, Heimberg, Brown, & Holle, 1996; Eng, Coles, Heimberg, Safren, 2001). Unfortunately, the QOLI does not include any explicit measure of PA or positive experiences, and focuses only on satisfaction with and importance of a variety of life domains. In addition, QOLI scores in these studies of the impact of treatment on quality of life among individuals with SAD remained well below the normative

sample for the measure. Moreover, another recent study concluded that group CBT for SAD improved some aspects of quality of life, but had no impact on the social functioning domain of the QOLI (Watanabe et al., 2010).

However, recent research by Alden, Buhr, Robichaud, Trew, and Plasencia (2018) compared CBT with a relational focus to a graduated exposure and applied relaxation control condition in a sample of treatment-seeking adults diagnosed with SAD. Results showed that CBT with a relational focus resulted in significantly greater satisfaction with social relationships, whereas the control condition did not differ from waitlist control. Both conditions saw decreases in anxiety and avoidance, and increases in social initiation (i.e., social approach behaviours), with the relational CBT outperforming graduated exposure for social initiation. Both reductions in SAD symptoms and improvements in relationship satisfaction were found to be explained by a common mediator: reductions in safety behaviours. This suggests that CBT approaches may be addressing the positive spectrum through the same mechanisms that they are targeting for reduction in SAD symptoms.

Given that a relational focus was shown to improve outcomes in SAD, it stands to reason that treatments with an emphasis on interpersonal dynamics may result in superior relational outcomes. However, a study by Lipsitz and colleagues (2008) found that traditional interpersonal therapy (which does not include a CBT component through behavioural experiments) was not superior for reducing SAD symptoms relative to a supportive therapy control group on any outcome measure other than fear of negative evaluation. This finding is particularly intriguing in light of Alden and colleague's (2018) results described above. Moreover, other therapeutic orientations do not appear to produce superior affective or relationship outcomes. A new study by Sewart and colleagues (2019) compared CBT and Acceptance and Commitment Therapy

(ACT; see Hayes, Luoma, Bond, Masuda, & Lillis 2006) to wait-list control in a treatment seeking sample with SAD. The study found that negative affect decreased in both CBT and ACT conditions, with only ACT outperforming wait-list. PA increased in all conditions, with neither treatment group outperforming wait-list control. This suggests that, in this sample, neither treatment was effective in addressing positive emotions, despite ACT typically emphasizing pursuit of meaningful goals as a component of treatment, which should ostensibly be associated with positive emotions.

Overall, the current state of the literature suggests that CBT, Interpersonal therapy, ACT, and other forms of therapy are not adequately addressing positivity deficits in social anxiety. Doing so effectively requires a strong foundation of basic research on the factors that contribute to PA deficits in SAD. However, scant attention has been given in prior research to better understanding how to promote PA in social anxiety, and what specific factors or mechanisms to target when attempting to ameliorate positivity deficits.

Experimental Research on Promoting Positive Affect in Social Anxiety

There has been a relatively small number of experimental studies emphasizing promotion of PA and positivity more broadly in social anxiety. Recent research on unselected samples has supported the idea that engaging in prosocial acts (i.e., acts of kindness towards others) has benefits for the experience of positive emotions and *psychological flourishing*, which is a construct that encompasses emotional well-being as well as positive psychological and social functioning (Nelson, Layous, Cole, & Lyubomirsky, 2016). In this study, prosocial acts led to greater flourishing and positive emotions than two control conditions in which participants engaged in self-focused acts of kindness, or activity monitoring, and this positive function endured two weeks beyond the period in which they were instructed to engage in prosocial

behaviour. Analyses revealed that prosocial behaviour had a direct impact on positive emotions, which mediated psychological flourishing.

The impact of engaging in prosocial acts has, similarly, been examined in a sample of high socially anxious undergraduates (Alden & Trew, 2013). Individuals in this study were assigned to engage in kind acts for other people, or complete cognitive behaviourally-oriented behavioural experiments, or complete an activity monitoring control condition for four weeks. Engaging in kind acts resulted in significant increases in PA sustained over 4 weeks, higher satisfaction with social relationships, and decreased avoidance motivation. Moreover, the degree of anxiety reduction and negative affect reduction was similar between the kind acts and behavioural experiments groups, suggesting that there is an additional benefit to kind acts without any cost to fear reduction. While this initial finding was promising, a replication of this study with another sample of high socially anxious undergraduates did not find any differences in PA between the kind acts group and behavioural experiments group (Trew & Alden, 2015).

Some researchers have approached the promotion of approach goals from the perspective of automatic action tendencies rather than explicit behavioural instructions. High socially anxious individuals trained to approach computerized smiling faces by pulling a joystick towards themselves displayed greater social approach behaviour and elicited more positive reactions from an interaction partner in a follow-up social interaction task, as compared a control group trained to move the joystick to the side (Taylor & Amir, 2012). This study supported the notion that automatic motivational tendencies can be modified by means other than explicit and intentional behavioural strategies. However, this study did not explicitly assess PA as an outcome, so it remains unclear what effect, if any, increased approach behaviour had on affective outcomes.

In addition to the evidence that automatic approach tendencies and specific behavioural instructions can be modified to promote PA and social functioning, there is some initial evidence that explicitly instructing individuals about social goals may have an impact as well. In a study by Aron and colleagues (1997) the authors designed a protocol for the generation of interpersonal closeness. In one of a series of studies included in this publication, the authors manipulated whether participants were provided with instructions to achieve closeness with their partner during the task, or to simply complete the instructed tasks with their partner. This methodology was tested on pairs of introverted or extraverted participants. Results demonstrated that overall, extraverted participants achieved similar levels of closeness to their partner at the end of the study. However, an interaction emerged wherein introverted pairs only achieved similar levels of closeness to extraverted participants when primed with instructions to try to achieve closeness. This suggests that introverts may not tend towards closeness in their social interactions unless specifically instructed to make this an explicit goal, even when provided with a task that facilitates closeness. Although this study was not clinical in nature and made no reference to social anxiety, there is a high degree of correspondence between introversion and social anxiety and the two constructs have been shown to be positively correlated with one another (Janowsky, Morter, & Tancer, 2000).

Research Objectives

The broad objective of this research was to advance our understanding of positivity deficits in social anxiety, and to develop an improved framework for understanding the experience of positive emotions in SAD. Despite some recent interest in this topic across the literature, there are substantial gaps in our understanding of the underlying processes and mechanisms driving and maintaining these positivity deficits, and what can be done to restore

positive hedonic functioning in socially anxious individuals. Three studies were designed and completed, and these are presented in manuscript format in this document, as formatted for publication.

Three distinct theory- and hypothesis-driven goals for the present research were identified in support of the overarching objective. The first goal was to investigate motivational, cognitive, and behavioural variables implicated in the experience of positive emotions in SA. Specifically, we sought to identify variables that were predictive of experienced positive emotions that were theoretically amenable to manipulation or promotion. This goal was primarily addressed in the first two studies. Study one and two investigated the role of affiliative social goals (i.e., motivational goals) within the context of a social interaction task with a stranger. Study one investigated the roles of curiosity, authenticity, and self-focused attention (i.e., cognitive variables) on positive experiences. Study two investigated the role of emotional expressivity, warmth, empathy, reciprocity, and displayed interest in the conversation partner (i.e., behavioural variables).

A second, related research goal was to elucidate the role of social context in the experience of positive emotions in social anxiety. Specifically, do interpersonal variables better account for positive emotions than individual variables? The majority of past research has not accounted for the role of the interaction partner on the experience of positive emotions in social anxiety. As such, studies one and two addressed this research question by incorporating a dyadic framework to the analyses, accounting for the influence of interaction partners on experienced positive emotions. Study three manipulated the nature of the environment in which rewarding stimuli were imagined (social versus non-social) in order to better understand the role of social context on experienced positive emotions.

The third research goal was to gather new information that would bring us closer to determining the theoretical framework that would best account for existing data on positivity deficits in social anxiety. Can such deficits best be accounted for by biological theories or CBT models? Although this question is broad and complex and no single study would provide a definitive answer, study three was designed with this question in mind. In particular, study three added a new element not assessed in the previous two studies, which involved the measurement of positive affect responsivity (i.e., changes in affect from baseline), to better elucidate whether socially anxious individuals *derive* less positive affect in response to carefully controlled stimuli. Further, study three aimed to account for recent advances in the operational definitions and measurement of positive emotions by accounting for discrete positive emotional experiences, rather than assessing positive affect as a unitary construct.

Together, these three studies broadly served to advance the literature on positive emotional functioning in SAD, to meet the goal of improving theory and providing new avenues and directions for applied treatment research. Ultimately, the aspirational goal was to improve outcomes for those with SAD. Study hypotheses and their empirically-based justifications are presented in greater detail in subsequent sections.

Study One – Social Anxiety and the Generation of Positivity During Dyadic Interaction: Curiosity and Authenticity are the Keys to Success

Introduction

Social interaction is essential to human survival and flourishing. People interact with others to trade resources, acquire information, meet emotional needs, and pursue idiosyncratic interpersonal goals. For these reasons, social relationships are often a source of joy, fulfilment, and positivity, promoting well-being and life satisfaction. However, for people with high levels of trait social anxiety (SA), including those with social anxiety disorder (SAD), social interactions tend to elicit interpersonal pain and distress while also inhibiting the generation of positivity and the experience and expression of positive emotions (Kashdan & Breen, 2008). Though SA has been reliably associated with diminished positive affect (PA) (Kashdan 2007) and deficits in associated positive and interpersonal outcomes across a variety of contexts (Heerey & Kring, 2007; Kashdan & Steger, 2006; Papsdorf & Alden, 1998), less is known about the underlying cognitive and motivational variables that may promote or inhibit these positivity deficits. The present study examined the effects of affiliative social goals and trait SA on PA and interpersonal outcomes, as well as the processes that may mediate such effects, during dyadic social interaction.

Positive emotions in social anxiety

Diminished PA uniquely distinguishes SAD from the other anxiety disorders (Clark & Watson, 1991; Brown, Chorpita & Barlow, 1998; Watson, Clark, & Carey 1988). But how, and why, does elevated SA contribute to deficits in hedonic functioning? Our understanding of the answer to this question is still in its infancy (e.g., Farmer et al., 2014). Research has shown that hedonic deficits among those with elevated levels of trait SA or a clinical diagnosis of SAD are

widespread across a variety of contexts. For example, a daily diary study demonstrated that socially anxious individuals report fewer and less intense positive emotions and more anger than non-anxious individuals across both social and non-social situations (Kashdan & Collins, 2010). Moreover, socially anxious individuals tend to rate their sexual encounters as less pleasurable and to experience lower feelings of connectedness to their partners during sexual episodes (Kashdan et al., 2011). These deficits may be more than a byproduct of anxious avoidance resulting in limited exposure to opportunities for pleasurable experiences. Indeed, socially anxious individuals tend to respond less enthusiastically to the good news of romantic partners and are less likely to share good news with their loved ones (Kashdan, Ferrisizidis, Farmer, Adams, & McKnight, 2013). These intriguing findings raise questions about why socially anxious individuals may be experiencing less PA and pleasure despite the presence of appropriate opportunities. Moreover, it is unclear whether socially anxious individuals simply fail to seize opportunities adequately to experience pleasure, or are failing to derive pleasure in the same way that non-anxious individuals do. To account for the variety of contexts in which lower PA has been observed in SAD, some researchers have theorized that those with SAD may be burdened by attempts to downregulate their anxiety, manage social impressions, and attend to social threats – self-regulatory efforts that may deplete essential psychological resources that are necessary for extracting social rewards during interpersonal encounters (Kashdan, Weeks, & Savostyanova, 2011).

Social rank and affiliation

Although observed deficits in positive emotions and experiences can be seen as a downstream consequence of anxiety and avoidance, several researchers have posited that they represent more than secondary outcomes due to anxiety. Evolutionary models of SA suggest that

there are two distinct motivational systems that guide interpersonal behaviour: one that is sensitive to perceptions of social rank and dominance, and one that is concerned with relational affiliation and safety (Trower & Gilbert, 1989; Gilbert & Trower, 2001). One system serves to attend to one's rank within the social hierarchy with the goal of reducing the potential for injuries to oneself and the group as a result of competition for resources. The other serves to promote approach to loved and trusted others, enhancing mutual cooperation within the group. Theorists have suggested that SAD is comprised of both a tendency to over-utilize the rank system and a tendency to under-utilize the affiliation system. Consistent with the over-utilization hypothesis, researchers have found that higher trait SA is associated with perceiving oneself as inferior, having low social rank (Aderka, Weisman, Shahar, & Gilboa-Schechtman, 2009; Weisman, Aderka, Marom, Hermesh, & Gilboa-Schechtman, 2011), and behaving submissively (Heerey & Kring, 2007). Moreover, socially anxious individuals perceive social interactions as more competitive than non-anxious individuals (Hope, Sigler, Penn, & Meier, 1998). Socially anxious individuals tend to engage in upward social comparisons, viewing themselves as subordinate to others (Antony, Rowa, Liss, Swallow, & Swinson, 2005). This over-activation of the rank system is associated with heightened perceptions of threat from the social environment, and is evidenced by behaviour such as hypervigilance toward signals of social threat (Gilboa-Schechtman, Foa, & Amir, 1999).

Alongside the over-utilization of the rank system in SA, which likely underlies many of the familiar outcomes associated with heightened distress in response to perceived social threat, the under-utilization of the affiliation system has been speculated to play a key role in positivity deficits (Gilboa-Schechtman, Friedman, Helpman, & Kananov, 2013; Weisman et al., 2011). Supporting this theory, individuals with higher SA report lower intimacy and closeness in peer,

friend, and romantic relationships (Alden & Taylor, 2004; Kashdan, 2007), and are less observably warm and interested in others (Alden & Wallace, 1995). Though researchers have interpreted these outcomes as support for the under-utilization of the affiliation system, other observations can be construed as supporting an intact affiliation system. For example, when socially anxious people anticipate positive outcomes, they tend to become friendlier, which has been viewed as evidence of an underlying motivation to connect with others (Alden & Bieling, 1998), and a recent study found no differences between a SAD sample and healthy controls in strivings to affiliate with others (Goodman, Kashdan, Stikma, & Blalock, 2019). These results are difficult to reconcile with a theoretical perspective that emphasizes an under-active affiliation system in SA, which would suggest an inhibited desire to affiliate and connect with others. Indeed, these studies appear to indicate that socially anxious individuals do have a desire to connect with others and that they are capable of holding affiliative goals, at least within certain social contexts. It is possible that the desire or goal to affiliate may be absent in moments of high anxiety or threat or that it is poorly translated into affiliative action. The specific mechanisms and behaviours that characterize the expression of affiliative drive in SA are not well established in the literature.

Cognitions and motivations associated with affiliative drive

One key process that may be involved in affiliative drive in SA is *curiosity*, a pleasant appetitive motivational state that has been linked to interpersonal goal pursuit and seeking new experiences (Kashdan, Rose, & Fincham, 2004; Kashdan & Steger, 2007). Studies by Kashdan and colleagues have demonstrated that higher trait SA is associated with lower curiosity (Kashdan, 2007) and that greater state curiosity in socially anxious undergraduates is associated with greater PA during social interaction (Kashdan & Roberts, 2006). Curiosity may therefore

serve as a means for individuals to better attend to their partners and to capitalize on opportunities to connect and bond with them, resulting in greater quality of interaction and opportunities to experience PA.

Others have posited that *authenticity* (one's sense of behaving genuinely) may be an important mechanism through which people express their affiliative drive within interpersonal contexts, which enables them to attribute positive interpersonal outcomes to their own genuine efforts (i.e., their "real" selves) rather than rehearsed behaviours or a false social façade (Goldman & Kernis, 2002; Plasencia, Alden, & Taylor, 2011). In one study, SAD participants instructed to reduce safety behaviour use during interactions with confederates experienced increased authenticity and subsequent PA as well as elevated desire for future interaction (Plasencia, Taylor, & Alden, 2016). In a similar vein, other researchers have investigated the role of inauthenticity in SA. Researchers have argued that uncertainty about one's self-concept, a phenomenon observed in high SA individuals, may result from inauthentic self-disclosure (Orr & Moscovitch, 2015). Moreover, inauthentic self-disclosure has been linked to negative interpersonal outcomes in SA such as lower support and greater interpersonal conflict (Cuming & Rapee, 2010). Similar to curiosity, behaving in a genuine or authentic manner may enable individuals to prioritize connecting with other people rather than attempting to manage one's impression in the eyes of others. As a result, it may be easier to develop internal attributions for successful encounters, foster a more stable and positive sense of self, and derive greater pleasure from personal interactions with others.

Finally, *self-focused attention* (SFA; see Hope, Gansler, & Heimberg, 1989; Spurr & Stopa, 2002) may also play an important role in inhibiting affiliative drive and the capacity to derive pleasure from social interaction (Woody, 1996; Woody, Chambless, & Glass, 1997;

Woody & Rodriguez, 2000). One study demonstrated that greater SFA during a laboratory-based social threat induction partially mediated the relation between trait SA and lower state PA (Kashdan & Roberts, 2004), suggesting the inverse may be true as well (i.e., adopting affiliative goals leads to reduced SFA which in turn elevates PA). Another study found that greater SFA resulted in increased post-event processing following a social interaction task, which undermined positive self-appraisals of participants' performance (Holzman & Valentiner, 2016), suggesting again that reduced SFA may promote positive outcomes. Higher SFA has been linked to poorer interpersonal outcomes, with conversation partners of more self-focused high SA individuals reporting lower feelings of engagement in conversation (Heerey & Kring, 2007). Self-focus during social interaction may be antithetical to an emphasis on affiliation and approach. Thus, high SFA may interfere with individuals' ability to attend to positive interpersonal outcomes (e.g., a friendly smile) that can subsequently generate positive emotions, as well as inhibiting them from deploying prosocial behaviour that may contribute to the positive experience of conversation partners.

Present study and hypotheses

The present study was designed to manipulate and measure participants' interpersonal goals in ways that either promoted or inhibited affiliative motivation while they participated in a dyadic interaction with a stranger. We examined, first, whether promoting affiliative motivation enhances PA and leads to more positive interpersonal outcomes. Second, we investigated whether relations between affiliative motivation and positive emotional and interpersonal outcomes for both participants and their interaction partners depends on participants' levels of trait SA. Finally, we examined candidate psychological processes – curiosity, authenticity, and

SFA - that might mediate the relationship between adopting affiliative goals and subsequent emotional and interpersonal outcomes.

High and low socially anxious (HSA, LSA) undergraduates were paired with unfamiliar undergraduate partners in the lab to complete a structured interaction task (described in detail below). Self-report data were collected from both participants and partners, and data were analyzed within a dyadic framework. Specifically, we predicted that: (1a) participants instructed to pursue affiliative goals would experience greater PA and more positive interpersonal outcomes; (1b) the benefits of affiliative social goals on PA and interpersonal outcomes would be stronger for HSA than LSA participants because adopting such goals would help to activate inhibited but otherwise intact motivational and affective systems among HSAs; and (1c) the positive impact of affiliative social goals would extend to interaction partners' reported outcomes. We also predicted that: (2a) the relation between an affiliative mindset and positive outcomes would be mediated by greater self-reported curiosity and authenticity as well as lower self-focused attention; (2b) the mediating relationship would be significant for both participant and partner outcomes; and (2c) the mediating relationships would be stronger for HSA than LSA participants (i.e., moderated-mediation).

Method

Participants

Participants were recruited from the undergraduate Psychology participant pool at the authors' institution. Inclusion criteria included the ability to speak, read, and write English fluently. Potentially eligible participants completed the Social Interaction Anxiety Scale (SIAS; described below) at the start of term to enable preselection of participants with high and low levels of trait SA from the undergraduate Psychology pool, HSA and LSA groups were

predefined as the top and bottom 25% of the distribution, respectively. Both females and males were eligible for the study, but time-slots were arranged so that dyads were never mixed gender (i.e., all dyads were male-male and female-female). Dyads consisted of a primary participant, who was either HSA or LSA, and a partner participant, who was always LSA, resulting in both HSA-LSA and LSA-LSA dyads. Participants were instructed not to sign up with a friend.

A total of 119 same-gender dyads participated in the study. The sample consisted of predominantly female pairings (78.2%) with an average age of 19.83 years ($SD = 3.38$). Sixty-three dyads consisted of HSA-LSA pairings, and 56 were LSA-LSA. Forty two percent of participants identified as Caucasian, 20.2% East Asian, 20.2% South Asian, 5.0% Southeast Asian, 5.0% Middle Eastern, and 7.6% other (African, Hispanic, Caribbean, Indigenous).

Arrival to lab and condition assignment

The study was advertised as a “getting acquainted game” involving a conversation with an unfamiliar partner in a laboratory setting. As described above, eligible HSA and LSA participants (henceforth called “primary participants”) were assigned to converse in same-sex dyads with an LSA partner (henceforth called “partner participants”). Only the primary participant in each dyad received the manipulation.

Upon arriving to the lab, members of the dyad were sent into separate rooms for initial consent and baseline measures of affect. Participants were told that the purpose of the study was to better understand social interaction and were informed that their conversation would be videotaped (for later coding and behavioural analyses, which are not included in this paper). After obtaining informed consent, primary and partner participants completed initial questionnaires. Prior to the start of the conversation task, primary participants were randomly assigned to one of two conditions, while partner participants received no additional instructions.

Primary participants either received instructions to adopt *affiliation* goals for the upcoming conversation or were assigned to a control condition designed to de-emphasise affiliation and prompt participants to adopt *impression management* goals. Primary participants assigned to the affiliation condition were instructed to adopt the goal of “becoming close” with their partner, whereas those assigned to the impression management control condition were instructed to adopt the goal of “making a good impression” on their partner. We expected the affiliation condition to enhance affiliative goals relative to the control condition. Prior to the conversation, primary participants in both conditions completed a brief visualization exercise (see Appendix 1 for script) in which they imagined themselves implementing the instructed goal. Participants were then brought together into a single room to receive instructions for the interaction task.

Social interaction task

The room setup for the conversation task consisted of two comfortable chairs facing one another at a slight angle, a coffee table between them, and wall-mounted video cameras above and behind each participant. The experimenter controlled the cameras and observed the interaction from an adjoining room.

The conversation task itself relied on the procedures outlined by Aron, Melinat, Aron, Vallone, and Bator (1997). Participants were provided with 33 ordered slips of paper, each containing a question or a task (e.g., “Would you like to become famous?” or “Name three things you and your partner appear to have in common”). The slips we used represented a subset of Aron et al.’s (1997) original 36 slips. Participants were instructed to complete all questions and tasks one at a time and in the order provided. Both members answered each slip, but they alternated roles from slip to slip such that one member of the dyad read the first question or task out loud and the other member responded first, then the other member read the second question

or task on the next slip out loud and the first member responded, and so on, until all the slips were completed or the time allotted for the task expired.

The study was divided into three 15-minute segments. Participants were provided with one-third of the slips in each segment, during which they were given 15 minutes to converse. Following each 15-minute period, the researcher then returned to interrupt the conversation and separate the two participants into different rooms to complete additional questionnaires. After completion of the questionnaires, and prior to returning the participants to the same room, primary participants received an abbreviated version of the condition manipulation, reminding them of the assigned goals for the conversation.

Members of the dyad were then invited back into the experiment room together to converse for another 15 minutes with the second set of slips followed by another pause for questionnaires. As before, the primary participant was reminded of the task instructions prior to completing another abbreviated manipulation reminder and resuming for the third of three segments. After completing all three 15-minute segments (45 minutes total), participants were administered a final battery of questionnaires. Finally, both members of the dyad were brought together for debriefing and remuneration of participation credits. Study duration was approximately 90 minutes.

Self-report measures

Trait social anxiety. The *Social Interaction Anxiety Scale* (SIAS; Mattick & Clarke, 1998) was used to measure social anxiety symptoms and to select eligible HSA and LSA participants and LSA partners, as described above. Respondents answer 20 questions in likert-response format on typical experiences of anxiety during social encounters (e.g., “I become tense if I have to talk about my feelings”, “when mixing socially, I am uncomfortable”). The SIAS has

been established as a highly reliable and valid measure of social interaction anxiety in undergraduates, with consistent scores across genders (Mattick & Clarke, 1998; Osman, Gutierrez, Barrios, Kopper, & Chiros, 1998). In this sample the SIAS demonstrated excellent internal consistency (Cronbach's $\alpha = .94$).

State affect. The *Positive and Negative Affect Schedule* (PANAS; Watson, Clark, & Tellegen, 1988) was used to measure participant and partner state affect throughout the study. The PANAS consists of two subscales assessing positive and negative affect (PA and NA), respectively. It has demonstrated strong psychometric properties, with each of the subscales demonstrating good internal consistency and invariance across demographic subgroups (Crawford & Henry, 2004). In this study, our analyses of interest focused only on the PANAS PA subscale (e.g., “inspired”, “determined”), which had excellent internal consistency (Cronbach's $\alpha = .88$ to $.91$ across time).

Interpersonal goals. In order to verify that our manipulation was indeed priming affiliation- or impression-oriented mindsets for primary participants (manipulation check), and to capture the extent to which both the primary and partner participants held goals for the conversation that were consistent with affiliation, we developed the *Interpersonal Goals Questionnaire* (IGQ), a 10-item measure with ratings on a 5-point scale ranging from 1 (never) to 5 (always). Five items were designed to correspond with the impression management goals of the control condition (e.g., “I tried to present myself in a positive light”), and 5 items were designed to measure affiliation goals (e.g., “I tried to get to know the other person”). Primary participants completed this questionnaire 3 times, with each point of measurement referring retrospectively to the preceding portion of the conversation task, while partner participants completed the measure once at the end of the conversation task. An exploratory factor analysis

conducted on the average score of all time-points using principal axis factoring with direct oblimin rotation supported a 2-factor solution based on both scree plot interpretation and eigenvalues greater than one. The two-factor model account for 73.8% of the total variance. All items loaded onto their hypothesized subscales with no cross-loadings greater than an absolute value of .25. The two factors were correlated at .40. Table 1 presents the full list of items and communalities, as well as the pattern matrix. The affiliation subscale demonstrated good internal consistency in this sample for both primary participants and partners (Cronbach's $\alpha = .81$ to $.88$), as did the impression management subscale (Cronbach's $\alpha = .81$ to $.86$). Since impression management goals were not of central interest to our hypotheses regarding positive outcomes they were not included in analyses, and were only used to examine participant response to the manipulation.

Table 1. *Item list, communalities, and rotated pattern matrix from an Exploratory Factor Analysis of the Interpersonal Goals Questionnaire (IGQ)*

	Communalities		Rotated Pattern Matrix	
	Initial	Extraction	Factor 1	Factor 2
I tried to connect with the other person.	.83	.90	.98	
I tried to get to know the other person.	.78	.82	.88	
I tried to relate to the other person.	.75	.74	.76	
I tried to form a bond with the other person.	.73	.72	.87	
I really listened to what the other person was saying.	.50	.41	.60	
I tried to present myself in a positive light.	.77	.84		.81
I tried to convey a positive self-image.	.77	.81		.81
I was careful not to say anything that would make me look bad.	.43	.44		.72
I tried to get the other person to like me.	.64	.62		.67
I tried to seem confident and self-assured.	.56	.49		.57

Note. Extraction of items was via Principal Axis Factoring with Direct Oblimin Rotation. Coefficients < .3 are not shown.

Hypothesized mediators. Self-report measures of curiosity, authenticity, and SFA were completed by primary participants during the breaks between each 15-minute segment of the conversation task. Specifically, to assess state curiosity, participants completed the *Melbourne Curiosity Inventory-State Version* (MCI; Naylor, 1981). The MCI consists of 20 items presented in likert-response format assessing current feelings of curiosity (e.g., “I want to know more”, “my interest has been captured”). The MCI has demonstrated good to excellent internal consistency and convergent validity with other measures of curiosity (Boyle, 1983). In this

sample, the MCI demonstrated excellent internal consistency (Cronbach's $\alpha = .93$ to $.94$). In addition, participants completed the *Self-Experience Questionnaire* (SEQ; Plasencia, et al., 2011), a brief 4-item measure in 7-point likert response format assessing the degree to which respondents felt authentic or artificial during a social interaction (e.g., "I felt genuine during the conversation"). The SEQ has shown acceptable internal consistency and has been found to significantly correlate with more comprehensive measures of authenticity (Plasencia et al., 2011). In this study the SEQ demonstrated acceptable to good internal consistency (Cronbach's $\alpha = .73$ to $.86$). Finally, participants completed the *Focus of Attention Questionnaire* (FAQ; Woody et al., 1997), which consists of two subscales assessing self-focused attention (e.g., "I was focusing on what I would say or do next", "I was focusing on past social failures"), and other-focused attention. The FAQ has demonstrated acceptable internal consistency and has been found to be sensitive to changes in SFA following manipulations (Woody, 1996). We analyzed only the self-focused subscale, which demonstrated good reliability (Cronbach's $\alpha = .80$ to $.84$).

Interpersonal outcome measures. A variety of social and interpersonal outcome measures were administered post-conversation to both primary and partner participants. The *Desire for Future Interaction Scale* (DFI; Coyne, 1976) is an 8-item self-report measure assessing the degree to which respondents would like to interact again with their social partner in the future (e.g., "would you like to meet this person again?", "would you like to work with this person?"). As in past studies (e.g., Papsdorf & Alden, 1998), the DFI demonstrated excellent internal consistency in the present study (Cronbach's $\alpha = .93$). The *Inclusion of Other in Self Scale* (IOS; Aron, Aron, & Smollan, 1992) is a single-item pictorial measure assessing feelings of interpersonal connectedness. IOS respondents are instructed to indicate how close they felt to their partner by choosing between 7 images of two circles representing "self" and "other" that

vary in their degree of overlap. The IOS is highly correlated with other scales of relationship closeness and has been found to be a highly reliable measure of closeness in relationships (Gachter, Starmer, & Tufano, 2015). The *Quality of Interaction Scale* (QI; Berry & Hansen, 1996) assesses perceptions of smoothness and intimacy of a social interaction and the satisfaction drawn from that interaction (e.g., “how much did you enjoy the interaction?”, “to what degree was the interaction intimate?”). The scale is comprised of 11 items rated on an 8-point scale. The QI has been found to have good overall internal consistency in previous research (Heerey & Kring, 2007), and demonstrated good internal consistency in this sample (Cronbach’s $\alpha = .89$).

Demographics. Finally, all participants completed a demographics questionnaire to measure age, ethnicity, marital status, sexual orientation, familiarity with English, and whether they have had any previous contact with the participant with whom they were partnered.

The order of questionnaires within each block throughout the study was randomized with the exception of state affect measures, which were always completed first.

Data Analytic Plan and Data Preparation

Hypothesis testing and statistical power

Preliminary ANOVAs were conducted to test the effects of the experimental manipulation. Primary hypotheses were then tested with structural equation modeling (SEM) using the Actor-Partner Interdependence Model (APIM; Cook & Kenny, 2005), as described in greater detail in relevant sections below. Sample size for this study was determined by a desired minimum power of .8 for mediation tests. Based on Thoemmes and colleagues (2010) empirical estimates of sample sizes needed for mediation, a sample size of 462 was required to detect small effects (2% of variance), while a sample size of 71 was required to detect medium effects (13%

of variance). Obtaining a sample large enough to detect small effects was not feasible. Calculations suggested that a sample size of 116 was both feasible and sufficient to detect mediation when the effect size of one path is medium and the other is small to medium.

Missing data, outliers and distributions

One hundred twenty-three dyads participated in the study at the end of data collection. Two participants were excluded from subsequent analyses due to terminating the study early and failing to complete outcome questionnaires, one was excluded due to an encoding error that resulted in no questionnaire data being retained, and one mixed-gender dyad was mistakenly recruited and excluded. The final sample consisted of 119 dyads. There were no missing data or impossible values for any of the 119 dyads, with the exception of one set of partner ratings that failed to record. As a result, all analyses using data from the primary participants were based on a sample size of 119, whereas any dyadic analyses relying on partner data were based on a sample size of 118.

All variables were screened for extreme skewness (>3) and kurtosis (>10) as recommended by Kline (2008). No key variables showed significant univariate violations of normality. Univariate outliers were defined as any data point exceeding 3 standard deviations from the mean (Kline, 2008), and multivariate outliers were identified by Mahalanobis distance. All outlying data points were examined for plausibility, deemed plausible, and retained in subsequent analyses.

Results

Group comparisons at baseline

Prior to conducting a manipulation check and testing subsequent hypotheses, analyses were conducted to verify that the groups in the study did not differ at baseline on any relevant

variables. Within the affiliation condition, there were 32 HSA-LSA dyads (7 male) and 28 LSA-LSA dyads (6 male). Within the impression management condition, there were 31 HSA-LSA dyads (8 male) and 28 LSA-LSA dyads (5 male). Collapsing across conditions, the HSA group had a mean SIAS score of 55.48 ($SD = 8.97$), and the LSA group had a mean SIAS score of 13.09 ($SD = 5.81$). An SIAS score of 43 is the recommended cutoff score indicative of clinical levels of SA (Mattick & Clarke, 1998), suggesting that HSA participants were indeed highly socially anxious, with average symptom scores above the cutoff. Across anxiety group status, there were no significant differences in how well the participants knew each other prior to the study, $t(117) = 1.21, p = .230, d = .22$ or their age, $t(117) = 1.28, p = .210, d = .24$. Participants reported either having never met their partner ($n = 107$), or only having interacted once before ($n = 7$), or brief encounters ($n = 5$). No participants endorsed being friends or close friends with their partner prior to the experiment. As expected, HSA participants reported significantly lower baseline PA ($M = 21.43, SD = 7.12$) than LSA participants, ($M = 25.73, SD = 7.97$), $t(117) = 3.11, p = .002, d = .58$. Examining baseline differences between conditions while collapsing across anxiety group status, there were no differences in age, levels of trait SA, how well participants knew each other prior to the study, or PA (all t 's < 1.80 , all p 's $> .07$).

Manipulation check

To verify that the manipulation impacted participants' conversation goals in expected ways, we conducted two separate 2 (anxiety status) by 2 (condition) ANOVAs, one each assessing primary participants' self-reported impression management and affiliation goals from the Interpersonal Goals Questionnaire. Average scores were calculated across the three time points for analysis. Contrary to expectations, results revealed no effect of condition on self-reported affiliation goals, $F(1,115) = 1.31, p = .254, \eta_p^2 = .01$. There was a main effect of anxiety

status, $F(1,115) = 4.36, p = .039, \eta_p^2 = .04$, with HSA participants reporting lower affiliation goals overall than LSA participants, but no interaction, $F(1,115) < 0.01, p = .972, \eta_p^2 < .01$. Conducting a similar ANOVA predicting impression management goals from the IGQ revealed no effect of condition, $F(1,115) = 0.01, p = .913, \eta_p^2 < .01$, no effect of anxiety status, $F(1,115) = 0.18, p = .673, \eta_p^2 < .01$, and no interaction, $F(1,115) = 0.62, p = .43, \eta_p^2 = .01$.

To determine whether condition was associated with any of the outcome variables in the present study, we examined and detected no significant correlations between condition and any of the measured variables, (all p 's $> .05$). Furthermore, condition did not interact with anxiety status to predict any variable via ANOVA (all p 's $> .43$). Taken together, these preliminary analyses suggested that the manipulation did not affect affiliative or impression management social goals during the social interaction task in the expected manner, and indeed had no discernable impact on any of the study variables. Additional correlation analyses revealed that self-reported IGQ impression management goals and affiliative goals averaged across time-points were significantly positively correlated with one another ($r = .50, p < .01$), suggesting that both types of goals were held by participants simultaneously, irrespective of condition assignment. We therefore modified our data analytic plan to use the continuous subscale score from the affiliation subscale of the IGQ as our predictor of hypothesized outcomes instead of the categorical condition variable. As a result, subsequent hypotheses were tested using self-reported affiliative social goals collapsed across the two conditions. Collapsed across conditions, state affiliative goals were significantly associated with key hypothesized variables in the study (see Table 2 for correlations). Descriptive statistics for study variables collapsed across conditions are presented in Table 3.

Table 2. *Correlations Between Key Study Variables (N = 118)*

Variables	1	2	3	4	5	6	7	8	9
1. Affiliation Goals†	-								
2. Impression Goals†	.50**	-							
3. Curiosity†	.54**	.20*	-						
4. Authenticity†	.58**	.12	.38**	-					
5. Self-focused Attention†	-.14	.21*	.01	-.37**	-				
6. Final Positive Affect	.49**	.15	.57**	.48**	-.22*	-			
7. Desire for Future Interaction	.57**	.21*	.55**	.47**	.13	.54**	-		
8. Quality of Interaction	.61**	.16	.49**	.60**	-.19*	.52**	.76**	-	
9. Perceived Closeness	.29**	-.07	.22*	.34**	-.24**	.39**	.46**	.42**	-

Note. † Mean of all time-points collected * $p < .05$; ** $p < .01$;

Table 3. *Descriptive Statistics [M (SD)] for Measured Variables between Groups Collapsed Across Conditions*

	LSA (<i>n</i> = 56)	HSA (<i>n</i> = 63)	HSA – LSA Difference (<i>d</i>)	Partner (<i>n</i> = 118)
SIAS scores	13.09 (5.81)	55.48 (8.97)	6.52*	13.81 (6.23)
Baseline Positive Affect	25.73 (7.97)	21.43 (7.12)	0.57*	25.95 (7.84)
Affiliation Goals [†]	22.55 (2.35)	21.56 (2.75)	0.39*	21.85 (2.79)
Impression Management Goals [†]	18.19 (3.77)	18.49 (3.80)	0.08	17.69 (3.71)
Curiosity [†]	52.76 (11.61)	51.67 (11.71)	0.09	52.60 (12.02)
Authenticity [†]	12.93 (1.23)	11.43 (2.30)	0.81*	12.57 (1.80)
Self-Focused Attention [†]	7.86 (1.85)	11.83 (4.09)	1.25*	8.00 (2.26)
Final Positive Affect	35.14 (9.72)	29.24 (7.96)	0.66*	32.46 (9.52)
Desire for Future Interaction	33.25 (6.10)	29.81 (7.13)	0.52*	31.00 (7.05)
Quality of Interaction	72.20 (8.48)	65.44 (12.37)	0.64*	70.43 (9.66)
Perceived Closeness	4.14 (1.21)	3.48 (1.42)	0.50*	4.08 (1.39)

[†] Mean of all time-points collected; * $p < .05$

Effects of state affiliative social goals on positive outcomes

Hypotheses were reformulated slightly to state that holding greater affiliative social goals (rather than being assigned to the affiliation condition) would be associated with greater positive experiences during the interaction. We addressed the lack of independence between participant and partner behaviour by using the Actor-Partner Interdependence Model (APIM; Cook & Kenny, 2005) to test hypotheses in AMOS v.21. APIM analyses enable researchers to account for the reciprocal influences of participants' and partners' behaviour.

In addition to investigating effects on PA alone, we wished to investigate broader social outcomes. In the interest of reducing family-wise error, the positive outcomes measured in the study were combined to form a composite outcome variable that included PA, desire for future interaction, perceived closeness, and quality of interaction. This composite variable, which we labelled "positive outcomes," demonstrated good model fit when subjected to a confirmatory factor analysis for both the primary participant, $\chi^2(2) = 1.40, p = .497$; CFI = 1.00; RMSEA = .000; $pclose = .590$, and for the partner, $\chi^2(2) = 0.44, p = .803$; CFI = 1.00; RMSEA = .000; $pclose = .849$ (see Hooper, Coughlan, & Mullen, 2008, for a review of fit indices). All standardized factor loadings were $> .52$.

Next, a structural model was created following the APIM approach. The initial model included all possible pathways between primary participants and partners and assessed the contribution of anxiety group, affiliative goals, and their interaction on overall positive outcomes. For this model, we entered the average affiliative goals across each of the three time-points for the primary participant, whereas affiliative goals for the partner participant were included from conversation end, as this was the only time-point at which they were measured. This initial model was just-identified and therefore no model fit could be determined. Inspection

of the pathways revealed no significant pathways between partner affiliative goals and the participant independent variables. Partner affiliative goals was not correlated with participant affiliative goals, $r = .06$, $p = .546$, not correlated with participant anxiety status, $r = -.10$, $p = .282$, nor the interaction term, $r = .07$, $p = .428$. Therefore, these pathways were subsequently trimmed from the model, see Figure 1 for the final model.

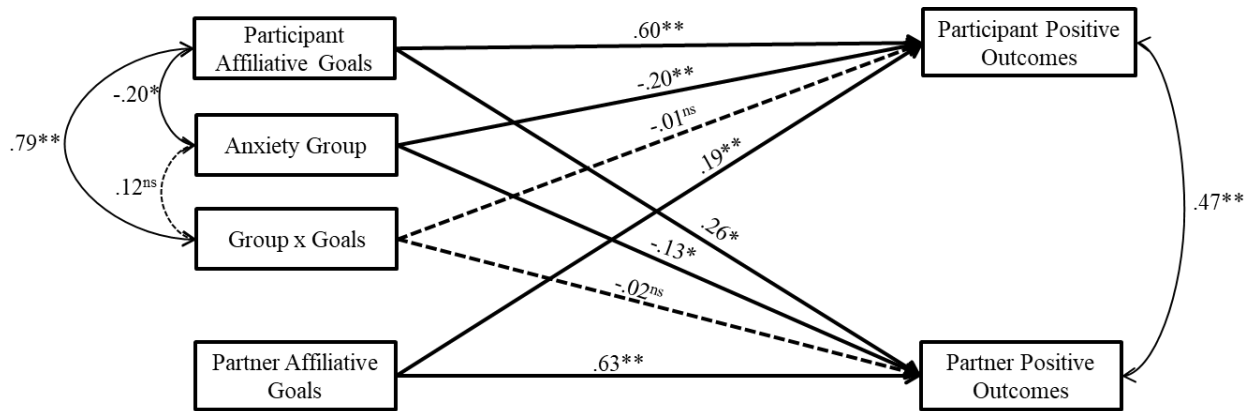


Figure 1. Model predicting positive outcomes composite scores (desire for future interaction, quality of interaction, closeness, positive affect). Pathways represent standardized estimates, dashed lines represent non-significant pathways. * $p < .05$; ** $p < .01$.

The newly trimmed model demonstrated good model fit, $\chi^2(3) = 1.68$, $p = .642$; CFI = 1.00; RMSEA = .000; pclose = .737. The model accounted for 47% and 49% of positive outcomes and partner’s positive outcomes, respectively. Significant pathways indicated that participants’ HSA status contributed to diminished positive outcomes for both themselves ($\beta = -.20$, $p = .004$) and their partners ($\beta = -.13$, $p = .048$). Consistent with hypotheses 1a and 1c, the extent to which primary participants held affiliative social goals during the social interaction predicted greater positive outcomes for both themselves ($\beta = .60$, $p < .001$), and their partners ($\beta = .26$, $p = .015$). Similarly, the extent to which partners held affiliative goals strongly predicted

their own positive outcomes ($\beta = .63, p < .001$), but also positively impacted positive outcomes for participants ($\beta = .19, p = .005$). Contrary to hypothesis 1b, there was no significant interaction of affiliative social goals and SA in predicting positive outcomes for either participants ($\beta = -.01, p = .955$), or partners ($\beta = -.02, p = .830$). Outcome error term covariance in the model indicated a significant correlation between outcomes for participants and partners ($r = .47, p < .001$).

Next, as PA was of central interest for the current study, we conducted a similar APIM analysis examining PA and partner PA alone as the outcome variables rather than the composite. As before, the initial model included all possible pathways, and as before there was no significant correlation between partner affiliative goals and any of the independent variables of the actor. Therefore, these pathways were subsequently trimmed from the model. The resulting model (Figure 2) had good fit, $\chi^2(3) = 1.68, p = .642$; CFI = 1.00; RMSEA = .000; $p_{close} = .737$.

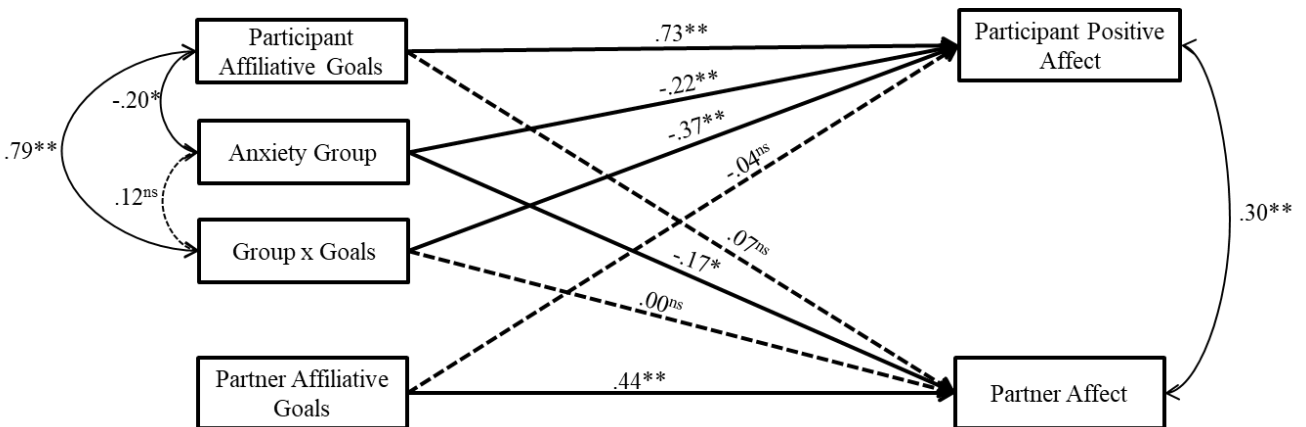


Figure 2. Model predicting positive affect for both primary participants and partners. Pathways represent standardized estimates, dashed lines represent non-significant pathways. * $p < .05$; ** $p < .01$.

The model accounted for 35% of the variance in the participant's PA, and 23% of the variance in partner's PA. SA group status negatively contributed to PA experienced by the primary participants ($\beta = -.22, p = .003$), and had a significant negative impact on the PA experienced by their partners ($\beta = -.17, p = .037$). Again, supporting hypothesis 1a, primary participants' affiliative social goals significantly contributed to their own increased PA ($\beta = .73, p < .001$); however, contrary to hypothesis 1c and the previous model, this did not extend to their partners' PA ($\beta = .07, p = .595$). Unlike in the previous model, a significant interaction between affiliative social goals and SA group status was found to predict primary participants' PA ($\beta = -.37, p = .002$). However, in contrast to hypothesis 1b, the results indicated that affiliative social goals had *less* impact on PA for HSA than LSA participants. This interaction effect did not extend to the partners' PA ($\beta < .01, p = .979$). Similar to primary participants, partners' affiliative goals predicted their own PA ($\beta = .44, p < .001$), but did not impact that of primary participants' PA ($\beta = -.04, p = .579$). As in the first model, outcome error term covariance in the model indicated a significant correlation between outcomes for participants and partners ($r = .30, p = .002$).

Mediating variables

Next, to test hypothesis 2, we built on the previous models to assess whether authenticity, curiosity, and/or self-focused attention mediated the relations between affiliation and outcomes for both primary participants themselves and their partners, and to examine whether any mediating pathways were moderated by anxiety status. The three hypothesized mediators were assessed simultaneously within a model examining the positive outcomes composite as the outcome variable, and a second model examining just PA as the outcome. Affiliative goals measured at break 1 were used as predictor variables in the model, whereas mediator variables

were measured at break 2, and outcome variables were measured at conversation end. The APIM framework was retained as before, including the pathway between partner affiliative goals and outcomes. Pathways between group and the three mediators were included in the model, as it was expected that anxiety status would account for some of the variance in the hypothesized mediators, and would therefore improve model fit. In addition, error terms between the mediators were allowed to covary in the model. Since AMOS only provides total indirect effects for the entire model, a custom estimand (Gaskin, 2016) was used to test the discrete indirect paths in the models following the product-of-coefficients approach outlined by Preacher and Hayes (2008). Bootstrapping with 2000 samples was conducted, and lower and upper boundaries of the estimates were calculated using bias-corrected 95% confidence intervals. All results are reported with standardized values.

As seen in Figure 3 below, a model predicting positive outcomes with all three mediators included had good fit, $\chi^2(5) = 6.41, p = .269$; CFI = 0.99; RMSEA = .049; pclose = .425. The model predicted 53% of the variance in positive outcomes for the primary participants and 50% for the partners. Results revealed a significant total effect of participant affiliative goals on positive outcomes, $B = .47, p < .001, 95\% \text{ CI } [.27, .63]$, and a significant total effect of anxiety group on positive outcomes, $B = -.22, p = .007, 95\% \text{ CI } [-.37, -.05]$. Similarly, a significant total effect was seen for participant affiliative goals on partner positive outcomes, $B = .17, p = .014, 95\% \text{ CI } [.04, .33]$, and for anxiety group on partner positive outcomes, $B = -.15, p = .023, 95\% \text{ CI } [-.27, -.02]$. Significant indirect effects of affiliative goals on positive outcomes were observed for primary participants through increased authenticity, $B = .22, p = .002, 95\% \text{ CI } [.09, .36]$, and through increased curiosity, $B = .29, p = .001, 95\% \text{ CI } [.13, .48]$, but not through SFA, $B = .00, p = .424, 95\% \text{ CI } [-.01, .05]$. Examining the indirect effects on partners' positive

outcomes revealed no indirect effect of primary participants' affiliation through curiosity, $B = .10, p = .100, 95\% \text{ CI } [-.02, .25]$, SFA, $B = .00, p = .626, 95\% \text{ CI } [-.05, .01]$, or authenticity, $B = .15, p = .076, 95\% \text{ CI } [-.02, .35]$. Tests of our moderated mediation hypothesis are described below.

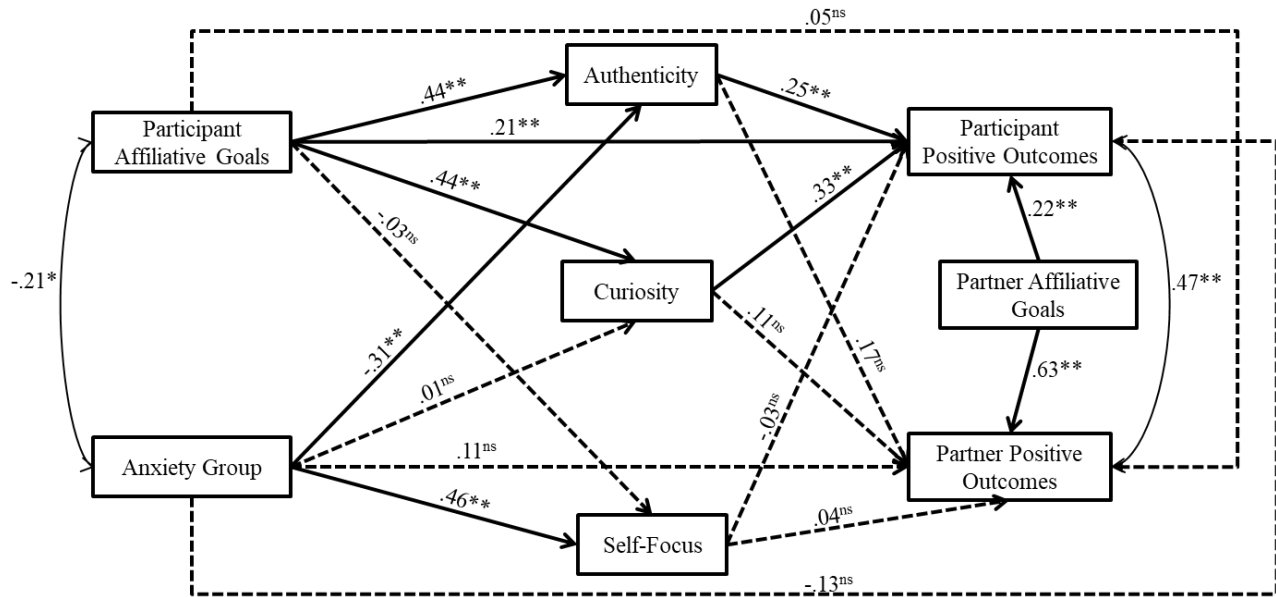


Figure 3. Mediation model predicting positive outcomes composite scores (desire for future interaction, quality of interaction, closeness, positive affect) and. Pathways represent standardized estimates, dashed lines represent non-significant pathways. Covariances between mediators are not displayed for ease of readability. * $p < .05$; ** $p < .01$.

Next, a second model (Figure 4) was tested to examine PA alone as the outcome variable. Model fit was identical to the previous model, and the model accounted for 44% of the variance in participants' PA, and 24% of the variance in partners' PA. Results revealed a significant total effect of participant affiliative goals on PA, $B = .33, p < .001, 95\% \text{ CI } [.17, .48]$, and a significant total effect of anxiety group on PA, $B = -.26, p = .006, 95\% \text{ CI } [-.42, -.08]$. No significant total effect was seen for participant affiliative goals on partner PA, $B = .01, p = .940,$

95% CI [-.16, .17]. However, a significant total effect of anxiety group on partner PA was observed, $B = -.19, p = .019, 95\% \text{ CI} [-.36, -.03]$. Significant indirect effects of primary participants' affiliative goals on their own PA were found through increased curiosity, $B = .65, p < .001, 95\% \text{ CI} [.32, 1.12]$. However, neither authenticity, $B = .25, p = .075, 95\% \text{ CI} [-.03, .57]$, nor SFA, $B = .00, p = .623, 95\% \text{ CI} [-.03, .09]$, emerged as significant indirect pathways. In contrast to the previous model, examining indirect effects of participants' affiliation on partners' PA revealed a significant indirect effect of authenticity, $B = .32, p = .046, 95\% \text{ CI} [.01, .79]$, but not through curiosity $B = -.06, p = .613, 95\% \text{ CI} [-.39, .21]$ or SFA, $B = -.01, p = .535, 95\% \text{ CI} [-.15, .05]$.

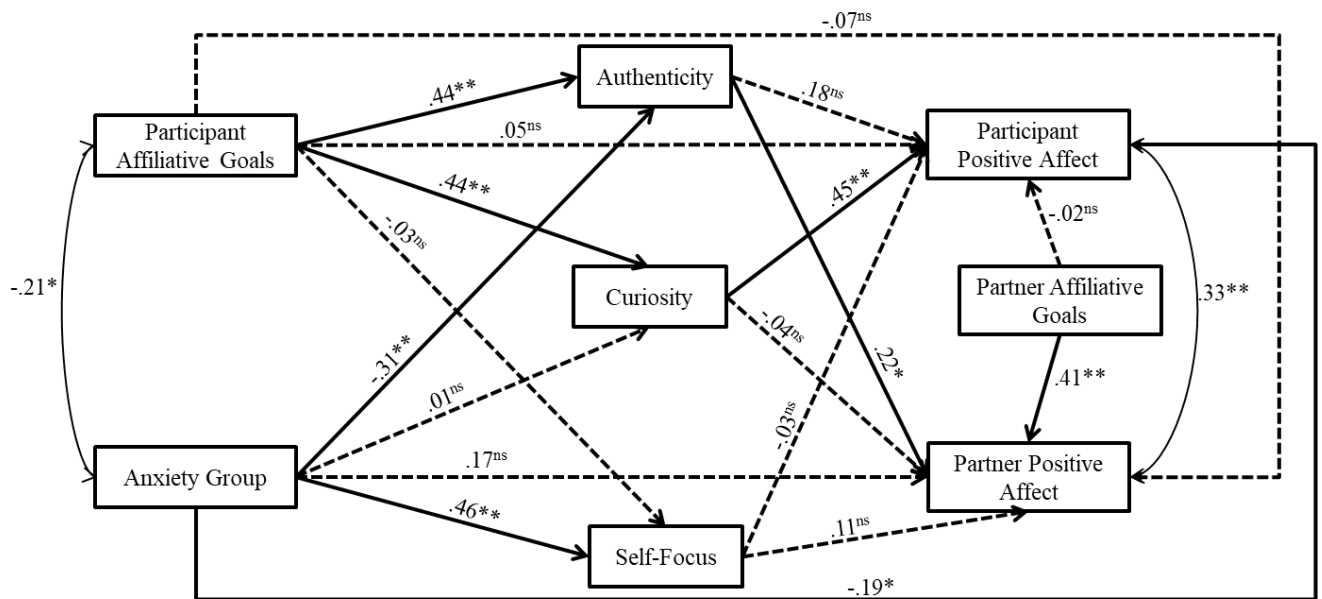


Figure 4. Mediation model predicting positive affect for both primary participants and partners.

Pathways represent standardized estimates, dashed lines represent non-significant pathways.

Covariances between mediators are not displayed for ease of readability * $p < .05$; ** $p < .01$.

To test whether any of the proposed mediating pathways were moderated by anxiety status (hypothesis 2c), we used a custom estimand (Gaskin, 2016) in AMOS to determine whether there was a statistically significant difference in the magnitude of the observed indirect effects between HSA and LSA groups. As before, 2000 bootstrap samples were obtained with 95% bias-corrected confidence intervals. Results revealed that the magnitude of the indirect effect did not differ between the HSA and LSA groups for curiosity, $B = -.01$, $p = .916$, 95% CI [-.38, .32], authenticity, $B = -.08$, $p = .633$, 95% CI [-.48, .26], or SFA, $B = .01$, $p = .673$, 95% CI [-.07, .10] when predicting primary participants' positive outcomes. Similarly, no evidence of moderated mediation was found for affiliative social goals on partner positive outcomes through curiosity, $B = .13$, $p = .398$, 95% CI [-.17, .42], authenticity, $B = .12$, $p = .435$, 95% CI [-.20, .50], or SFA, $B = .00$, $p = .935$, 95% CI [-.08, .10]. Similar results were obtained when examining moderated mediation for the models with PA as the outcome variable. Specifically, for participant PA, the magnitude of the indirect effect did not differ between the LSA and HSA groups for curiosity, $B = -.49$, $p = .183$, 95% CI [-1.21, .12], authenticity, $B = -.23$, $p = .409$, 95% CI [-.77, .24], or SFA, $B = .02$, $p = .915$, 95% CI [-.17, .26]. Similarly, for partner PA, no group differences were observed in the magnitude of indirect effects for curiosity, $B = .04$, $p = .985$, 95% CI [-.66, .58], authenticity, $B = .44$, $p = .170$, 95% CI [-.09, 1.17], or SFA, $B = .00$, $p = .861$, 95% CI [-.25, .22].

Discussion

Individuals with high trait SA and especially those with SAD experience a variety of difficulties with friendships, intimacy, interpersonal connection, and positive emotions, which can have severe implications for quality of life and overall functioning. The present study was designed to enhance our understanding of the mechanisms by which individuals can derive

greater positive social outcomes, and PA in particular, from social encounters, ultimately supporting hedonic functioning.

As expected, participants with high trait SA experienced reduced PA and less positive social outcomes overall (reflecting a composite measure consisting of conversation quality, feelings of closeness, and desire to interact with participants again in the future). The negative impact of participants' SA also carried over to their conversation partners, predicting lower partner ratings of PA and less positive social outcomes overall. These findings highlight the role of SA in inhibiting positive emotional and interpersonal outcomes for both members of the dyad during one-on-one social interactions (see also Alden & Taylor, 2004; Bielak, Moscovitch, & Waechter, 2018; Heerey & Kring, 2007). On the other hand, we found that holding more affiliative social goals in mind during the conversation enhanced participants' own PA as well as their own and their partners' ratings of social outcomes overall, though the relationship between affiliative goals and increased PA was statistically weaker for HSA than LSA participants. It is possible that the capacity of high trait SA individuals to experience PA may be subject to certain limits of a hypoactive "affiliation system," which may be based on biological constraints or inhibited by a competing and hyperactive "rank system," as suggested by evolutionary theories (Trower, & Gilbert, 1989; Weisman et al., 2011). At the same time, results suggest that the detrimental effects of SA could be offset, at least in part, by adopting affiliative goals during social interaction, as those who oriented themselves toward affiliation experienced both personal and interpersonal benefits.

The impact of participants' affiliative social goals on their own positive outcomes was partially mediated by both curiosity and authenticity, but only curiosity emerged as a significant mediator when examining PA alone. The strength of these mediating relationships was no

different for HSA and LSA participants. Curiosity is posited to be a mechanism through which one can interpret a novel or uncertain situation as an opportunity for learning, rather than as personally threatening, a stance that facilitates both approach behaviour and pleasurable emotional experiences (see Kashdan & Roberts, 2006). Affiliative goals appear to promote an inquisitive mindset about the other person that is consistent with a social approach orientation in which social interaction may be viewed as an opportunity to acquire new information and new learning about other people. In contrast, entering a conversation with low levels of affiliation may inhibit the generation of curiosity, with no attention or value given to acquiring new information and new learning thus constraining opportunities to extract PA. As anxiety increases, it may be more difficult to maintain higher levels of state curiosity; however, reduction in anxiety symptoms may not be sufficient to promote affiliative goals and curiosity, and to derive the subsequent emotional and interpersonal benefits from social interaction.

Interestingly, SA group was not predictive of curiosity in this study, which is contrary to previous research demonstrating that SA has a negative impact on curiosity (Kashdan et al., 2004). A variety of factors may have influenced this outcome, including our use of a non-clinical sample. The structured nature of the task may have also played a role by alleviating some of the anxious arousal that is antagonistic to curiosity (Spielberger & Starr, 1994). Our results suggest the potential importance of curiosity as a target for interventions designed to boost positive outcomes. For example, helping individuals attend to what is novel in a social situation, or highlighting the novelty of their internal experiences may help to boost their levels of state curiosity (Kashdan, Rose, & Fincham, 2004), which could have positive downstream effects on both affective and interpersonal outcomes (Kashdan, 2009). Moreover, framing behavioural experiments for individuals in terms of information acquisition, discovery, and exploration rather

than solely as opportunities for disconfirmation of threatening interpretations may promote curiosity, a sense of mastery, and positive outcomes.

Authenticity also emerged as a significant mediator of the relationship between participants' affiliative goals and their own positive outcomes, a finding that is consistent with prior work showing that operating in accordance with one's true self helps to improve social-relational outcomes (see Plasencia et al., 2016). Individuals with SAD often intentionally engage in self-concealment and other subtle avoidance and self-protective behaviours designed to hide their true self from others (see Moscovitch, 2009; Rodebaugh, 2009), with a wide array of negative consequences. These self-concealing behaviours have been found to prevent disconfirmation of feared beliefs, reduce internal attributions for successful social encounters, increase anxiety, and paradoxically increase the likelihood of feared outcomes occurring (see Piccirillo, Dryman & Heimberg, 2016 for a review). Maintaining affiliative social goals may encourage individuals to adopt a stance towards the interaction that is inconsistent with self-concealment, thus allowing individuals to behave in a more genuine fashion. This genuine approach would be expected to be less effortful for individuals, as well as provide individuals with less rehearsed behaviour upon which to negatively evaluate and judge their own "performance." In turn, this may promote perceptions of a higher quality of interaction and greater feelings of closeness, while also leaving participants with increased desire to engage in future interactions. However, authenticity did not contribute to enhanced PA on its own when the measure of affect was uncoupled from the composite measure of positive outcomes.

Neither participant curiosity nor participant authenticity was found to mediate the path from affiliative goals to partner outcomes, although authenticity did directly contribute to partner PA. These findings are surprising, as theoretical models presume that diminished levels of

authentic disclosure and curiosity obstruct meaningful relationship formation (e.g., Cuming & Rapee, 2010; Kashdan, McKnight, Fincham, & Rose, 2011), and that enhanced levels would therefore promote more favourable interpersonal and emotional partner ratings. It is possible that the positive impact of authenticity on partner PA contributes to longer-term perceptions of positive relationship quality that do not emerge in a single encounter with a stranger, thus requiring a longitudinal design or an already-established close relationship to detect in the laboratory.

Another possibility is that participants' self-reported levels of curiosity and authenticity are not readily discerned by conversation partners. To this end, participants' observable behaviours that stem from affiliative goals might better explain the relationship between affiliative goals and partner outcomes. For example, despite the presence of heightened subjective experiences of curiosity and authenticity, higher SA individuals may engage in other behaviours that negatively impact partner experiences. For example, they may fail to display any increased behavioural warmth and friendliness towards their interaction partner, both of which have been shown to be important in positive interpersonal functioning, and to be impaired in SA (e.g., Kashdan & Breen, 2008; see also Rodebaugh, Bielak, Vidovic, & Moscovitch, 2016).

Contrary to hypotheses, SFA played no discernable role in positive social or affective outcomes. This finding is interesting in light of the wealth of research supporting the role of SFA in SA (see Spurr & Stopa, 2002), and some evidence that SFA may inhibit the experience and/or expression of positive emotions (e.g., Kashdan & Roberts, 2004). It may be that the role of SFA in interpersonal interactions pertains more to the experience of negative outcomes such as anxiety and negative affect.

Limitations and future directions

Although the dyadic framework we used in the present study helped us begin to disentangle the reciprocal influence of SA on the behaviour and emotions of self and others, it remains unclear whether findings would generalize from the standardized context of our design to real social contexts and interactions with partners who may have characteristics that differ from those recruited here. The structured conversation was chosen to control the length of the interaction and to reduce variability across interactions, but applicability to a typical first-encounter may be limited; indeed, typical first-meeting encounters are unstructured and conversation partners have the freedom to determine and shift conversation topics on the fly. This type of synchronous, spontaneous communication can be more anxiety provoking for HSA individuals than structured conversations with well-defined topics and roles. Further, the present study relied on an analogue group of high anxious undergraduate participants. The HSA group reported levels of trait SA that were above the clinical cutoff on a well-established symptom measure. It is possible that these results may generalize to individuals with a clinical diagnosis of SAD, but it remains an empirical question whether other aspects of SAD-related functional impairment beyond symptom levels alone may alter the effects that we demonstrated in this non-clinical sample.

Another limitation was that the experimental manipulation appeared to have no differential impact on participants' conversation goals across the two conditions. It may be that modifying conversational goals requires a stronger manipulation than brief task instructions, particularly within the context of a potentially stressful and complex social task. Alternatively, it is possible that the structured nature of the task limited the potential for participants to deviate widely from the assigned topics and that the manipulation may have been more successful within

the context of an unstructured conversation. Future studies could also examine whether the goal of promoting affiliation may be better served by manipulating more specific and concrete targets such as authenticity and curiosity.

This study was limited by sample size and power for testing mediation and moderated-mediation hypotheses. A larger sample may have improved our ability to detect significant effects, especially for analyses including SFA as well as those examining partner outcomes. Nonetheless, this study was well-powered to detect medium effects, and small effects may be less clinically meaningful. Future work can build upon the present study by conducting Monte Carlo simulations based on the outcomes reported here, which will aid researchers in their determination of appropriate sample sizes for their research goals.

As this study relied solely on self-report outcomes, it would be beneficial to determine the behavioural manifestations of affiliative social goals in order to establish which, if any, observable behaviours are associated with different participant and partner outcomes. For example, adopting affiliative goals and associated curiosity may encourage people to ask more questions of their partner, possibly signalling a higher degree of interest and engagement. Further, through increased authenticity, affiliative goals may contribute to more genuine self-disclosure, which has been linked to positive interpersonal outcomes (see Orr & Moscovitch, 2015). Research incorporating such behavioural data may help to generate an enhanced understanding of the observable (and potentially trainable) actions that individuals could adopt to facilitate their own and others' positive experiences and interpersonal outcomes, with potential for the development of more targeted interventions (e.g., Alden & Trew, 2013; Craske et al., 2019; Taylor, Lyubomirsky, & Stein, 2017).

Finally, the impact of affiliative goals differed depending on whether the dependent variable was overall social outcomes or PA alone, suggesting the need for future research to disentangle these effects and enhance our understanding of how PA may be both related to and distinct from positive interpersonal outcomes more generally. Future studies would benefit from the use of multi-session longitudinal designs to better determine the directionality and durability of observed effects across time.

Conclusion

These limitations notwithstanding, the present study highlights important processes in the generation of positivity in interpersonal interactions for individuals across the SA spectrum. Results demonstrated that: (a) holding affiliative social goals confers emotional and interpersonal benefits to people and their interaction partners, irrespective of levels of trait SA; (b) such benefits are more modest for those with high trait SA; and (c) curiosity and authenticity may be important mechanisms through which affiliative social goals operate to influence people's own ratings of positive affect and social outcomes. Future research is needed to replicate and extend these novel findings and investigate whether and how they could be leveraged to improve clinical interventions and outcomes for SAD.

Study Two – Behavioural Manifestations of Affiliative Social Goals During Relationship Formation in Social Anxiety

Introduction

To improve our understanding of interpersonal processes in social anxiety (SA), in study one we investigated the subjective effects of holding affiliative social goals on positive social and emotional outcomes in individuals with high vs. low trait SA during a first-time conversation with a stranger. We found that holding more affiliative social goals was associated with positive social and affective outcomes for all participants, but especially for those with lower levels of trait SA. Dyadic analyses indicated that the emotional benefits of holding affiliative goals extended as well to participants' social partners. Moreover, participants who endorsed stronger affiliative goals during the interaction experienced greater prosocial feelings of curiosity and reported an increased sense of felt authenticity.

These novel findings contribute to the recent surge of research in both affective and relationship science that is quickly advancing our understanding of the dynamic interpersonal processes that contribute to positive emotional and social outcomes during dyadic interaction (e.g., Algoe, 2019; Ramsey & Gentzler, 2015; Sbarra & Coan, 2018). Less is known, however, about how affiliative social goals are successfully translated into observable affiliative behaviours in individuals with higher or lower levels of trait SA. In the present study, we sought to expand on our previous findings by using our video-recorded interaction data to assess the coded behavioural manifestations of affiliative social goals and examine whether these behaviours mediated the effects of affiliation on positive affective and interpersonal outcomes for both participants and their social partners in high vs. low SA individuals.

Interpersonal consequences of social anxiety

The functional and interpersonal consequences of SA can be severe and far-reaching, particularly for individuals diagnosed with social anxiety disorder (SAD). People with SAD are significantly more likely than average to be single, unemployed, and live alone (Norton et al., 1996; Wittchen & Beloch, 1996). In addition to having fewer social relationships, individuals with SAD report negative impacts on their existing family and romantic relationships (Aderka et al., 2012; Schneier et al., 1994; Wittchen, Fuestsch, Sonntag, Muller, & Liebowitz, 2000), reporting decreased intimacy (Sparrehovn, & Rapee, 2009), decreased satisfaction with sexual encounters, and lower feelings of connectedness to their partners (Kashdan et al., 2011). Individuals with higher levels of SA, including those with SAD, have difficulties achieving closeness in first-encounters with strangers, as seen in study one, among other research (Hope, Sigler, Penn, & Meier, 1998; Kashdan & Wenzel, 2005). Even when reporting on their existing friendships, people with SAD endorse lower satisfaction and lower ratings of friendship quality (Rodebaugh, 2009), a sentiment that is felt more strongly by those with SAD than their friends (Rodebaugh et al., 2014).

Given the myriad of contexts in which SAD negatively impacts social functioning and, by extension, quality of life, it is essential that we develop a greater understanding of the cognitive and behavioural contributors to positive relationship functioning in SA. Indeed, recent research has found that relationship quality predicts future SA symptoms rather than the reverse relationship (Rodebaugh, Lim, Shumaker, Levinson & Thompson, 2015). However, previous research on interpersonal processes in SA has generally emphasized the negative impact of anxiety and negative affect on interpersonal outcomes (e.g., Alden & Bieling, 1998; Rowa et al., 2015) while ignoring the role of positive affect and approach behaviour, resulting in significant

gaps in our understanding of the factors that contribute to positive relational functioning in SAD (Fredrickson, 2001; Kashdan & Steger, 2006; Taylor, et al., 2017).

Avoidance behaviour in social anxiety

At the most basic level, the somatic manifestations of SA, although involuntary, are often visible to others. Individuals with SAD can sometimes be seen blushing, twitching, stammering, or sweating when interacting with others (Rapee & Heimberg, 1997), though rarely as much as they believe. Indeed, it is theorized that individuals with SAD fear what others may think about these visible signs of anxiety, or fear that the signs of anxiety might reveal flaws in their character to others, and are therefore motivated to conceal them (Moscovitch, 2009; Rapee & Heimberg, 1997).

Perhaps consequently, individuals with SAD engage in a wide variety of avoidance behaviour ranging from avoiding situations altogether to more subtle avoidance and self-protective behaviours frequently referred to as safety behaviours (see Piccirillo, Dryman, & Heimberg, 2016, for a review). The term *safety behaviour* has come to be used to describe both active behaviours (such as wearing make-up to conceal blushing), and restriction of behaviours (such as avoiding eye contact) that are performed in an attempt to reduce the likelihood of negative evaluation. Although an exhaustive list of safety behaviours and their idiosyncratic purposes is beyond the scope of this paper, safety behaviours are thought to prevent learning that feared outcomes are not likely to occur, and their use may paradoxically increase symptoms of anxiety, negative self-perception, and the likelihood of actual negative evaluation by others (e.g., McManus, Sacadura, & Clark, 2008; Moscovitch et al., 2013; Plasencia, Alden & Taylor, 2011; Rowa et al., 2015). In addition to sustaining negative affect and anxiety, use of safety behaviours may also restrict socially anxious individuals' opportunities to experience positive emotions,

which have been found to be the best predictor of feeling connected and desiring future social engagement with others (Taylor et al., 2017). Indeed, the experience of positive emotions may be blocked by socially anxious individuals' use of safety behaviours and other self-regulation strategies designed to manage impressions and attend to social threats, which deplete psychological resources that are necessary for extracting social rewards during social encounters (Kashdan et al., 2011). To this end, one recent study showed that SAD participants instructed to drop their use of safety behaviours during interactions with confederates experienced increased PA as well as elevated desire for future interaction following the conversation (Plasencia, Taylor, & Alden, 2016).

There is accumulating evidence in support of the important role of positive emotions in SAD for promoting social engagement and satisfying longer-term social relationships. As studies begin to investigate the factors that facilitate the experience of positive emotions in high SA individuals (Trower & Gilbert, 1989; Weisman, et al., 2011), continued research on the underlying behaviours, cognitions, and motivations that contribute to PA, rather than solely those linked to negative affect and anxiety, may provide unique insights into the interpersonal consequences of SAD. For example, in a recent study (Pearlstein, Taylor, & Stein, 2019), individuals with SAD and healthy controls engaged in a conversation with a confederate. Using software to code facial expressions, researchers found that SAD participants smiled less frequently and less intensely, and this was associated with decreased desire for future interaction with the SAD participant, as rated by both the confederates and objective observer-raters. Interestingly, and counter to the author's predictions, the frequency or intensity of fear displays during the conversation did not distinguish between the SAD participants and controls and were not related to interpersonal outcomes. Thus, the absence of an expected affiliative behaviour

proved to be a more important predictor of interaction quality than any observable signs of anxiety.

Affiliative and prosocial behaviour in social anxiety

Smiling is not the only affiliative behaviour that appears to be reduced in people with higher trait SA. Indeed, higher SA may negatively impact a variety of prosocial behaviours. In one of the few dyadic interaction studies that did not rely on the use of a confederate, Heerey and Kring (2007) examined the behaviour of paired dyads, consisting of two non-socially anxious individuals or a mixed dyad of a high socially anxious individual paired with a non-socially anxious individual, as they engaged in a 5-minute unstructured conversation. Conversations were video-taped and coded for verbal and nonverbal behaviours. Compared to the dyad of non-socially anxious participants, socially anxious participants asked fewer questions of their partners, and tended to elicit more empathy and support from their partners due to higher reassurance seeking. Meanwhile, high SA participants displayed significantly less empathy and support for their partners. When examining the impact of the behaviours measured in the study, it was found that more smiling resulted in greater PA experienced by the conversation partner, although there were no overall differences in the frequency of smiles, unlike in the more recent study by Pearlstein and colleagues (2019). In addition, greater empathy and support from partners resulted in greater PA experienced by the high SA participant. Interestingly, participant negative affect was not correlated with partner ratings of interaction quality or affect, even for high SA participants. However, participant PA was correlated with partner PA, suggesting that interventions designed to improve behaviours that promote PA in high SA individuals may represent a promising avenue for future research. In fact, recent studies have started to examine treatments designed to improve reward sensitivity and reduce anhedonia. A study using a mixed

sample of clinical participants with anxiety and/or depression provided a 15 week treatment designed to improve PA (Craske, Meuret, Ritz, Treanor, Dour, & Rosenfield, 2019), and found that treatment targeting PA showed greater increases in PA, decreases in NA, lower symptoms of depression and anxiety, and lower suicidal ideation at 6-month follow-up when compared to a negative affect treatment protocol.

Another important affiliative behaviour that appears to be impaired in SA is emotional expressivity. Emotional expressivity is broadly defined as the extent to which emotional impulses are manifested behaviourally (e.g., facial, postural changes such as smiling, crying, storming out of a room; Gross & John, 1997). Higher SA is associated with decreased levels of emotional expressivity (Kashdan & Breen, 2008). Suppressing the expression of emotions has been found to have negative individual and interpersonal consequences. Studies have shown that expressive suppression disrupts communication, negatively impacts both positive and negative affect, and increases blood pressure in both individuals and their interaction partners (Butler et al., 2003; Gross & Levenson, 1997). Moreover, in the Butler and colleagues' study, emotional suppression was found to inhibit relationship formation and reduce rapport in unacquainted strangers.

Conversely, greater emotional expressivity has been linked to increased PA, social functioning, and cooperativeness, and is associated with positive judgements from others (see Gilboa-Schechtman & Shachar-Lavie, 2013 for a review). Interestingly, one study found that increased expression of positive emotions was linked to increased PA for those low in SA, but not those high in SA (Kashdan & Breen, 2008). Researchers have demonstrated that people with higher levels of SA are more likely to believe that overt emotional expression is undesirable (Spokas, Luterek, & Heimberg, 2009), and it has been argued that individuals may avoid

expressing intense emotions that might draw unwanted attention (Moscovitch et al., 2013). In sum, although the relationship between motivation to avoid negative outcomes and emotional expressivity is relatively clear, with some evidence supporting the negative interpersonal consequences of emotional suppression, less is known about whether holding affiliative goals promotes more emotional expressivity, and if this can improve social outcomes for high SA individuals.

Another prosocial variable that has been investigated in the context of SA is interpersonal warmth, defined in the interpersonal circumplex as consisting of traits such as tenderness, kindness, and appreciativeness (e.g., Wiggins, 1979). Although not completely orthogonal from emotional expressivity, as the single best behavioural indicator of warmth is smiling (Bayes, 1972), warmth can be seen as a correlated but distinct construct, as it comprises a variety of affiliative traits. In SAD, individuals are often seen as quiet, distant, and cold by their interaction partners (Alden & Wallace, 1995; Christensen, Stein, & Means-Christensen, 2003; Kachin, Newman, & Pincus, 2001). Self-report ratings from socially anxious individuals suggest that they view themselves as cold (as compared to warm), and that they are more tolerant than low SA individuals of others who adopt a similarly cold interaction style (Rodebaugh, Bielak, Vidovic, & Moscovitch, 2016). Indeed, it has been argued that people perceived as both warm and competent universally elicit positive emotions and behaviours from others across cultures, time, and stimuli (Fiske, Cuddy, & Glick, 2007). In study one we discussed the hypothesis that high SA individuals may under-utilize their affiliation system and the possibility that this leads to lower warmth; however, this relationship has yet to be directly tested.

Examining the impact of SA on affiliative behaviour from a dyadic perspective reveals insights beyond what can be found with individual variables. For example, the construct of

reciprocity is inherently dyadic as it incorporates sequences of verbal and non-verbal behaviours at the dyad level (see Bakeman & Gottman, 1997), and encompasses one's quality of responding as elicited by one's interaction partner. Reciprocity can be assessed in its simplest form as behavioural mimicry, such as body posture, or smiling (see Gilboa-Schechtman & Schachar-Lavie, 2013), or can be operationally defined to capture more complex back-and-forth disclosure. For example, an unsolicited self-disclosure of a negative childhood experience during a first-meeting conversation may be perceived as disruptive, or unwelcome to the flow of a conversation. However, this same disclosure within a close friendship or in response to someone disclosing their own struggles may instead be perceived as supportive and bonding, promoting a sense of connection and closeness. Conversely, failing to respond with a self-disclosure when someone shares something deep and substantive may be perceived as a sign of disinterest or coldness. This back-and-forth matching is critical and cannot be assessed outside the context of the dyad.

Research has overwhelmingly supported the importance of reciprocity in relationships, despite somewhat diverse operational definitions of reciprocity. Simple reciprocal behaviour such as shared laughter has been found to be a marker of high-quality relationships (Kurtz & Algoe, 2015), and postural mirroring has been found to be indicative of increased cooperation and interpersonal involvement (LaFrance, 1985). Reciprocal self-disclosure, a more complex form of reciprocity, has been found to elicit greater liking than non-reciprocal patterns (e.g., Altman & Taylor, 1973; Jourard, 1971; Sprecher, Treger, Wondra, Hilaire, & Wallpe, 2013). High SA individuals tend to engage in self-protective concealment that does not match the disclosure levels of their interaction partners, leading to more negative responses from their partners and lower ratings of likeability (Alden & Bieling, 1998; Meleshko & Alden, 1993).

In addition to self-disclosure, high SA individuals have been found to have lower reciprocity of smiling behaviour (Heerey & Kring, 2007), and tend not to match on displays of positive affect when others disclose good news (Kashdan, Ferssizidis, Farmer, Adams, & McKnight, 2013), which has been linked to decreased relationship quality and stability. Although the research on reciprocity within the context of SAD is somewhat limited compared to the wealth of research in social psychology on non-clinical populations, the association between reciprocity and fewer positive outcomes remains consistent. As with the other behaviours we have reviewed above, we currently do not know whether impaired affiliative drive in people with SAD contributes to their observed deficits in reciprocity. Moreover, few if any studies have attempted to examine reciprocity in the context of SA without relying on the use of a confederate.

Present study and hypotheses

The present study sought to test the relationship between SA, affiliative social goals, and key prosocial behaviours as they relate to positive affective and interpersonal outcomes. Here, we drew from the sample in study one where high socially anxious (HSA) and low socially anxious (LSA) individuals engaged in a 45-minute structured interaction task with an unfamiliar LSA partner. To supplement self-report data obtained from participants and their partners, the interactions were video-recorded and subsequently coded for the presence of observable prosocial behaviours. In our previous study, we found that HSA individuals endorsed holding less affiliative social goals and felt they were less authentic throughout the conversation. Being in the HSA group was associated with fewer positive self-reported interpersonal outcomes, less PA, and fewer partner positive outcomes. Affiliative goals contributed to better positive outcomes, better partner positive outcomes, and greater PA for all participants, but the positive

impact on PA was dampened for the HSA participants. Both curiosity and authenticity were found to partially mediate the relationship between affiliative goals and individual positive outcomes, but not partner outcomes. To build upon these findings, the current study examined whether SA and affiliative social goals predicted coded prosocial and approach behaviours. We also tested whether prosocial behaviours were predictive of positive affect and interpersonal outcomes as reported by both participants and their interaction partners. Finally, we tested whether observed affiliative behaviours mediated the relationship between affiliative goals and subsequent emotional and interpersonal outcomes.

We hypothesized that: (1) relative to LSA participants, HSA participants would display less affiliative/prosocial behaviours during the interaction (as measured by coded empathy, number of questions asked, emotional expressivity, warmth, and reciprocity); (2a) these prosocial behaviours would predict positive affective and social outcomes for participants and (2b) their interaction partners; (3a) the relationship observed in study one between affiliative social goals and positive affective and social outcomes would be mediated by greater prosocial behaviours; (3b) the mediating relationship would remain significant for partner social outcomes. Finally, (4) we sought to explore whether the mediating relationships would differ for HSA participants than LSA participants. As our previous study did not find evidence of moderated-mediation we had no a-priori hypothesis on whether to expect a moderating effect, nor the direction of the effect.

Method

Participants

The sample described in this paper represents a subset¹ of the sample of participants described in study one. Please refer to that paper for additional details about the sample and the study protocol.

Participants were undergraduates at a large Canadian University. Participants were required to complete the Social Interaction Anxiety Scale (SIAS; described below) as part of a pre-selection battery of questionnaires. Participants in the top and bottom 25% of the distribution of SIAS scores were invited to participate to form the HSA and LSA groups, respectively. Participants were invited to the study in same-gender dyads, consisting of a primary participant (HSA or LSA) paired with an LSA partner. To ensure dyads were unacquainted, participants were instructed not to sign up for the same timeslot as a friend.

A total of 112 same-gender dyads were included in this study. The majority of pairings were female (77.7%) with a mean age of 19.88 ($SD = 3.45$). Participants identified as Caucasian (39.3%), South Asian (21.4%), East Asian (20.5%), South-East Asian (5.4%), Middle Eastern (5.4%), and 8% other (African, Caribbean, Hispanic). Sixty dyads consisted of HSA-LSA pairings, and 52 dyads LSA-LSA.

Procedure

Eligible participants were invited to complete a “getting acquainted game,” in which they engaged in a 45-minute conversation with an unfamiliar partner. Upon arrival to the lab, participants were initially escorted to separate rooms to complete baseline measures of affect. Prior to the conversation, one of the two participants (the HSA participant in the HSA-LSA

¹ This subset consisted of all participants from the initial study who consented to and completed video recordings, prior to any additional exclusions described below.

dyads, and a randomly selected participant in the LSA-LSA dyads) were randomly assigned to one of two study conditions where they received additional task instructions. The participant who received task instructions will henceforth be referred to as the *primary participant*, whereas the *partner* received no additional task instructions prior to the conversation.

Primary participants were either instructed to adopt a goal of becoming close with their partner throughout the conversation (affiliation condition), or to adopt a goal of making a good impression on their partner (impression management condition). The instructions included a brief visualization exercise. Once primary participants completed the exercise, the dyad was brought together to complete the conversation task. A more detailed description of the procedure and manipulation can be found below.

Conversation task

Participants were seated in comfortable chairs facing one another, with wall-mounted video cameras above and behind each participants' head. Camera angles were set to have both participants fully in frame, and could be adjusted as needed by the researcher who monitored from the adjoining room.

The task was adopted from Aron, Melinat, Aron, Vallone, and Baltor's (1997) procedure to generate closeness. Once seated, participants were each provided with 33 identical ordered slips of paper, each containing a question or a task. Participants were instructed to read the slip to their partner, followed by the partner completing the instructions on the slip. Once the partner completed the instructions, the person who read aloud first would then also complete the task. Participants were required to complete all questions and tasks in the order provided, alternating who read aloud first with each subsequent slip. Participants continued in this manner until they ran out of slips or the time expired. At each 15-minute interval, the researcher interrupted the

conversation and separated the participants to complete a brief set of questionnaires. Following completion of the questionnaires after the first break, the participants were returned to the same room to complete another 15 minutes with a second set of slips (one third of the total slips), followed by another break for questionnaires, and a final 15 minutes with a third set of slips, for a total of 45-minutes conversing. Following the conversation, participants completed final questionnaires and were debriefed.

Self-report measures

Trait social anxiety. The *Social Interaction Anxiety Scale* (SIAS; Mattick & Clarke, 1998) was used to select eligible HSA and LSA participants and LSA partners, from the top 25% and bottom 25% of all respondents. The SIAS has been demonstrated to be a highly reliable and valid measure of social interaction anxiety in undergraduates (Mattick & Clarke, 1998; Osman, Gutierrez, Barrios, Kopper, & Chiros, 1998). In this sample, the SIAS demonstrated excellent internal consistency (Cronbach's $\alpha = .94$).

State affect. The *Positive and Negative Affect Schedule* (PANAS; Watson, Clark, & Tellegen, 1988) was used to measure participant and partner state affect throughout the study. The PANAS consists of two subscales assessing positive affect (PA) and negative affect (NA). It has demonstrated strong psychometric properties, with each of the subscales demonstrating good internal consistency and invariance across demographic subgroups (Crawford & Henry, 2004). Only PANAS PA scores were analyzed for the present study. PA scores demonstrated high internal consistency across all time-points for both primary and partner participants (Cronbach's α ranging from .89 to .92).

Affiliative social goals. To assess the degree to which participants endorsed affiliative interpersonal goals we employed the 5-item affiliation subscale of the *Interpersonal Goals*

Questionnaire (IGQ) that was developed for the previous study from which this sample was derived. The 5 items assessing an affiliation-oriented mindset (e.g., “I tried to get to know the other person”) were rated on a 5-point scale ranging from 1 (never) to 5 (always). Primary participants completed this questionnaire 3 times throughout the study, with each point of measurement referring retrospectively to the preceding portion of the conversation task, while partners completed the measure once at the end of the conversation task. The affiliation subscale demonstrated strong internal consistency for both primary participants and partners (Cronbach’s α ranging from .81 to .89). IGQ scores were averaged across the 3 time-points for hypothesis testing.

Interpersonal outcome measures. Several social and interpersonal outcome measures were completed by both participants and partners post-conversation to capture their impressions about the conversation itself and their conversation partner. The *Desire for Future Interaction Scale* (DFI; Coyne, 1976) is an 8-item measure assessing participants’ inclination to engage with their social partner again in the future. The DFI demonstrated high internal consistency in the present study (Cronbach’s $\alpha = .93$). The *Inclusion of Other in Self Scale* (IOS; Aron, Aron, & Smollan, 1992) is a single-item measure assessing feelings of closeness with another individual. Respondents chose between 7 images of two circles representing “self” and “other” that varied in their degree of overlap. The IOS is highly correlated with other scales of relationship closeness and has been found to be a highly reliable measure of closeness in relationships (Gachter, Starmer, & Tufano, 2015). The *Quality of Interaction Scale* (QI; Berry & Hansen, 1996) is an 11-item scale that assesses general perceptions of smoothness, intimacy, and satisfaction drawn from a social interaction. The QI demonstrated high internal consistency in this sample (Cronbach’s $\alpha = .89$)

Consistent with the approach used in our previous study, these outcomes were combined for some analyses with post-conversation PA to form a composite outcome variable we called “positive outcomes.” The composite demonstrated good model fit when subjected to a confirmatory factor analysis testing the single-factor outcome for both the primary participant, $\chi^2(2) = 1.65, p = .439$; CFI = 1.00; RMSEA = .000; $pclose = .529$, and for the partner $\chi^2(2) = 0.59, p = .971$; CFI = 1.00; RMSEA=.000; $pclose = .978$ (see Hooper, Coughlan, & Mullen, 2008, for a review of fit indices). All standardized factor loadings were $> .52$.

Demographics. Finally, all participants completed a demographics questionnaire to assess age, ethnicity, marital status, sexual orientation, familiarity with English, and whether they had had any previous contact with the participant with whom they were partnered. The order of questionnaires within each block throughout the study was randomized with the exception of state affect measures, which were always completed first.

Video coding

Videos from the interactions were coded (see detailed description below, and Appendix 2) by two of the study authors (K.C.B. and M.A.M.M.) and a trained research assistant. Raters were trained to agreement on videos from four dyads whose data had already been excluded from the study due to technical difficulties or failing to complete final questionnaires. Videos were randomly assigned to raters for coding, with the exception that no rater would be assigned to code a video of any participant they personally tested. This ensured that raters remained blind to the anxiety status of the primary participant. Raters were assigned to overlap on 25% of their total coded videos (approximately 30 videos), consistent with recommendations by Koo and Li (2016) for establishing reliability. Weekly meetings were held between the 3 raters to review videos coded in the previous week to ensure fidelity to the coding scheme and prevent drift. Any

discrepancies between raters were discussed in detail and consensus on the correct rating was established. However, no changes were made to the discussed ratings during these meetings as the original ratings were used to quantify inter-rater reliability.

Empathic support behaviours. Empathic support behaviours were coded based on Heerey and Kring's (2007) methodology, and included empathic comments, such as "I feel the same way," defending their partner, such as "I would have done the same thing," and advice, such as "you should go talk to a professor about that." Ratings were coded as a sum of the total number of instances of empathic support behaviour displayed during the interactions. Compliments, positive statements about the conversation partner, and polite pleasantries were not coded as empathic support behaviour, but were included in the rating for warmth (described below).

Total number of follow-up questions. Consistent with approaches used in previous studies (e.g., Heerey & Kring, 2007), follow-up questions were tallied. Asking questions of the partner was hypothesized to demonstrate interest in the partner and be positively related to the affiliative goals of forming a bond and learning more about their conversation partner. Heerey and Kring (2007) reported that HSA individuals asked fewer questions of their partners than their LSA counterparts. Since the conversation paradigm (Aron et al., 1997) that was used in this study required participants to ask certain questions of each other, questions directly from the task written on the cue cards were omitted from the count. Specifically, we measured participants' self-generated follow-up questions, which were counted based on specific attempts to solicit additional information from the interaction partner. In rare instances in which follow-up questions could be interpreted as empathic support behaviours, raters were instructed to code them solely as empathic support and not to count them in both categories.

Emotional expressivity. In-lab techniques of measuring emotional expressivity have varied from relying on detailed analysis of emotional expressions (Schug, Matsumoto, Horita, Yamagishi, & Bonnet, 2010) to global ratings by blind observers (Gross & John, 1997). For this study, raters coded participant's emotional expressivity as defined by their *range of affect* displayed throughout the conversation. Raters were instructed to ignore the valence of the emotion, and to attend only to the intensity and range of emotions displayed. A single score for the overall conversation was determined by the rater and ranged from 1 (no variability in affect) to 9 (consistently displaying a wide range of appropriate affect), with an anchor at 5 (occasional affective expression). Prototypical examples of scores of 1, 5, and 9, as well as detailed instructions were provided to raters (see Appendix 2).

Warmth. Raters were trained to provide a global assessment of the extent to which the participant conveyed warmth towards the partner. Drawing upon methodology used in prior research (e.g., Alden & Wallace, 1995), raters coded participants behaviour based on the specific question "to what extent did the participant display warmth towards their partner" on a 9-point scale, with the addition of anchors at 1 (cold), 5 (indifferent), and 9 (warm). Raters were encouraged to consider multiple facets of warmth such as smiling, positive statements about their partner, and showing interest in their partner. Prototypical examples of scores of 1, 5, and 9 were provided to raters (see Appendix 2).

Reciprocity. Rather than tally instances of behavioural mimicry, such as smiling and body posture, raters assessed the *responsivity* of participants in matching both *affective content* and *depth of content* throughout the interaction. Given that the conversation paradigm was inherently designed to promote reciprocal turn taking (i.e., alternating turns reading the cards and speaking first) during the interaction, raters assessed reciprocity only when the primary

participant was the second to respond to the card (i.e., not assessing when the participant was first to answer a card), with the goal of better capturing the participant's unique contribution to the reciprocity of the conversation. Raters provided overall ratings of both affective matching and depth of content matching, each on a scale ranging from 1 (no reciprocity) to 9 (high reciprocity), with an anchor at 5 (moderate reciprocity). These two scores were then summed and divided by two to create the reciprocity score. Prototypical examples of scores of 1, 5, and 9, as well as detailed instructions were provided to raters (see Appendix 2).

Data Analytic Plan and Data Preparation

Hypothesis testing and statistical power

Independent samples t-tests were conducted to test group differences between the HSA and LSA groups on the coded behavioural outcome variables. Subsequent hypotheses and tests of mediation were examined within a dyadic framework using the Actor-Partner Interdependence Model (APIM; Cook & Kenny, 2005) in AMOS v.21. Consistent with our previous study, we sought to achieve power of .8 for the mediation analyses to detect medium effects (13% variance accounted for), as it was unfeasible to collect a sample large enough to detect small effects. As such, a minimum sample size of 71 was required if both mediating pathways were medium, and a sample size of 116 if one pathway was small to medium using bias-corrected bootstrapping (Fritz & Mackinnon, 2007; Thoemmes, Mackinnon, & Reiser, 2010). As we were restricted by the sample size of our previous study, we sought to retain the entire sample for this study in order to be sufficiently powered.

Missing data, outliers and distributions

Data for this study were drawn from the 119 participants in study one who consented to be recorded for the duration of the experiment. Video recording failed for 7 participants, and

audio recording issues resulted in partial data for an additional 4 participants. In order to retain the maximum amount of data, missing observations were excluded pairwise for correlations and t-tests. However, as AMOS requires complete data for models the dyadic analyses were conducted with the 108 complete observations. Therefore, the total sample ranged from 108 to 112 observations across tests in the study from 60 HSA-LSA dyads and 52 LSA-LSA dyads.

All variables were screened for extreme skewness (>3) and kurtosis (>10) as recommended by Kline (2008). The distribution for total number of follow-up questions asked was found to be unacceptably kurtotic (11.16), and was approaching the extreme for skew (2.74). Prior to making any transformations, the variables were assessed for outliers. Univariate outliers were defined as any data point exceeding 3 standard deviations from the mean (Kline, 2008), and multivariate outliers were identified by Mahalanobis distance. As the empathic support and number of follow-up questions were tallies rather than ratings, there were extreme univariate outliers on both of these variables (maximum Z-scores of 4.49 and 5.85, respectively). To ensure outliers did not have undue influence on results, all values 3 standard deviations above the mean were winsorized to 3 standard deviations ($n = 2$ such values for each of the two variables). Following this procedure, the variables were again assessed for normality, and the distributions did not violate extreme boundaries of skew and kurtosis. No other transformations were made on any other variables.

Coding reliability

During initial training and subsequent interval checks to prevent drift, one of the three raters consistently demonstrated significant drift and poor agreement with the other two raters. As a result, the third rater was dropped from analyses, and the videos were re-coded by the remaining two raters, ensuring that 25% of the videos were double-coded (28 videos total), in

line with suggestions by Koo and Li (2006) to seek approximately 30 observations for conducting reliability studies. All consistency statistics presented here represent the agreement between the two coders after excluding the third. Based on conventions described in Koo and Li (2016), Intraclass correlation coefficients (ICC) below .50 are considered to be poor reliability, .50 to .75 is considered moderate, .75 to .90 is considered good, and anything above .90 is considered excellent. All reliability analyses report the single-measures ICC.

Reliability for the empathic support variable was found to be moderate between the two raters. As this variable was operationalized as a tally rather than a subjective rating, individual differences between raters was not a factor, and therefore absolute agreement was used rather than consistency. The single-rating 2-way mixed ICC with absolute agreement was .71 (95% CI: .44 to .86). The total number of follow-up questions was also a tally, and reliability was found to be excellent between the two raters. The single-rating 2-way mixed ICC with absolute agreement was .90 (95% CI from .78 to .95). Raters had moderate but acceptable reliability for coding of emotional expressivity, with a single-rating 2-way mixed ICC with consistency agreement of .64 (95% CI from .35 to .81). Similarly, raters had moderate reliability when coding warmth, with a single-rating 2-way mixed ICC with consistency agreement of .53 (95% CI from .20 to .75). Finally, reliability between raters for reciprocity was also found to be moderate, with a single-rating 2-way mixed ICC with consistency agreement of .58 (95% CI from .27 to .79).

Results

Confirming null effect of experimental manipulation

As described in study one, the procedure involved a manipulation where participants were instructed to adopt goals for the conversation that were either affiliative (connecting with your partner) or impression-management oriented (making a good impression on your partner).

The manipulation was found to have no impact on any study variables, and was dropped from subsequent analyses. As the data for our proposed analyses in the present study similarly relied on the same procedure which included the experimental manipulation, preliminary analyses were conducted to verify that the manipulation did not impact any of the coded behavioural variables introduced in this study.

Consistent with the previous study, 2 (anxiety status) by 2 (condition) ANOVAs revealed no effect of condition on number of empathic statements made, $F(1,104) = 0.62, p = .433, \eta_p^2 < .01$, total number of follow-up questions asked, $F(1,104) = 0.16, p = .691, \eta_p^2 < .01$, emotional expressivity, $F(1,107) = 0.35, p = .555, \eta_p^2 < .01$, warmth displayed, $F(1,107) = 0.60, p = .439, \eta_p^2 < .01$, or reciprocity, $F(1,106) = 1.27, p = .263, \eta_p^2 = .01$. No significant interactions between condition and anxiety status were observed for any of these outcome variables. Moreover, bivariate correlations revealed no significant relationships between condition and any of the five types of coded behaviour (all r 's $< .11$, all p 's $> .249$). Thus, as expected based on results of our previous study, these results verify that the manipulation did not affect participants' behaviour during the study. Primary analyses examining the effects of affiliation are conducted below, as planned, with affiliative goals measured continuously based on our self-reported measure of affiliation (IGQ; described in Measures, above).

Participant characteristics, baseline comparisons, and correlations

Participants in the LSA group had a mean SIAS score of 13.05 ($SD = 5.86$), and those in the HSA group had a mean of 55.48 ($SD = 8.97$). Mattick and Clarke (1998) defined the clinical cutoff at 43, suggesting the HSA group's average symptoms scores were within the clinical range. Conversation partners had a mean SIAS score of 13.81 ($SD = 6.23$), a level comparable to the LSA participants, $t(171) = 0.76, p = .448, d = .12$. Participants largely endorsed not having

known their partners prior to the conversation ($n = 106$), with a small number having interacted once before, or having had brief prior encounters ($n = 12$). No participants reported being friends or close friends with their partner prior to the conversation. No differences were observed across groups in how well participants knew each other prior to the study, $t(107.70) = 1.21$, $p = .228$, $d = .23$, nor age of participants, $t(116) = 1.30$, $p = .196$, $d = .24$.

Regarding state measures at baseline, HSA participants reported significantly lower baseline PA than LSA participants, $t(116) = 3.11$, $p = .002$, $d = .58$, as expected. Next, as a preliminary inspection of the pattern of relationships between affiliation, coded behaviours and both interpersonal and affective outcomes, zero-order correlations were examined. As shown in Table 4, all coded behaviours were positively correlated with one another, and most were positively associated with reported affiliative goals. Moreover, several of the coded behaviours were positively associated with positive affect, desire for future interaction, and quality of interaction.

Table 4. *Correlations Between Key Study Variables*

Variables	1	2	3	4	5	6	7	8	9	10
1. Affiliation Goals	-									
2. Empathic Statements	.12	-								
3. Follow-up Questions	.06	.44**	-							
4. Emotional Expressivity	.34**	.49**	.38**	-						
5. Warmth	.19*	.55**	.39**	.72**	-					
6. Reciprocity	.29**	.44**	.20*	.57**	.59**	-				
7. Final Positive Affect	.53**	.21*	.06	.26**	.23*	.22*	-			
8. Desire for Future Interaction	.60**	.13	.01	.29**	.22*	.34**	.55**	-		
9. Quality of Interaction	.63**	.18	.06	.33**	.27**	.37**	.55**	.76**	-	
10. Perceived Closeness	.33**	.08	.06	.08	.06	.05	.39**	.48**	.43**	-

Note. *N* ranges from 108 to 112 across variables. Affiliation goals were measured using the IGQ and represent the average of the three time-points measured. * $p < .05$; ** $p < .01$.

Effects of social anxiety on observable behaviour

To test the hypothesis that HSA participants would exhibit less affiliative and prosocial behaviour, independent samples t-tests were conducted. As displayed in Table 5, results partially supported this hypothesis, with several behavioural differences observed across the anxiety groups. Those in the HSA group were less emotionally expressive throughout the conversation, $t(110) = 2.96, p = .004, d = .56$, and behaved less warmly towards their partners, $t(110) = 2.65, p = .009, d = .51$. Although the differences did not reach statistical significance, HSA participants trended towards asking fewer questions, $t(106) = 1.84, p = .068, d = .36$, and towards lower reciprocity, $t(109) = 1.94, p = .055, d = .37$. However, HSA and LSA participants showed no

differences in the amount of empathic comments made throughout the conversation, $t(106) = 1.62, p = .108, d = .31$.

Table 5. Means and Group Comparisons Across High (HSA) and Low (LSA) Primary Participants

	HSA (<i>n</i> = 60)		LSA (<i>n</i> = 52)		<i>t</i>	<i>p</i>	<i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
<u>Participant Outcomes</u>							
Affiliation Goals	21.42	2.74	22.62	2.32	2.47	.015	.47
Empathic Statements	5.52	5.13	7.21	5.71	1.62	.108	.31
Follow-up Questions	7.92	8.45	11.17	9.86	1.84	.068	.35
Emotional Expressivity	6.87	1.27	7.54	1.11	2.96	.004	.56
Warmth	7.27	1.12	7.81	1.03	2.65	.009	.50
Reciprocity	7.48	1.39	7.96	1.16	1.94	.055	.37
Positive Affect	29.32	8.09	35.98	9.55	4.00	<.001	.75
Desire for Future Interaction	29.72	7.20	33.46	6.13	2.94	.004	.56
Quality of Interaction	65.22	12.62	72.21	8.33	3.40	.001	.65
Perceived Closeness	3.50	1.44	4.19	1.21	2.73	.007	.52
<u>Partner Outcomes</u>							
Positive Affect	30.57	9.58	35.24	9.32	2.59	.011	.49
Desire for Future Interaction	29.87	7.87	32.37	6.18	1.84	.068	.35
Quality of Interaction	67.97	11.01	73.69	7.00	3.31	.001	.62
Perceived Closeness	3.95	1.28	4.25	1.44	1.18	.240	.22

Note. Affiliation Goals variable represents the average of the three time-points measured. Total number of observations ranges from 108 to 112 across variable

Dyadic framework

APIM was used to investigate the relationship between affiliation, SA, the coded behaviours and social outcomes for both participants and their partners, while accounting for the partner's influence on outcomes. In the previous study, we determined that both affiliative social goals and anxiety status explained significant variance in both positive affective and positive social outcomes prior to testing mediation. To test hypotheses 2 and 3 in the present study, we created two mediation models in AMOS v.21 (see Figures 3 and 4).

Our composite variable, which we labelled 'positive outcomes' (consisting of the DFI, QI, IOS, and PA variables, as described above), was entered as the outcome variable in a structural model that included anxiety status and affiliative social goals as the predictor variables, and the five coded behaviours entered simultaneously as mediating variables. Both participant and partner positive outcomes were included as dependant variables. The direct contribution of partner affiliative social goals on outcomes was controlled for in the model. Following the approach used in our previous study, the pathways between partner affiliation and participant anxiety status and affiliation were constrained to zero, and error terms between mediating variables were allowed to covary in the model. As our previous study found positive affect to be distinct from other social outcomes, a second model was tested with participants' and partners positive affect entered as dependent variables.

An initial model was created and all pathways were examined. The coded behaviour of follow-up questions asked was not significantly predicted by any variable in the model, nor did it significantly contribute to predicting any outcomes. As a result, this variable was trimmed from the model. The resultant model predicting the positive outcomes composite can be seen in Figure 5.

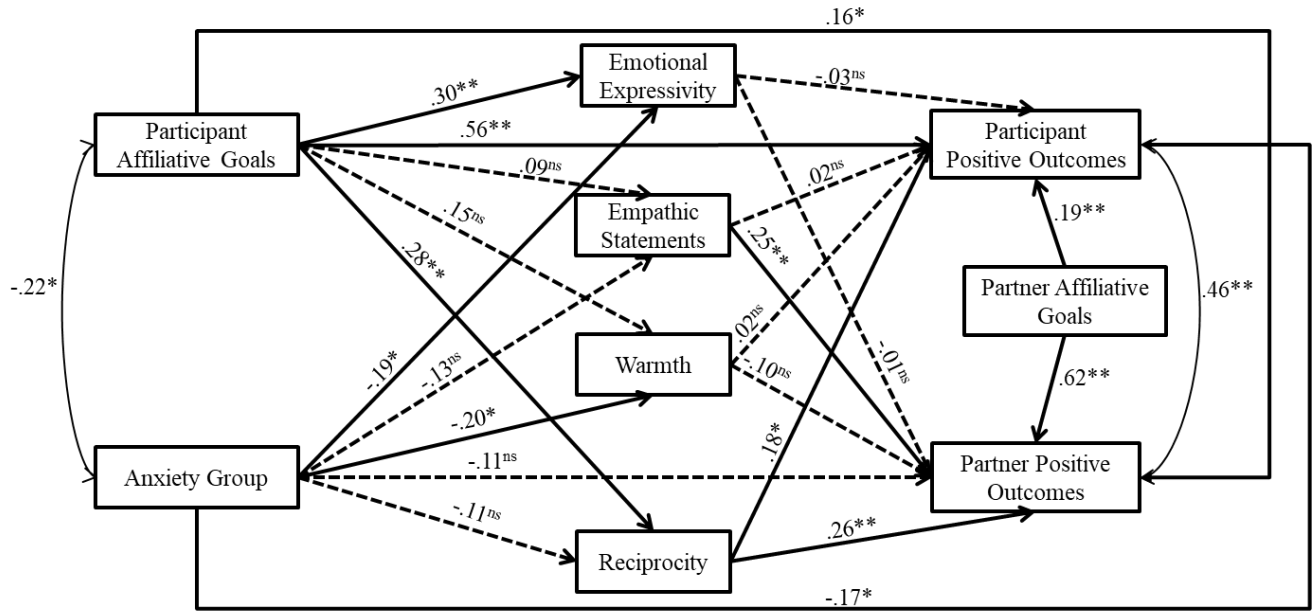


Figure 5. Mediation model predicting positive outcomes composite scores (desire for future interaction, quality of interaction, closeness, positive affect) for both primary participants and partners. Pathways represent standardized estimates, dashed lines represent non-significant pathways. * $p < .05$; ** $p < .01$.

The model was found to have good fit $\chi^2(7) = 2.65, p = .915$; CFI = 1.00; RMSEA = .000; $pclose = .957$. The model accounted for 52% of the variance in positive outcomes for the primary participant, and 61% of the variance in positive outcomes for the partner. Examination of individual pathways in the model supported the outcomes from the independent samples t-tests, with significant relationships observed between anxiety status and subsequent emotional expressivity, $\beta = -.19, p = .033$, and displayed warmth, $\beta = -.20, p = .035$ reciprocity, $\beta = .279, p = .003$, but not empathic statements, $\beta = -.14, p = .167$, or reciprocity, $\beta = -.11, p = .233$. Significant pathways were observed from participant affiliative goals to emotional expressivity, $\beta = .30, p < .001$, and reciprocity, $\beta = .28, p = .003$. However, affiliative goals did not contribute to empathic statements, $\beta = .09, p = .350$, or displayed warmth, $\beta = .15, p = .113$.

Examining the pathways from the coded behaviours to the dependant variables (hypothesis 2) revealed that only reciprocity significantly contributed to positive outcomes for the primary participant, $\beta = .18, p = .045$, whereas the same was not true of empathic statements, $\beta = .02, p = .826$, emotional expressivity, $\beta = -.03, p = .784$, or warmth, $\beta = .02, p = .853$. The best predictors of positive outcomes for the primary participant were the direct paths from self-reported affiliative goals, $\beta = .56, p < .001$, partner affiliative goals, $\beta = .19, p = .004$, and anxiety status, $\beta = -.17, p = .014$. In contrast, partner positive outcomes were significantly predicted by both number of empathic statements made by the primary participant, $\beta = .26, p < .001$, and the primary participants' reciprocity, $\beta = .26, p = .001$, but not their warmth, $\beta = -.10, p = .315$, or emotional expressivity, $\beta = -.01, p = .924$. Partner affiliative goals were the single strongest predictor of their own positive outcomes, $\beta = .62, p < .001$, and the direct pathway from participant affiliative goals to partner outcomes was significant, $\beta = .16, p = .016$. Participants' anxiety status was not significantly predictive of partner outcomes in this model, $\beta = -.11, p = .075$. Participant and partner outcomes were significantly correlated, $r = .46, p < .001$.

As presented in Figure 6, a second APIM analysis was conducted to examine the unique impact on PA for participants and their conversation partners. As before, it was found that number of follow-up questions was not predicted by any variables, nor did they contribute to the prediction of any variables; thus, this variable was trimmed from the model. The resulting model was found to have good fit $\chi^2(7) = 2.57, p = .860$; CFI = 1.00; RMSEA = .000; $p_{close} = .921$. The model accounted for 35% of the variance in PA for the primary participant, and 32% of the variance in PA for the partner. Contrary to hypothesis 2, participant PA was not predicted by any of the coded variables (all β 's $< .12$, all p 's $> .20$), and was found to be predicted only by the direct contributions of affiliative goals, $\beta = .47, p < .001$, and anxiety status, $\beta = -.22, p = .008$. In

contrast, partner PA was found to be predicted by the primary participants' reciprocity, $\beta = .27, p = .010$, but not empathic statements, emotional expressivity, or warmth (all β 's $< .16$, all p 's $> .09$). Partner PA was predicted by their own self-reported affiliative goals, $\beta = .41, p < .001$, but not participant affiliative goals, $\beta = .01, p = .899$ or participant anxiety status, $\beta = -.15, p = .076$. Participant and partner affect were significantly correlated, $r = .26, p = .010$.

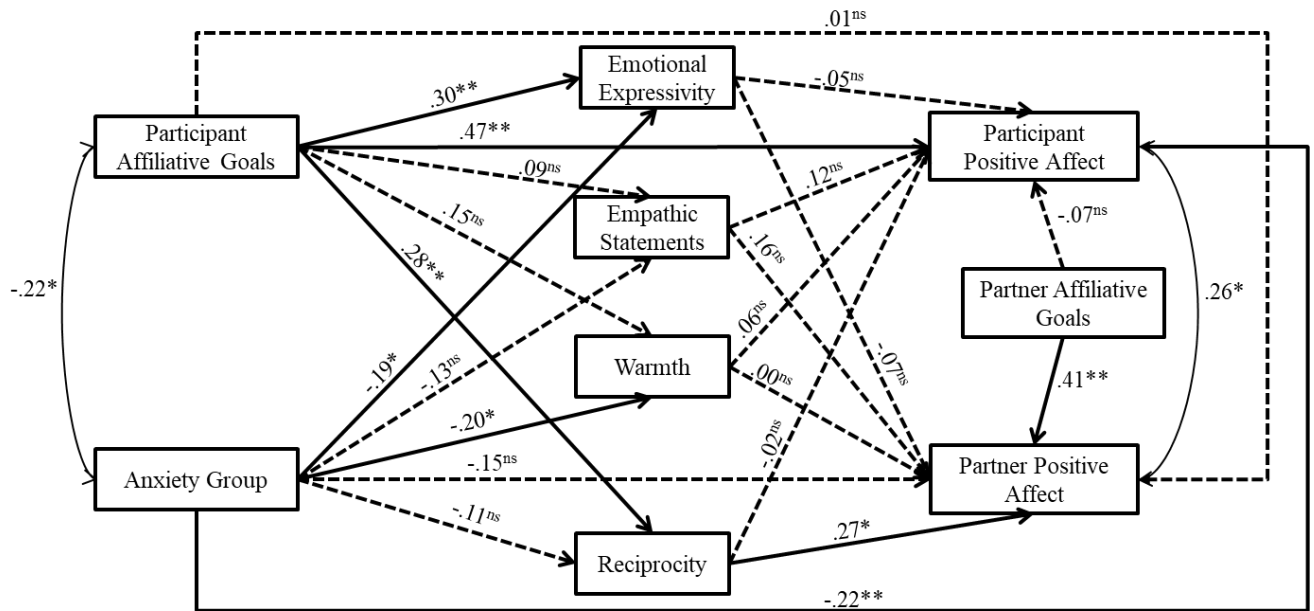


Figure 6. Mediation model predicting positive affect for both primary participants and partners. Pathways represent standardized estimates, dashed lines represent non-significant pathways. * $p < .05$; ** $p < .01$.

In sum, these models demonstrate partial support for hypothesis 2, with participants' positive outcomes (composite measure) predicted by reciprocity, but no behavioural predictors of participant PA. Partners' composite positive outcomes were predicted by both reciprocity and empathic statements, whereas partner PA was predicted only by reciprocity. Contrary to hypothesis 2, warmth, questions asked, and emotional expressivity did not contribute to

outcomes within the models. These findings have implications for the mediation analyses to be conducted for hypothesis 3.

Mediation analyses

To test the hypothesis that the prosocial behaviours will mediate the relation between affiliation and outcomes (hypothesis 3a), a custom estimand (Gaskin, 2016) was employed to assess discrete indirect paths using the product-of-coefficients approach described in Preacher and Hayes (2008). Bootstrapping with 2000 samples was conducted, and lower and upper boundaries of the estimates were calculated using bias-corrected 95% confidence intervals. All results are reported with standardized values.

Results demonstrated a significant total effect of participant affiliative goals on positive outcomes, $B = .61, p < .001, 95\% \text{ CI } [.41, .75]$, and a significant total effect of anxiety group on positive outcomes, $B = -.19, p = .017, 95\% \text{ CI } [-.34, -.03]$. Similarly, a significant total effect was seen for participant affiliative goals on partner positive outcomes, $B = .24, p = .003, 95\% \text{ CI } [.08, .39]$, and for anxiety group on partner positive outcomes, $B = -.16, p = .022, 95\% \text{ CI } [-.29, -.02]$.

Since the only coded variable to predict positive outcomes for the primary participant was reciprocity, this variable was the only one to be tested for mediation. A marginally significant indirect effect from affiliation to participant positive outcomes through reciprocity was found, $B = .11, p = .050, 95\% \text{ CI } [.00, .33]$, suggesting that the positive impact of affiliation on positive outcomes is partially explained through increased reciprocity. When assessing the impact of affiliation on partner outcomes (hypothesis 3b), a similar indirect effect was found from affiliation through increased reciprocity, $B = .15, p = .026, 95\% \text{ CI } [.02, .37]$, but not empathic statements, $B = .05, p = .293, 95\% \text{ CI } [-.05, .18]$.

When examining the model predicting PA, results revealed a significant total effect of participant affiliative goals on their own PA, $B = .47, p = .002, 95\% \text{ CI } [.30, .61]$, and a significant total effect of anxiety group on PA, $B = -.24, p = .002, 95\% \text{ CI } [-.40, -.07]$. No significant total effect was seen for participant affiliative goals on partner PA, $B = .08, p = .338, 95\% \text{ CI } [-.09, .26]$. Anxiety group had a significant total effect on partner PA, $B = -.19, p = .047, 95\% \text{ CI } [-.36, -.01]$. As reciprocity was the only coded variable to predict PA, and only for partners, we tested for mediation and again found a significant indirect path from participant affiliation to partner PA through increased reciprocity, $B = .21, p = .040, 95\% \text{ CI } [.01, .62]$.

Subsequently, to examine whether the strength of the observed mediations was stronger for HSA and LSA participants (hypothesis 4) we tested for the presence of moderated mediation using another custom estimand in AMOS (Gaskin, 2016). The HSA and LSA groups were compared to determine whether there was a statistically significant difference in the magnitude of the previously observed indirect effects. Results revealed that the magnitude of the indirect effect of affiliation through reciprocity did not differ between the HSA and LSA groups for positive outcomes, $B = .14, p = .205, 95\% \text{ CI } [-.10, .48]$, or for partner positive outcomes, $B = .14, p = .246, 95\% \text{ CI } [-.12, .47]$. Similarly, the magnitude of the indirect effect of affiliation on partner PA through reciprocity was no different across groups, $B = .06, p = .694, 95\% \text{ CI } [-.55, .67]^2$.

Discussion

Results of the present study indicated that HSA individuals exhibited less emotional expressivity and warmth towards their conversation partners than their LSA counterparts, and trended towards having lower levels of reciprocity. Interestingly, despite these observable

² Additional moderated-mediation analyses were conducted on the other proposed mediators; no moderated-mediation was observed for any of the outcomes.

differences across groups and counter to our predictions, conversation partners were not negatively impacted by participants' lower warmth or emotional expressivity. Moreover, the number of empathic statements participants made strongly predicted partners' positive outcomes, but such statements were not associated with participants' anxiety status or affiliative goals. When all variables were included in a dyadic model, anxiety status no longer directly predicted partner outcomes. In this model, reciprocity emerged as a key variable, significantly predicting both participants' and partners' social outcomes as well as partner PA, and partially mediating the relationship between affiliative social goals and these three outcomes, with similar effects in both the HSA and LSA groups.

Although reciprocity is a dyadic construct and captures collaborative patterns of interaction between both members of the dyad, our coded measure of reciprocity in this study captured the participants' unique influence on the reciprocal nature of the conversation. In the context of the conversation task, partners tolerated observable deficits in affiliative behaviours other than reciprocity without any negative impact on positive outcomes, but proved to be negatively impacted by lower levels of reciprocity irrespective of whether participants had high or low levels of trait SA. This finding suggests it is not SA per se that contributes to poor interpersonal outcomes, but rather the degree of responsiveness individuals show in reaction to their interaction partners' attempts to affiliate. Indeed, individuals who tended to reciprocate the affective tone and the depth of interaction partners' disclosures were more likely to enjoy the interaction themselves and feel close to their interaction partners *and* to have interaction partners who reported deriving pleasure from the interaction and feeling close to such individuals. Individuals who demonstrate poor interpersonal reciprocity, high SA and low SA alike, would be expected to have significant difficulty forming new relationships. This interpretation of the

importance of responsiveness in social interaction is supported by previous research on friendship formation (e.g. Fehr, 2008; see also Pearlstein et al., 2019).

As operationalized in this study, reciprocity included behaviours such as smiling and expressing emotion, which had a high degree of overlap with other behaviours assessed in the study (as further supported by the high intercorrelations between the variables). Despite this overlap, absolute levels of warmth and emotional expressivity did not predict partner outcomes in the final model.

Building on our previous study, these results provide further support for and clarification of the role of affiliative social goals in positive relational outcomes. Those with greater affiliative social goals tended to be more emotionally expressive, and demonstrated greater reciprocity. In our previous study, we found that affiliative social goals boosted participants' own PA through the mediating roles of increased curiosity and authenticity; however, these same mechanisms did not account for partner outcomes. In contrast, in the present study, we were able to identify and code specific behavioural manifestations of affiliation, which cumulatively accounted for the majority of the variance in partner positive outcomes, but failed to directly account for the PA experienced by the primary participant. This suggests that adopting affiliative goals plays an important role in generating positive outcomes for both the individual and their interaction partner, but likely through different mechanisms, with participants' positive outcomes generated through the processes of curiosity and authenticity and partners' through the process of reciprocity.

Unexpectedly, SA was not strongly or consistently associated with deficits in coded manifestations of prosocial behaviour. There are several possible reasons for this. First, we investigated an analogue sample of high socially anxious undergraduates, rather than treatment

seeking individuals with a diagnosis of SAD. Second, the structured conversation task itself was designed to elicit the behaviours that were being measured in many cases; in unstructured conversations, there may be more variability in behaviour across levels of trait SA. Third, previous research often used confederates (e.g., Alden & Wallace, 1995), which allowed the researchers to control the nature and quality of affiliative displays by the confederate, ensuring that there were consistent opportunities to elicit affiliative behaviour from the participant. In contrast, the LSA partners in the present study may have responded to the lower warmth and emotional expressivity of the primary participant with even stronger attempts to connect, thus eliciting more affiliative behaviours from the HSA participants and closing the gap that is typically observed during interactions with confederates in high relative to low socially anxious individuals when partner behaviour is held constant. In this way, our findings highlight the capacity of dyadic methods to elicit novel insights about the dynamics of social interaction and the role of SA in interpersonal relationship formation.

A particularly intriguing finding was that empathic statements predicted partner outcomes to approximately the same degree as reciprocity. However, neither SA nor affiliative goals significantly contributed to empathic statements in the dyadic model, and no group differences were observed between HSA and LSA participants on amount of empathic statements made. This is partially consistent with what was found by Heerey and Kring (2007), but important methodological differences need to be considered. The Heerey and Kring study relied on a 5-minute interaction rather than 45-minutes as in this study. HSA participants may take longer to warm-up to their interaction partner, and therefore differences observed in a short time-frame may disappear over the course of a longer conversation. Moreover, Heerey and Kring (2007) utilized an open-ended conversation task rather than the structured task from Aron and

colleagues (1997), which may have elicited different opportunities to provide and receive empathy and support.

Interestingly, and consistent with results from the previous study there were no signs of moderated mediation. That is, the mediating role of reciprocity on positive outcomes, partner outcomes, and partner PA was equally applicable across the trait SA groups. Although we were likely underpowered to detect moderated mediation, and as such should be cautious in our interpretation of a null finding, this suggests that the benefits of reciprocity, and the role affiliation plays in promoting reciprocity may be applicable across the SA spectrum. However, we must consider the constraints to this conclusion imposed by the design of this study and the sample.

Strengths and limitations

A strength of the present study was its use of a real first-time interaction with a real, other participant (rather than confederate), enabling us to pursue dyadic analyses to examine the effects of affiliative goals and SA on dynamic interpersonal processes of participants and their conversation partners when the behaviours of partners are not controlled as they would be with a confederate. However, this approach comes with its own limitations. First, although this approach increases ecological validity, the decreased control over partner behaviour across the study results in lower internal validity. To control for some of the variability inherent in this approach, partners were selected to have low SA, but this necessarily came at the cost of generalizability to interactions with people with varying levels of SA. Furthermore, the highly structured nature of the task ensured that participants were able to continue the conversation without having to generate new topics, but the predetermined and therefore contrived nature of this task may pull for behaviours that differ from those generated by real-life unstructured

conversation, raising questions about the applicability of these outcomes to everyday encounters with strangers or acquaintances.

Another major strength of this study was the detailed coding of the entire 45-minute conversation. Using objective behavioural measures rather than relying solely on self-report provides insights into processes that would otherwise not be adequately captured. Although our coding process was novel and detail-oriented, it was also time-consuming. Moreover, we opted to drop a rater who demonstrated consistent drift and poor agreement with the other raters, calling into question whether the coding scheme could be reliably taken up by other assessors. When assessing the intraclass correlations, all of our variables displayed adequate reliability, but the wide confidence bands suggests that there is room for improvement. Anecdotal evidence from the raters of this study suggests the number of variables to be assessed while reviewing the videos was ambitious, and that reducing the number of variables assessed at one time may improve reliability. Moreover, several of our coded variables had high intercorrelations, with one of the variables even exceeding 50% variance accounted for in the other (warmth and emotional expressivity); therefore, it may not be necessary to code all of these prosocial behaviours separately, depending on their degree of overlap.

This study was also limited by the fact that while we assessed partner self-reported outcomes, we did not also code partner behaviour for the APIM analyses. Although the workload would be much greater for coders, such data could provide insight into how SA influences the behaviour of their interaction partners, and vice versa. It may be that HSA participants are particularly sensitive to behavioural cues of low affiliation, and would be quick to appraise any such cues negatively (e.g., Stopa, & Clark, 2000), or that HSA participants may be even more tolerant of some behaviours like low warmth from their partner than LSA participants would be,

as suggested by at least one prior study that examined how participants responded to characters described in imagined vignettes (Rodebaugh et al., 2016).

As in our previous study, we were unable to manipulate affiliative social goals effectively, as assignment to condition had no meaningful impact on self-reported affiliation or any of the mediating or outcome variables in this study, including behavioural variables. As such, it is impossible to infer from our results that affiliative social goals play a causal role in eliciting downstream affective or behavioural outcomes. As well, although reciprocity was found to mediate the relationship between affiliative goals and positive outcomes, the temporal dynamics of measured variables were not fully consistent with the temporal sequencing requirements of mediation models. Specifically, our measures of affiliation and reciprocity were both averaged across multiple time-points throughout the conversation. Therefore, although these results were derived through mediation analysis, caution should be exercised when describing reciprocity as a causal mediator. There are several avenues we propose for future research to help substantiate the direction of the pathways observed in this study.

Future directions and clinical implications

Beyond the need for replication and extension in a clinical sample of individuals with SAD, several important issues and questions warrant attention in future research. Future studies should continue to seek effective ways to manipulate affiliative social goals in order to better establish directionality and causality. Alongside our previous study, the current study affirms that affiliative social goals link in intriguing ways to both individual and interpersonal affective and behavioural positive outcomes. Studies making use of repeated measures within the context of a longitudinal design can better disentangle causality, and can better explore longer-term effects.

If findings can be translated to helping socially anxious patients, then the fact that the

effects of affiliative goals on affective and behavioural outcomes were dissociable invites the possibility that interventions that directly target the behaviours we measured, such as those focused on increasing reciprocity, will likely have a significant positive influence on interpersonal outcomes but will not necessarily enhance patients' own feelings of social pleasure. It is possible that within the context of a single interaction, prosocial behaviours influence partners' PA more than participants' own PA, but over time this positive influence on interaction partners might begin to improve participants' PA as well through a positive feedback loop; indeed, partners' and participants' affective outcomes were correlated. There may also be utility in social skills training protocols that aim to improve individuals' comfort and skill in enacting prosocial behaviours such as reciprocity and empathy, as well as other affiliative interpersonal behaviours during social interaction, which could in turn help to promote positive affective outcomes (Fredrickson, 2001; Taylor et al., 2017).

At the present time, the precise mechanisms responsible for increasing social pleasure among high SA individuals remain rather elusive. Future research extending current knowledge on social reward processing to SA may provide helpful clues (see Craske, Meuret, Ritz, Treanor, & Dour, 2016, for a review of neural underpinnings of anhedonia). Our previous study demonstrated that higher levels of participants' felt authenticity and curiosity were linked to enhanced participant feelings of social pleasure. Subsequent research would benefit from continued focus on dyadic interpersonal paradigms that can incorporate both participants and their social partners into the analysis of affiliative behaviour across time, as understanding the keys to interpersonal success and social pleasure may lie within the dynamic interplay of the dyad rather than the individual alone.

Rationale for Study Three

Studies one and two identified key cognitive, behavioural, and motivational variables associated with the experience of PA and other positive emotional outcomes. These results serve primarily to address the first overarching research goal guiding the dissertation, whereas study three was designed primarily to address the second and third research goals concerning contextual factors in the experience of PA, and informing theory at large. Specifically, we wished to better understand whether social context accounts for PA deficits, with implications for biologically-based versus cognitively-based theories.

In the introduction to study three, we present additional background information concerning theorized accounts for diminished PA in SAD. In general, there were several points of focus we wished to address in study three that were not well-addressed in previous literature. The first concerns the issue of state *changes* in positive affect, which few studies have incorporated into their design. The second concerns the issue of social context and whether PA reactivity in SAD is moderated by social cues, with implications for theoretical accounts of PA deficits. Third, few if any prior studies have examined reactivity to pleasant standardized stimuli in socially anxious individuals outside the dynamics of a threatening or unstandardized interpersonal context – a gap we hoped study three would help fill. Finally, study three enabled us to explore whether the nature of PA deficits in SAD depended on how PA was conceptualized and measured, in light of recent claims that previous research has been unjustified in treating PA as a unitary construct (see Shiota et al., 2017, described in greater detail in subsequent sections).

Here we present brief additional analyses from the sample in study one that were not included in the previous sections that served to inform study three. As the questions of primary concern for study one and study two centered around the predictors of PA and positive

experiences, the only group comparisons of PA were conducted at baseline to ascertain whether the HSA participants were indeed displaying less PA than the LSA group as expected based on previous research. However, theory-driven explanations for PA deficits in SAD (described in greater detail in the following section), suggest that socially anxious individuals may derive or extract less PA either globally or uniquely in social circumstances. To examine this in the context of study one, we conducted a 2 (between: HSA vs LSA) by 2 (within: baseline PA to post-conversation) mixed ANOVA. This allowed us to examine whether 1) there were indeed group differences in overall levels of PA across anxiety status, and 2) whether the HSA group was experiencing a smaller change in PA than the LSA group.

The results of this analysis are depicted in Figure 7. A main effect of group was found, with the HSA group displaying lower overall levels of PA, $F(1, 117) = 14.92, p < .001, \eta_p^2 = .11$. In addition, a main effect of time was found, with participants showing increases in PA from baseline to post-conversation, $F(1, 117) = 140.04, p < .001, \eta_p^2 = .55$. However, no group by time interaction was observed, $F(1, 117) = 1.21, p = .273, \eta_p^2 = .01$, suggesting that the HSA participants experienced similar increases in PA as LSA participants throughout the course of the study. HSA participants experienced lower PA at baseline ($M = 21.43, SD = 7.12$) than LSA participants ($M = 25.73, SD = 7.97$), HSA participants continued to exhibit lower PA post-conversation ($M = 29.24, SD = 7.98$) than LSA participants ($M = 35.14, SD = 9.72$).

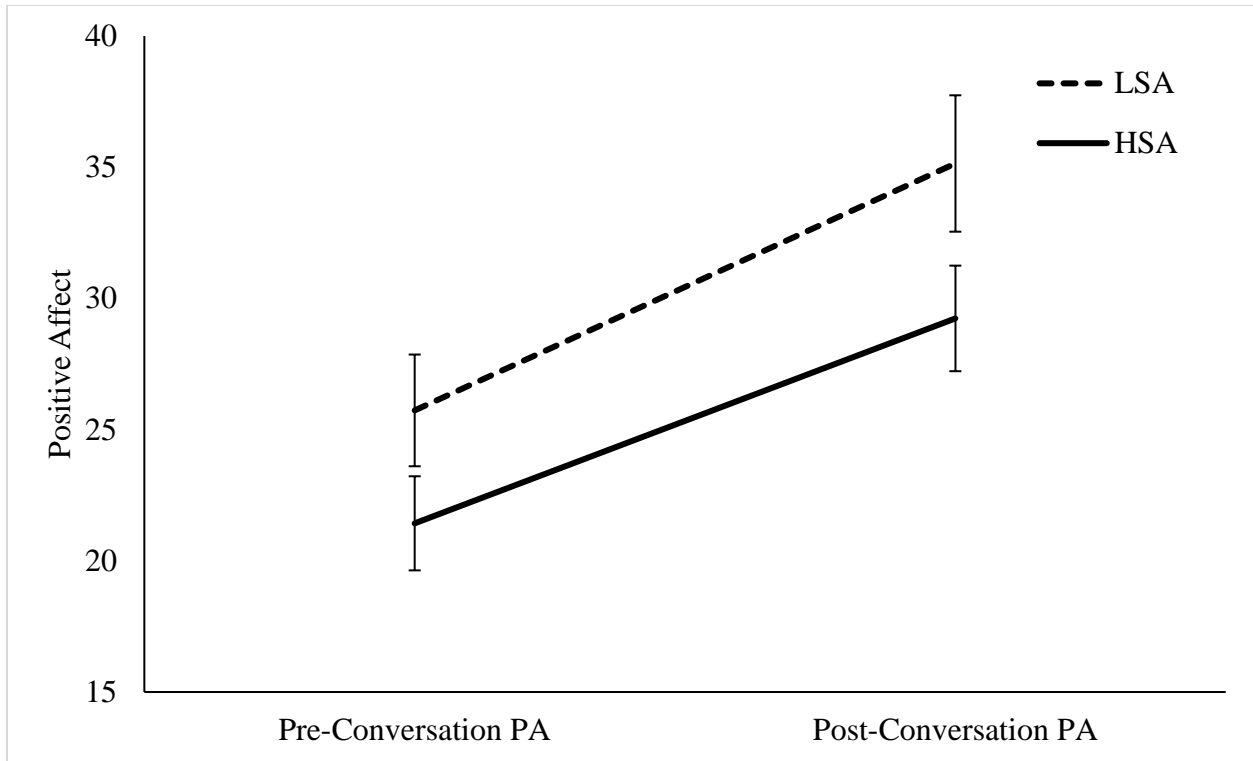


Figure 7. Changes in positive affect from pre-conversation to post-conversation across anxiety groups. Error bars represent 95% confidence intervals.

These results suggest that the impaired PA seen in SA may be representative of globally depressed levels, rather than decreased PA responsivity to social stimuli. That is, the HSA group *extracted* equivalent levels of rewards from the social encounter as compared to the LSA group. Despite this interesting result, there are several factors that limit the interpretation of this finding. First, this study used an analogue sample, and therefore these results may not extend to clinical populations. Second, as all participants engaged in a social task, we had no way of comparing and contrasting whether HSA participants would experience greater increases in PA to non-social stimuli, or whether they would even display lower overall levels of state-PA outside of a social context. Third, the nature of the task involved significant differences in individual experiences, as participants were allowed to discuss whatever they liked following the initial

questions presented in the task. Finally, the interaction partner adds considerable variance to the experience, potentially masking whether participants would have extracted less PA if presented with identical circumstances.

Therefore, the first two studies were unable to adequately address the question of whether those with SAD experience decreased positive emotional reactivity, which was deemed to be essential to the overarching research questions of the dissertation. It remains possible that the PA deficits are moderated by social context, which would have implications for theory, and subsequent treatment. In response to these issues that could not be addressed with the design of study one and study two, study three was designed to better address issues of social context, within-individual changes in positive emotions, and issues in the measurement of positive emotions.

Study Three – Positive Affect Reactivity to Pleasant Social and Non-Social Stimuli in Social Anxiety Disorder

Research has shown that social anxiety (SA) and its clinical counterpart, Social Anxiety Disorder (SAD), reflect more than just the experience of increased fear and arousal within social contexts. Indeed, the emotional signature of SAD is characterized not only by heightened trait negative affect (NA) but also by decreased trait PA (see Kashdan, 2007), with symptoms of SA robustly correlated with self-reported PA, even after accounting for comorbid symptoms of depression ($r = -.36$ when pooled across studies). Thus, in addition to symptoms of social distress, a prototypical characterization of SAD should also consist of someone laughing less with their friends, smiling less with their partner, and feeling less connected to the world around them. Owing to a surge of recent research, our knowledge of PA deficits in SA has expanded beyond initial correlational studies documenting significant associations between global measures of trait PA and SA, to a more nuanced and complex understanding of how SA relates to specific positive emotions across time and contexts (e.g., Cohen & Huppert, 2018; Kashdan & Collins, 2010).

Theoretical underpinnings of impaired PA in SAD

Despite recent advances in our knowledge of positivity deficits in SA, there are still significant gaps in our understanding, with various theories attempting to account for the available data. For example, the behavioural activation system and the behavioural inhibition system (BAS/BIS) are biobehavioural systems that are posited to underlie approach and avoidance motivations (see Gray, 1981), respectively. Research has supported the notion that trait-level variation in the activation of both systems might account for individual differences in SA symptoms (Kimbrel, Nelson-Gray, & Mitchell, 2012; Trew & Alden, 2012). Similarly,

personality theories suggest that lower PA activation among introverts may result from lower reward sensitivity generally, or in other words, less innate propensity for PA (e.g., Carver, Sutton, & Scheier, 2000). These findings support a view that low PA may result from relatively innate biological differences and/or longstanding personality factors. Indeed, approximately 50% of individuals categorized as “behaviourally inhibited” as children go on to develop clinically significant levels of SA, which persist into adulthood (Clauss & Blackford, 2012).

Alongside theories emphasizing the role of biological vulnerabilities and personality traits in SAD-related PA deficits are theories that emphasize cognitive-behavioural factors such as a tendency to suppress positive emotions (Farmer & Kashdan, 2012; Kashdan, Ferssizidis, Farmer, Adams, & McKnight, 2013). In contrast to biological models, cognitive-behavioural models advance the premise that low PA in SAD results primarily from maladaptive, anxiety-driven self-regulation strategies that facilitate experiential avoidance (Kashdan, Barrios, Forsyth, & Steger, 2006; Kashdan & Breen, 2008; Kashdan & Steger, 2006, Rodebaugh & Heimberg, 2008; Rodebaugh & Shumaker, 2012; Kashdan et al., 2013). According to this view, individuals with SAD expend disproportionately high levels of effort to self-regulate their behaviour during social interaction (Kashdan, Weeks, & Savostyanova, 2011), resulting in the depletion of cognitive resources that drive the effortful regulation of attention required to benefit from positive social experiences (see Morrison & Heimberg, 2013). The frequent use of avoidance strategies by socially anxious individuals limits their exposure to opportunities for experiencing heightened PA (Clark & Wells, 1995) and undermines their ability to capitalize on such opportunities when they present themselves (Kashdan et al., 2013). Given the interpersonal nature of SAD, the initial failure to respond positively to positive social cues may, in turn, elicit

negative feedback from others, further eroding opportunities to experience interpersonally-generated PA (Alden & Taylor, 2004).

Integrating these viewpoints, Richey and colleagues (2019) recently proposed that SAD is associated with a “sensitivity shift” to social reward and punishment during adolescence, where neurobiological factors combine with negative learning experiences to attenuate approach-driven motivation. According to Sensitivity Shift Theory, high susceptibility to the influence of social context combined with repeated exposure to adverse environmental experiences during adolescence (e.g., bullying, parental stress, financial strain) produces an enduring aversion to social contact, resulting in social anhedonia. Phenomenologically, social anhedonia is theorized by Richey and colleagues (2019) to present as a reduction in approach behaviour, a diminished expression of PA, and impaired social skills.

As seen through the lens of Sensitivity Shift Theory, both biological and cognitive-behavioural factors may be operating simultaneously to maintain PA deficits in SAD. Which factors are viewed as fundamental or primary contributors to SA-related deficits in PA will determine whether and how clinicians attempt to treat such deficits. Proponents of cognitive-behavioural theories may be more likely to view PA deficits as being amenable to psychological intervention relative to proponents of biological theories. Although cognitive-behavioural and biological theories both highlight the important role of PA in SAD, they also posit different sets of circumstances under which individuals with SAD would be expected to derive normal levels of PA. Whereas cognitive-behavioural theories suggest that PA deficits in SA should primarily occur within social contexts when heightened perception of social threat drives the excessive use of self-regulation strategies, biological theories predict that PA deficits may be likely to occur globally across contexts, irrespective of the presence of social threat or the use of such strategies.

However, as outlined below, the research evidence in support of one viewpoint or the other is currently mixed, with the potential for clear conclusions clouded by methodological differences in the measurement of PA across studies.

Methodological considerations in the measurement of PA

Advances in measurement methodology may help to expand our understanding of the conditions under which positivity deficits are likely to emerge in SAD. Measurement of PA has often relied on trait-like measures, which Nezlek (2001) criticized on the grounds that they exhibit weak correlations with state measures of PA. Similarly, retrospective self-report measures, in which respondents estimate how much PA they experienced in response to a recent event or during a recent period of time, have been criticized on the grounds that they may be prone to retrospective bias – a type of bias which may operate differently for anxious and non-anxious individuals; indeed, socially anxious individuals tend to disqualify positive experiences, fear positive evaluation, and engage in post-event processing (see Weeks, 2014). These retrospective approaches may conflate decreased emotional responsivity in the moment with biased memory for positive emotions. Indeed, trait SA tends to be associated with poorer memory for positive social stimuli (Romano, Tran, & Moscovitch, 2019).

Daily-diary and experience-sampling measures in studies using ecological momentary analysis have advanced our field by enabling researchers to examine PA over time as it changes in response to evolving contexts within participants' every-day lives (e.g., Farmer & Kashdan, 2012; Kashdan & Collins, 2010). However, these approaches are not without their own limitations. For example, such approaches do not permit sufficient standardization and experimental control over context and stimuli to enable researchers to determine conclusively whether SA is associated with less responsivity to particular types of rewarding or positive

stimuli. Further, daily-diary studies often rely on ultra-brief measures of emotion states that may obscure nuanced variability in positive emotional experiences that can only be captured with measures that enable richer sampling of a variety of discrete positive emotions. In this vein, some emotion scholars have recently criticized the assessment of PA as a unitary construct and have called for improvements in the accuracy and precision with which positive emotions are measured (see Shiota et al., 2017).

The vast majority of research on PA in SAD has relied on the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988), which is comprised of two subscales to distinguish negative from positive emotions. However, the positive affect subscale of the PANAS has been criticized in recent years for capturing only *activated* positive emotions (e.g., excited, determined) while neglecting other lower arousal positive emotions (e.g., relaxed, peaceful) (Gilbert, McEwan, Mitra, Franks, Richter, & Rockliff, 2008). Gilbert and colleagues (2008) theorized that there may be two related but distinguishable PA systems that serve different evolutionary purposes – one linked to drive and seeking of reward, and another linked to soothing and contentment. Gilbert et al. (2008) tested their claim by examining a measure of PA, incorporating items from several affect scales that sampled across the proposed domains. When their affect measure was subjected to an exploratory factor analysis, results actually supported *three* correlated but separate forms of PA: activated, relaxed, and content. Activated PA represents a high energy drive to seek out reward, with relaxed PA representing low-level activation, and contentment capturing feelings of social safeness (i.e., soothing feelings of attachment to others) rather than reward seeking per se. Building upon Gilbert's argument that the conceptualization of positive emotions can be expanded and measured in more nuanced ways, some researchers have recently postulated that the key to understanding PA deficits in

SAD may be to study even more specific emotions. For example, in three separate studies of both undergraduate and clinical participants, Cohen and Huppert (2018) demonstrated preliminary evidence of specific deficits in socially anxious individuals' emotional experiences of pride, but not joy, which remained significant even after accounting for global PA deficits.

Present Study and Hypotheses

The overarching purpose of the present study was to investigate diminished positive affective responses to well-controlled, discrete pleasurable stimuli among participants with SAD. We had three specific objectives in support of this goal. First, we wished to examine whether individuals with SAD would exhibit PA deficits compared to healthy control (HC) participants in response to a discrete pleasurable non-social stimulus (pleasant music) that has been reliably shown in prior studies to elicit positive emotions. Given that prior studies have documented global deficits in PA across both social and nonsocial contexts among individuals with higher levels of SA (Kashdan & Collins, 2010), we hypothesized that participants with SAD would experience less PA than HCs overall but that the two groups would exhibit similar increases in PA from baseline when exposed to pleasant music. Our second objective was to examine PA reactivity in individuals with SAD to an imagined pleasant scene that was embedded within either a social or nonsocial context. We hypothesized that PA deficits in participants with SAD would be moderated by social context, with greater deficits in responsivity only emerging within the social context as compared to the non-social context, as predicted by cognitive theories. Third, we aimed to explore differences in PA responsivity when conceptualizing PA either as a unitary global construct or as discrete positive emotions. Given that prior research has suggested that global PA and discrete PA-related emotions may both be relevant for understanding positivity deficits in SAD, but perhaps in different ways, we expected that results might vary

depending on whether PA was analyzed as a global measure or as a discrete set of constructs, but these analyses were exploratory as we advanced no specific a priori hypotheses about how they might vary.

Method

Participants

Participants were recruited through our University of Waterloo research pool of clinically anxious and non-anxious community participants (see Moscovitch et al., 2015). Clinical participants were recruited using flyers and online advertisements targeting people who self-identified as experiencing difficulties with anxiety without any history of mania or psychosis and without current symptoms of significant suicidality or substance use. All potentially eligible clinical participants completed online symptom checklists and were screened on the phone by a trained assessor. Those who passed initial screening were then administered the Mini International Neuropsychiatric Interview, Version 7 for DSM-5 (MINI; Sheehan, 2014), a well-validated semi-structured diagnostic interview (Pinninti, Madison, Musser, & Rissmiller, 2003; Sheehan et al., 1998) by a trained graduate student under the supervision of two registered psychologists with specialized expertise in diagnosing and treating anxiety and related disorders. The MINI was complemented by symptom checklists adapted from the Anxiety Disorders Interview Schedule (ADIS; Brown & Barlow, 2014), which were also administered by graduate students. Participants were selected for the SAD group if they met full DSM-5 criteria for a current clinical diagnosis of SAD that was clinically interfering and distressing, even if SAD was not their principal current diagnosis (i.e., their most interfering and/or distressing presenting problem). Each diagnosis provided required consensus between a group of several trained graduate students and both supervising psychologists, who met weekly to discuss that week's

cases. Flyers and online advertisements were also used to recruit a control group of healthy community participants. Eligible participants for this group completed a series of symptom checklists adapted from the MINI either online or by phone; potential participants were screened out if they endorsed any current symptoms suggestive of DSM-5 diagnoses or a history of significant psychological difficulties.

Self-report measures

Trait measures. Participants completed the Social Phobia Inventory (SPIN; Connor, Davidson, Churchill, Sherwood, Weisler, & Foa, 2000), a well-established measure of social anxiety symptoms. The measure consists of 17 items rated on 5-point scales. Items on the scale relate to physical and psychological symptoms associated with social anxiety, with higher scores representing higher severity of symptoms (e.g., “I am afraid of people in authority”, “I avoid having to give speeches”). The SPIN has been shown to have good convergent and discriminant validity, excellent overall internal consistency, and good test-retest reliability over 3 weeks (Antony, Coons, McCabe, Ashbaugh, & Swinson, 2006). In this sample, the SPIN demonstrated excellent internal consistency (Cronbach’s $\alpha = .96$).

State affect. To assess state affect across both positive and negative emotions, the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988) was administered along with additional affect ratings. The PANAS is a 20-item self-report measure that assesses one’s current affect, with half the items measuring NA, and half the items PA. Higher scores on each subscale reflect greater endorsement of in-the-moment experience of positive and negative affect. The PANAS has been demonstrated to be a reliable and valid measure of state affect, with each of the subscales demonstrating good reliability (Crawford & Henry, 2004). The current study focused exclusively on participants’ responses to the PA

subscale. As described above, Gilbert and colleagues (2008) have argued that the PANAS PA subscale only captures *activated* PA but not *relaxed* and *content* PA. To address these limitations, we incorporated items from Gilbert and colleagues' (2008) *activated* (e.g., eager, lively, adventurous), *relaxed* (e.g., calm, peaceful, serene) and *safe/content* (e.g., safe, secure, warm) affect scales to supplement the PANAS. The PANAS PA subscale demonstrated good to excellent internal consistency across all time-points (Cronbach's $\alpha = .88$ to $.92$), as did the activated subscale (Cronbach's $\alpha = .91$ to $.95$), the relaxed subscale (Cronbach's $\alpha = .91$ to $.95$), and the safe/content subscale (Cronbach's $\alpha = .86$ to $.92$) of the expanded affect measures.

Demographic and clinical variables. Participants completed a demographics and clinical questionnaire to assess variables such as age, sex, ethnicity, marital status, psychiatric treatment status, current medications, and familiarity with English.

Attention check. Attention check items were embedded in the study to ensure that participants were attending to the stimuli. At the conclusion of the study, participants were also asked to report the degree to which they attended to the study stimuli on a 5-point likert type scale (1 = not attending at all, 5 = extremely attentive). Participants' responses were reviewed for indications of potentially unsatisfactory or invalid responding.

Mood induction stimuli

Neutral images. To establish baseline affect, and to facilitate recovery in affective responding in between the presentation of pleasant music and social vs. nonsocial imagery stimuli, a neutral mood induction stimulus was employed. Drawing from the methods used by Zhang, Yu, and Barrett (2014), *Wind on Water* (Fripp, R., 1975) was played for 1 minute while participants viewed a series of neutrally-valenced, low-arousal images that were selected from the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 1997).

Pleasant music. Several forms of positive mood induction stimuli have been used in previous research, ranging from funny movies to music and behavioural interventions (see Lench, Flores, & Bench, 2011 for a review). Certain types of music have been found reliably to promote positive mood, with a medium effect size (mean weighted effect $d = .65$) that is comparable to other positive mood inductions (Westerman et al., 1996). Given the proven utility of classical music in mood induction research (e.g., Trost, Ethofer, Zentner, & Vuillermier, 2012; Zentner, Grandjean, & Scherer, 2008), we used *The Arrival of the Queen of Sheba* (Handel, G., 1715) to induce positive affect. This piece of classical music has been used successfully to induce positive affect in at least two prior studies (Conklin & Perkins, 2005; Zhang et al., 2014).

Social vs. non-social imagery. Two guided imagery scripts were created and audio-recorded by the first author, and participants were randomly assigned to listen to one of the two audio files. The scripts were matched not only in narration but also in timing, pacing, emotional tone, and content. Both scripts were designed to promote positive affect but only differed in context such that one of the vignettes described a solitary activity (walking alone on a wooded path while noticing the sensory qualities of the surrounding natural environment), while the other script was identical but described the forest walk as occurring with a companion. Both scripts were comparable in length, sound effects, and narrative style. Their features were designed to resemble emotion induction scripts that have been used in previous research (e.g., Zhang et al., 2014). The audio files were each approximately two minutes long.

Procedure

Following recruitment, eligible participants were sent an email with a link to the study. The email included instructions to set aside 30 minutes to complete the study in a single sitting,

in a private place where they would not be interrupted. They were required to indicate that they had headphones or speakers in order to participate.

Participants were greeted with a welcome screen instructing them to adjust their volume as needed, and were then instructed to attend to the images they were about to see on the screen. Participants were then presented with the neutral image stimuli to establish a standardized environment for eliciting baseline affect. They were instructed to focus on the neutral images on screen and to use their imagination to make the experience more personal, allowing themselves to experience any feelings that arose. While viewing the images, participants listened to *Wind on Water* (Fripp, R., 1975). After one minute, the screen automatically advanced for them to complete the PANAS and expanded affect ratings as measure of their baseline state.

Participants were then presented with the pleasant mood stimulus, *Arrival of the Queen of Sheba* (Handel, G., 1715), during which they were encouraged to close their eyes and focus on any feelings that arose. When the song concluded, participants were again prompted to complete the PANAS and expanded affect ratings. Following the state measures, participants were presented again with the neutral images followed by the PANAS and expanded affect ratings. Then, participants were then randomly assigned by the randomizer in Qualtrics to one of the two conditions, in which they received either the social or non-social version of the imagery audio file. Participants in both conditions were instructed to close their eyes and listen as they played the audio file, and to try to picture the scene in their mind as vividly as possible. Participants were informed that there would be 20 seconds of silence following the audio file to allow them to continue to imagine the scenario before automatically advancing to completion of the PANAS and expanded affect ratings for a final time. Following these measures, participants completed the questionnaire assessing demographics and clinical variables, the attention check, and the

SPIN in randomized order prior to advancing to a final debriefing screen. Participants were remunerated with a \$10 gift card.

Pilot testing stimuli

Prior to collecting data for the main study, stimuli were pilot-tested on an independent sample of 133 unselected undergraduates. The purpose of the pilot study was to determine whether the social and non-social stimuli elicited similar levels of PA, to inspect whether participants' ratings of PA were higher following the stimuli designed to elicit PA (music and imagery stimuli) relative to the neutral stimulus, and to examine whether PA successfully recovered in between the sets of stimuli (i.e., following the pleasant music and prior to assignment to condition). The study procedure was identical to that described above. Twenty participants endorsed skipping portions of the study, and were therefore excluded. An additional 31 participants did not correctly respond to the condition attention-check measure, and were excluded. The final pilot sample ($N = 82$) consisted of 42 participants in the social condition and 39 in the non-social condition.

Impact of condition. To examine whether the social and non-social stimuli elicited similar levels of PA in the non-clinical sample, independent samples t-tests were conducted. No statistically significant differences in PA reported post-stimulus were found between the social ($M = 23.81$, $SD = 10.51$) and non-social ($M = 21.31$, $SD = 9.05$) conditions, $t(79) = 1.14$, $p = .256$, $d = .26$. This pattern suggests that the two imagery tasks were eliciting comparable affect in our unselected sample.

Positive affect. Having established that the imagery conditions were comparable, we next sought to determine whether the series of stimuli were having the desired impact on PA collapsing across conditions. A one-way repeated measures ANOVA was conducted to examine

the impact of stimuli (baseline neutral, pleasant music, time 2 neutral, pleasant imagery) on PA. There was a statistically significant effect of stimulus on PA, $F(2.61, 208.78) = 43.20, p < .001, \eta_p^2 = .35$. Follow-up planned comparisons in the form of paired-samples t-tests revealed that all four time points differed significantly from each other (p 's $< .045$). PA was highest following the music stimulus ($M = 24.57, SD = 9.21$), followed by the imagery stimulus ($M = 22.60, SD = 9.85$), followed by the first neutral stimulus ($M = 18.65, SD = 7.50$), followed by the second exposure to the neutral stimulus ($M = 15.65, SD = 6.46$). The pattern of affective responding was generally consistent with expectations: the two neutral stimuli produced the least positive affect, and the music and imagery stimuli elicited the most.

Data Analytic Plan and Data Preparation

Hypothesis testing and statistical power

To test our first hypothesis that participants with SAD would experience less PA than HCs overall in response to the pleasant music stimulus but that the two groups would exhibit similar increases in PA from baseline, we conducted a 2 (within-subjects factor: t1 neutral, post-music) x 2 (between-subjects factor: SAD vs HC) mixed ANOVA. To test our second hypothesis that PA deficits in those with SAD would be moderated by social context, we conducted a 2 (within-subjects factor: t2 neutral, post-vignette) x 2 (between subjects factor: SAD vs HC) x 2 (between-subjects factor: social vs non-social) mixed ANOVA. Finally, we repeated analyses for hypotheses 1 and 2 as exploratory analyses using each of the sub-facets of PA rather than PANAS-PA as our primary outcome measures. Non-significant interaction effects that trended toward significance were probed with follow-up contrasts but interpreted with extreme caution.

A power analysis was conducted using G*Power software version 3.1.9.3 based on effect sizes drawn from Kashdan's (2007) meta-analysis of the impact of SA on PA. In that meta-

analysis, effect sizes reflecting the magnitude of the relationship between SA and PA were generally stronger for clinical samples than non-clinical samples, with a mean correlation of $-.41$ in the former and $-.35$ in the latter. Power calculations revealed that in order to detect significant interaction effects in a 2 (group) by 2 (time) mixed ANOVA with a desired power of $.80$ a total sample size of 96 participants was required if the effect size was medium ($r = .24$, $f = .25$), or 48 participants if the effect size was consistent with estimates for non-clinical populations in Kashdan's (2007) meta-analysis ($r = .35$, $f = .37$). To detect 3-way interactions in our 2 (group) by 2 (time) by 2 (condition) analyses, we required a sample size of 114 participants based on a medium effect size, or 54 participants based on the effect size estimate from Kashdan's meta-analysis. We based our recruitment on the desire to collect as many participants as was feasibly possible during a window of several months during which it was possible to collect dissertation data. However, recruiting clinical community-based samples tends to be a slow and time-consuming endeavour and, ultimately, the study was adequately sampled to detect effect sizes that ranged from medium to large.

For all analyses, any violations of sphericity as determined by Mauchly's test were corrected using the Greenhouse-Geisser correction. Corrections using the Welch-Satterthwaite method were reported for any violations of equality of variance as determined by Levene's test.

Missing data, outliers and distributions

Forty-eight clinical participants with SAD and 48 healthy controls completed the study ($N = 96$). There were no missing data across the sample. No participants endorsed skipping parts of the study, but 11 participants failed to correctly identify the condition they were in as part of the attention check items and were therefore excluded from analysis. Thus, the final sample consisted of 46 participants with SAD and 39 healthy controls ($N = 85$).

Participants in the SAD and HC groups were randomly assigned to either the social or non-social condition after the second exposure to the neutral stimulus. Unintentionally, we set the Qualtrics randomizer to allocate the participants from each group in a fully randomized rather than quasi-randomized (i.e., equally distributed) manner across conditions. Therefore, the distribution of participants across conditions was unequal. Thus, among the final sample of HC participants, there were 19 assigned to the social condition and 20 assigned to the non-social condition, and among the SAD participants in the final sample, there were 30 assigned to the social condition and 16 assigned to the non-social condition.

All variables were screened for violations of normality, and for outlying data points. There were no significant violations of normality, and all outlying data points were examined for plausibility, deemed plausible, and retained in subsequent analyses.

Results

Participant characteristics

Participants were predominantly female (75.3%) with a mean age of 29.01 years ($SD = 12.62$). The majority of participants identified their racial background as White (68.2%), with 10.6% identifying as East Asian, 8.2% as South Asian, and 13% as Other (including Indigenous, South East Asian, Hispanic, West Indian, and Middle Eastern). In terms of educational background, 43.5% endorsed some university education, 27.1% reported having completed a university or college degree, and 18.8% a post-graduate degree. An additional 5.9% of the sample reported having just a high school diploma, and 1.2% said they did not complete high school. The clinical group had a mean clinical severity rating of 4.76 ($SD = 0.79$, range: 4 - 6) for their SAD symptoms, with a score of 4 representing threshold for clinically significant impairment, and a score of 8 representing maximum impairment. Clinical participants had, on

average, 1.43 comorbid diagnoses ($SD = 1.20$), with 37% of the clinical group having a concurrent mood disorder. SAD was the principal (most severe) diagnosis for 63% of participants.

The clinical and control groups differed neither in age $t(83) = 0.39, p = .700$, nor years of education $t(83) = 0.88, p = .380$. Significant gender differences were observed across the clinical and control groups, with the control group having proportionately more males (36% versus 25%) than expected $\chi^2(2, N = 85) = 6.12, p = .047$. However, gender was not associated with any of the key outcome variables when controlling for diagnostic group. As expected, the clinical group had higher SPIN scores ($M = 39.39, SD = 12.94$) than controls ($M = 9.31, SD = 8.60$), $t(78.77) = 12.79, p < .001$. See Table 6 for participant and clinical characteristics across conditions. No significant differences were observed across conditions for any of the demographic or clinical variables.

Table 6. Group Comparisons Across Social Anxiety Disorder (SAD) and Healthy Control (HC) Participants by Condition

Characteristic	SAD (<i>n</i> = 46)		HC (<i>n</i> = 39)	
	Social Condition (<i>n</i> = 30)	Non-Social Condition (<i>n</i> = 16)	Social Condition (<i>n</i> = 19)	Non-Social Condition (<i>n</i> = 20)
Gender <i>n</i> (%)				
Male	7 (23.3)	2 (12.5)	7 (36.8)	7 (35)
Female	23 (76.7)	14 (87.5)	12 (63.2)	13 (65)
Ethnicity <i>n</i> (%)				
White	25 (83.3)	9 (65.3)	11 (57.9)	13 (65)
East Asian	0 (0)	3 (18.8)	3 (15.8)	3 (15)
South Asian	2 (6.7)	2 (12.5)	1 (5.3)	2 (10)
Other	3 (10)	2 (12.5)	4 (21)	2 (10)
Highest Education				
High School or Less	5 (16.7)	0 (0)	0 (0)	0 (0)
Some College/University	10 (33.3)	11 (68.8)	7 (36.8)	10 (50)
College or University Degree	11 (36.7)	2 (12.5)	6 (31.6)	5 (25)
Post-Graduate Degree	4 (13.3)	3 (18.8)	5 (26.3)	4 (20)
Age in years (<i>SD</i>)	28.47 (12.16)	28.63 (13.94)	32.84 (16.11)	26.50 (7.59)
SPIN <i>M</i> (<i>SD</i>)	40.37 (12.84)	37.56 (13.35)	9.89 (8.46)	8.75 (8.91)
SAD CSR <i>M</i> (<i>SD</i>)	4.77 (0.82)	4.75 (0.77)	-	-
Comorbid Diagnoses <i>M</i> (<i>SD</i>)	1.44 (1.21)	1.44 (1.21)	-	-
Concurrent Mood disorder <i>n</i> (%)	4 (25)	13 (43.3)	-	-

Note. SPIN = Social Phobia Inventory; CSR = Clinical Severity Rating.

Baseline PA and reactivity to music

The planned 2x2 mixed ANOVA to test the first hypothesis revealed a main effect of stimulus, $F(1, 83) = 25.11, p < .001, \eta_p^2 = .23$, with PA increasing from baseline neutral ($M = 18.62, SD = 6.50$) to post-music ($M = 22.99, SD = 8.31$), suggesting that the pleasant music stimulus promoted greater overall PA than the neutral stimulus, as expected. Contrary to expectations, there was no main effect of group $F(1, 83) = 0.80, p = .374, \eta_p^2 = .01$, suggesting that global PA did not differ between the SAD and control groups. As expected, however, there was no stimulus by group interaction, though the effect trended toward significance, $F(1, 83) = 3.13, p = .080, \eta_p^2 = .04$. Follow-up between-group contrasts within each time point separately revealed that the SAD group had marginally lower PA than HCs at baseline, $t(68.50) = 1.917, p = .059, d = .42$, but not at post-music, $t(83) = 0.14, p = .886, d = .03$. Within-group contrasts across time points showed that increases in PA occurred for both the HC group $t(38) = 2.38, p = .022, d = .38$, and the SAD group, $t(45) = 4.73, p < .001, d = .70$, suggesting that although both groups responded similarly to the pleasant music, the interaction trended in the direction of the SAD group experiencing more robust PA responsivity than the HC group. See Table 7 for affect rating descriptive statistics reported across groups and conditions.

PA reactivity to social versus non-social imagery

Hypothesis 2 was tested by examining differences in reactivity to the social and non-social vignettes. The planned 2x2x2 mixed ANOVA was conducted³. A main effect of stimulus was observed, with PA increasing from t2 neutral ($M = 15.95, SD = 5.90$) to post-vignette ($M = 21.51, SD = 7.71$), $F(1, 81) = 62.82, p < .001, \eta_p^2 = .44$, as expected. Contrary to expectations,

³ A 2x2 ANOVA with group as the between subjects factor and stimulus (positive music, time 2 neutral) as the within-subjects factor was conducted to establish that PA recovered following the pleasant music prior to examining the imagery stimuli. Results showed complete recovery for all participants, with statistically equivalent recovery for the SAD and HC groups.

there was no main effect of condition, $F(1, 81) = 0.04, p = .838, \eta_p^2 = .01$, suggesting that, on average, participants' reactions did not differ in response to the social ($M = 21.94, SD = 7.90$) vs. the non-social ($M = 20.92, SD = 7.50$) stimuli. Surprisingly, there was also no main effect of group, $F(1, 81) = 1.85, p = .178, \eta_p^2 = .02$, suggesting no differences in overall PA levels between SAD and HC participants. There was no stimulus by group interaction, $F(1, 81) = 1.69, p = .198, \eta_p^2 = .02$, suggesting no group differences in the degree to which PA increased from t2 neutral to post-vignette (see Table 7 for means and SDs). The group by condition interaction was also non-significant, $F(1, 81) = 0.00, p = .963, \eta_p^2 < .01$, suggesting no groups differences in PA levels across the social and non-social conditions, thus failing to support our hypothesis. Moreover, there was no stimulus by condition interaction, though it trended toward significance, $F(1, 81) = 3.10, p = .082, \eta_p^2 = .04$. Follow-up contrasts probing this effect revealed that that PA did not differ between conditions at either post-neutral, $t(83) = 0.84, p = .401, d = .18$, or post-imagery, $t(83) = 0.60, p = .549, d = .13$, and that PA increased from t2 neutral for those assigned to the social condition, $t(35) = 4.40, p < .001, d = 1.01$, as well as for those in the non-social condition, $t(48) = 7.12, p < .001, d = .73$. The results of these follow-up probes suggest that the interaction trended in the direction of participants experiencing greater PA increases within the social condition. Finally, there was no significant 3-way group by condition by stimulus interaction, $F(1, 81) = 0.00, p = .965, \eta_p^2 < .01$, suggesting no group differences in PA reactivity across time as a function of condition.

In sum, contrary to both hypotheses 1 and 2, SAD and HC participants did not differ in their overall levels of global PA across stimuli, including neutral stimuli, pleasant music, and social or non-social imagery. There were no differences in their reactivity to the pleasant stimuli, and they displayed no differences in reactivity to the social versus non-social conditions.

Table 7. Means and Standard Deviations Across Group and Condition for PA Ratings

	SAD (n = 46)			HC (n = 39)		
	Social Condition (n = 30)	Non-Social Condition (n = 16)	Overall	Social Condition (n = 19)	Non-Social Condition (n = 20)	Overall
Baseline/Neutral PA <i>M</i> (SD)						
PANAS Total PA	17.47 (4.70)	17.19 (6.71)	17.37 (5.41)	19.47 (7.37)	20.70 (7.53)	20.10 (7.38)
Activated	12.30 (4.91)	12.56 (5.32)	12.39 (5.00)	15.00 (5.83)	14.25 (6.41)	14.62 (6.07)
Relaxed	12.46 (5.26)	13.93 (5.11)	12.98 (5.20)	16.42 (4.36)	16.35 (5.31)	16.38 (4.81)
Content	9.10 (3.16)	10.37 (4.51)	9.54 (3.69)	12.84 (4.11)	12.90 (3.88)	12.87 (3.94)
Post-Music PA <i>M</i> (SD)						
PANAS Total PA	24.23 (8.12)	21.00 (8.78)	23.11 (8.40)	22.42 (7.85)	23.25 (8.91)	22.85 (8.31)
Activated	19.63 (8.14)	17.50 (8.68)	18.89 (8.30)	18.84 (6.53)	18.20 (7.74)	18.51 (7.09)
Relaxed	12.53 (5.14)	13.56 (4.55)	12.89 (4.92)	15.26 (6.75)	14.35 (4.93)	14.79 (5.83)
Content	10.93 (3.35)	10.81 (3.02)	10.89 (3.21)	12.10 (4.62)	11.55 (3.53)	11.82 (4.05)
Time 2 Neutral PA <i>M</i> (SD)						
PANAS Total PA	15.10 (5.19)	16.06 (6.60)	15.43 (5.66)	16.11 (5.86)	17.00 (6.59)	16.56 (6.17)
Activated	10.73 (5.29)	10.87 (5.56)	10.78 (5.32)	12.52 (5.26)	12.10 (5.27)	12.31 (5.20)
Relaxed	11.00 (5.59)	12.12 (5.40)	11.39 (5.49)	12.52 (5.99)	14.25 (5.61)	13.41 (5.79)
Content	7.60 (3.23)	8.25 (4.11)	7.83 (3.53)	9.89 (5.33)	10.85 (4.97)	10.38 (5.10)
Post Imagery PA <i>M</i> (SD)						
PANAS Total PA	20.83 (7.85)	19.44 (8.01)	20.35 (7.84)	23.68 (7.88)	22.10 (7.06)	22.87 (7.41)
Activated	16.56 (7.54)	14.62 (6.39)	15.89 (7.15)	20.15 (7.29)	17.10 (7.03)	18.59 (7.23)
Relaxed	16.56 (7.09)	14.06 (5.56)	15.70 (6.65)	20.26 (5.52)	17.05 (5.15)	18.63 (5.58)
Content	11.70 (4.22)	9.75 (3.62)	11.02 (4.09)	14.57 (3.08)	13.10 (3.89)	13.82 (3.55)

Note. PANAS = Positive and Negative Affect Schedule

Baseline and reactivity effects for discrete positive emotions

Next, exploratory analyses testing hypothesis 3 were conducted with the activated, relaxed, and content positive emotion affect rating subscales as the outcomes rather than PANAS PA total scores. Means and SDs provided in Table 7.

A 2 (within: baseline neutral, post-music) by 2 (between: SAD vs HC) mixed ANOVA revealed no effect of group for activated PA, $F(1, 83) = 0.58, p = .449, \eta_p^2 = .01$. Conversely, a significant main effect of group was found for relaxed PA, $F(1, 83) = 8.23, p = .005, \eta_p^2 = .09$, and for content PA, $F(1, 83) = 9.31, p = .003, \eta_p^2 = .10$, with the SAD group having lower overall levels of both relaxed and content PA. A main effect of stimulus was observed for activated PA, with increases from baseline to post-music, $F(1, 83) = 39.67, p < .001, \eta_p^2 = .32$, but not for relaxed or content PA, all F 's ≤ 1.67 , all $p \geq .200, \eta_p^2 \leq .02$. No significant 2-way interactions between group and stimulus were found for activated PA, $F(1, 83) = 2.49, p = .119, \eta_p^2 = .03$, or relaxed PA, $F(1, 83) = 1.34, p = .250, \eta_p^2 = .02$. However, a significant interaction of group by stimulus was observed for content PA, $F(1, 83) = 8.65, p = .004, \eta_p^2 = .09$. Follow-up contrasts revealed that content PA did not change from baseline to post-music for the HC group, $t(38) = 1.68, p = .102, d = .27$, but increased significantly for the SAD group only, $t(45) = 2.54, p = .015, d = .38$. Thus, despite lower overall levels of content PA for participants with SAD, pleasant music succeeded in increasing their content PA significantly from baseline.

Next, the sub-facets of PA from t2 neutral to post-vignette across the social and non-social conditions were examined in separate 2x2x2 mixed ANOVAs. No main effect of group was found for activated PA, $F(1, 81) = 3.51, p = .065, \eta_p^2 = .04$. However, the data trended in the direction of SAD participants reporting lower overall activated PA (as seen in Table 7). A significant main effect of group was observed for both relaxed PA, $F(1, 81) = 5.46, p = .022, \eta_p^2$

= .06, and content PA, $F(1, 81) = 12.77, p = .001, \eta_p^2 = .14$, with the SAD group displaying lower overall levels. No main effects of condition were found for any of the 3 outcome variables, all $F \leq 1.50, p \geq .225, \eta_p^2 < .02$. A main effect of stimulus was observed across all 3 sub-facets of PA, with significant overall increases in all forms of PA from neutral to post-music, all $F \geq 41.37, all p \leq .001, \eta_p^2 \geq .34$.

When examining the 2- and 3-way interactions, no significant group by condition interactions were observed for any of the 3 dependent variables, all $F \leq 0.23, p \geq .630, \eta_p^2 < .01$, nor any stimulus by group interactions, all $F \leq 1.19, p \geq .279, \eta_p^2 < .02$. However, significant stimulus by condition interactions were found for relaxed PA, $F(1, 81) = 9.52, p = .003, \eta_p^2 = .11$, and content PA, $F(1, 81) = 7.07, p = .009, \eta_p^2 = .08$, but not activated PA, $F(1, 81) = 2.74, p = .102, \eta_p^2 = .03$. Follow-up between-condition contrasts at each time point separately revealed no differences between conditions in content or relaxed affect at either post-neutral or post-imagery time-points, all $t \leq 1.67, all p \geq .099, all d \leq .37$, and within-condition contrasts between time points revealed significant increases in relaxed PA in both the social, $t(48) = 6.40, p < .001, d = .92$ and non-social conditions, $t(35) = 2.94, p = .006, d = .49$. Similarly, participants experienced significant increases in content PA in both social, $t(48) = 6.36, p < .001, d = .91$, and non-social conditions, $t(35) = 3.48, p = .001, d = .58$. Though both relaxed and content PA increased significantly within both conditions from post-neutral to post-imagery, inspection of means (Table 7) and effect sizes revealed that these increases were more robust within the social condition than the non-social condition. There were no 3-way interactions, all $F \leq 1.19, p \geq .277, \eta_p^2 < .02$.

Discussion

Results of the present study suggested that when PA was assessed by the PANAS as a

global, unitary construct, all observed between-group effect sizes were small. Moreover, both SAD and HC participants demonstrated intact PA reactivity (i.e., changes in PA over time from neutral baseline to pleasant stimuli), with no significant group differences in emotional reactivity across stimuli and conditions. At first blush, these outcomes seem to run counter to decades of research pointing to robust PA deficits in SAD; however, closer inspection of methodological differences may serve to account for discrepancies between the present findings and those of past studies.

A significant proportion of previous research on PA deficits in SA has relied on trait measures of affect (e.g., Brown et al., 1998; Kashdan, 2002; Kashdan & Breen, 2008), or longer-time periods such as “the past week” or “the past few days” (e.g., Alden & Trew, 2013; Taylor, Lyubomirsky & Stein, 2017). Daily diary research has often relied on end-of-day affect ratings (e.g., Farmer & Kashdan, 2012; Kashdan & Steger, 2006). Other research that assessed in-the-moment state PA did so in the context of anxiety-inducing tasks such as prior to meeting a new person (e.g., Trew & Alden, 2012) or an impromptu speech (e.g., Rodebaugh & Shumaker, 2012), or throughout a conversation with a stranger, as in study one and two in this dissertation. All of these prior studies provided consistent support for an inverse relationship between SA and PA, with medium to large effects.

Our results do not necessarily contradict these findings. Rather, our data demonstrate that there are circumstances under which those with SAD might exhibit normal levels of PA that appear indistinguishable from HCs. Of the studies cited above, none were designed to capture in-the-moment affect in response to simple pleasurable stimuli like we did in the present study. This difference may be important, as our design focusing on pleasant stimuli may have reduced the influence of biased memory for positive emotions, particularly when past research has typically

assessed positive emotions within stressful or anxiety-provoking contexts. Another key methodological difference was that the current study was conducted online, where participants could respond from the comfort of their own homes, thus eliminating a significant stressor of being in a university laboratory, which typically involves an appointment time, meeting a stranger for the first time, and perceived opportunities for scrutiny and evaluation by others.

The current study also sought to assess SAD vs. HC participants' PA *reactivity*, or changes in positive affective responding from baseline when exposed to standardized pleasant experimental stimuli. To the best of our knowledge, this is a novel contribution to the literature. In designing the tasks, we hoped to shed light on whether positive emotional responsivity in SAD may be globally deficient or only compromised when the rewarding or pleasurable stimuli were embedded within a social context. Interestingly, there was no evidence across any of the stimuli or conditions that those with SAD were experiencing less global positive emotional reactivity than their healthy counterparts in response to differing contexts. The consistently small between-group effect sizes across stimuli and conditions suggested that emotional responding appeared generally intact, irrespective of the context. Indeed, only one interaction approached statistical significance when assessing PA as a unitary construct, and although this effect was small and non-significant, the pattern was in the opposite direction, such that SAD participants trended towards *increased* responsivity relative to HCs when exposed to pleasant music. No group differences emerged when stimuli were embedded in social vs. non-social contexts. This evidence of intact PA responsivity in SAD was particularly striking, given that several of the participants with SAD also had a comorbid mood disorder.

Again, methodological considerations may help to shed additional light onto these results. It is possible that the positive or pleasure-inducing aspects of both the social and non-

social vignettes focused primarily on the non-social aspects that were common to both vignettes (i.e., elements of positive sensory connection with one's natural surroundings, such as the peaceful serenity of the forest). In other words, participants may have reacted affectively to the same pleasurable non-social cues that were present in both vignettes (calming scenery, peaceful walk), with the presence or absence of another person being relatively inconsequential to participants' emotional experiences. It may be that PANAS-derived PA deficits would have emerged if rewards were conceptualized as being strictly social in nature (e.g., laughing with another person, sharing good news with a friend). Moreover, the scenario was imaginal rather than in-vivo, and was intentionally designed not be anxiety-provoking or threatening to participants, which likely decreased the influence of other potentially important variables like negative affect, state anxiety, and use of safety behaviours, which have been shown to be related to decreased PA (Alden, Taylor, Mellings & Laposa, 2008; Moscovitch, Suvak, & Hofmann, 2010; Wallace & Alden, 1997). Whatever the reason, the current pattern of results suggests that the inclusion of a social contextual variable into an imagined pleasant situation may not be sufficient for reducing positive emotional reactivity in those with SAD, at least when PA is measured with the PANAS.

This last point represents an important caveat to our conclusions, as the nonsignificant group differences were observed only when PA was measured as a global, unitary construct using the PANAS. Indeed, significant PA-related deficits did, in fact, emerge for those with SAD relative to HCs when PA was assessed using Gilbert and colleagues' (2008) affect ratings, with the SAD group displaying lower overall levels of relaxed and content PA, on average, across all stimuli. It is therefore possible that deficits in positive emotions in SAD stem predominantly from low-arousal positive emotions, as captured by relaxed and content PA.

Interestingly, when we compared groups in their PA responsivity, as measured by Gilbert et al.'s PA sub-facets, we found that participants with SAD exhibited significant increases from baseline in content PA in response to pleasant music, while the HC group did not. This pattern was not replicated when assessing emotional reactivity to the imagery task, where participants in both groups showed increases in all sub-facets of PA as they progressed from processing neutral stimuli to processing imagery. The reason those with SAD experienced an increase in content PA in response to pleasant music, while HCs did not, remains elusive. Content PA is meant to capture soothed feelings of social safeness that tend to arise within the context of secure attachment relationships; thus, to experience unique increases in such feelings in response to relatively high-energy music is perplexing, and warrants replication. Indeed, one might expect that if deficits in PA reactivity existed, the music stimulus would be likely to elicit differences in activated rather than content or relaxed PA; however, both HC and SAD participants exhibited similarly robust increases in activated PA in response to the music stimulus.

Analyses on the interaction between stimulus and condition for sub-facets of PA showed that, collapsed across groups, the social imagery task elicited greater content and relaxed PA than the non-social condition. This enhanced effect of the social condition on content PA makes intuitive sense, as the imagined presence of a companion during the forest walk would be expected to increase pleasant feelings of attachment security or social safeness. With respect to relaxed PA, anecdotes obtained from pilot testing the stimuli suggested that some participants may have felt mildly concerned about their safety when imagining being alone in a forest – concerns which may have been assuaged in the social condition in the presence of a companion, thereby increasing relaxed PA in that condition relative to when participants imagined walking alone. Importantly, the social aspect of the imagery task specifically elicited greater feelings of

content and relaxed PA for *both* SAD and HC participants. These results provide the most substantive evidence of intact emotional reactivity in SAD, as the SAD participants responded as positively as HCs to the same social context. Moreover, activated PA was similarly elicited across both groups of participants irrespective of social context. Replication of these findings is essential, as few studies have applied Gilbert et al.'s framework to the study of PA in relation to symptoms of SA. One previous study found that levels of SA were associated with lower levels of both activated and deactivated PA during a social interaction, though observers rated high SA participants as only having observably lower levels of deactivated PA (Kashdan & Roberts, 2004). Although the outcomes observed in this study are intriguing, we are cautious in interpretation as the analyses were exploratory in nature, and no corrections for multiple comparisons were applied.

Limitations and future directions

Limitations to the interpretation of results from this study should be considered. First, despite having a carefully screened clinical and community sample, the study did not include an anxious control group, and therefore no claims about the observed effects of decreased relaxed and content PA being specific to SAD can be made. Importantly, the clinical group averaged more than one comorbid diagnosis, with more than one-third of the sample having a concurrent mood disorder and SAD the principal diagnosis in only two-thirds of the sample. Thus, it is unknown to what extent the observed effects can be attributed to SAD versus comorbid conditions.

Moreover, because the Qualtrics randomizer used fully-randomized rather than pseudo-randomized assignment, we had unequal cell sizes. The presence of unequal cells may have reduced our power to detect effects relative to equally distributed cells. Considering that some of

the interaction effects we probed were marginally significant or trending toward significance, it is conceivable that a larger sample size may have yielded more robust interaction effects that were consistently significant. Nonetheless, the magnitude of all observed group effects was small, raising interesting questions about whether small but statistically significant effects would be clinically meaningful. The question of how much PA is sufficient in any given situation to promote and sustain approach behaviour and psychological well-being remains to be answered. Given that past research has typically observed medium to large effects of social anxiety on PA, and the current study was designed to detect medium to large effects, the non-significant results may be best understood by considering the various methodological issues and contextual variables outlined above.

Although future extension and replication of our findings are essential, they do help lend additional support to calls for greater specificity in the measurement of positive emotions (Cohen & Huppert, 2018; Shiota et al. 2017), which may hold the key to understanding whether, when, and how positive emotion deficits occur in SAD. Future research should seek to investigate discrete positive emotions among individuals with SAD within the context of social tasks, or within the context of scenarios where positive emotions would be expected to be derived directly from the social context.

Moreover, researchers should seek to test aspects of theories that attempt to account for the cognitive, biological, and motivational underpinnings of decreased positive emotions in SAD to better understand when positive emotions are amenable to change. There is little doubt from the extant literature that those with SAD experience diminished PA across a variety of contexts. However, our results demonstrate that there may be particular circumstances in which those with SAD display intact reactivity to positive stimuli that is comparable to healthy controls. In

general, these results would seem to favour cognitive theories of PA deficits. However, irrespective of stimuli, we observed overall deficits in relaxed and content PA among participants with SAD, which seems to favour theories suggesting global deficits that are either innate or, at the very least, not the direct result of cognitive variables associated with social stressors. Furthermore, we observed no evidence of positive emotion deficits that emerged only within a social context, as would be suggested by some cognitive theories or sensitivity-shift theory. Indeed, we obtained evidence that those with SAD benefitted from social reward in the same manner as HCs. However, in the absence of in-vivo social tasks, and given the exploratory nature of analyses on sub-facets of PA, we hesitate to draw any firm conclusions from these data.

Conclusion

In sum, our results significantly diverged from previous literature, with clinically socially anxious individuals exhibiting largely comparable levels of PA to a healthy population across a variety of contexts. We posit that variance in measurement methodology of positive emotions may be a major contributor to diverging outcomes in the literature. Future research is needed to replicate and extend these findings. Researchers should seek to investigate state discrete positive emotions, and changes therein, within the context of longitudinal designs and in-vivo social encounters among individuals with higher levels of social anxiety, including those with a clinical diagnosis of SAD.

General Discussion

The principal purpose of the current research was to improve our understanding of the effects of SA symptoms on positive emotions and associated positive outcomes. Despite a wealth of research showing decreased PA and positive experiences among individuals with SAD, few studies have investigated the factors that may account for the association between symptoms of social anxiety and reduced PA. Moreover, until very recently, decreased PA in SAD has largely been ignored as a potential target of cognitive-behavioural models or treatment designs. The current studies were developed to (a) improve our understanding of the cognitive, behavioural, motivational, and interpersonal variables that contribute to PA deficits in SAD, (b) determine whether and how social contextual factors contribute to SA-related positivity deficits and, ultimately, (c) inform, refine, and improve theory and treatment.

Results of the three studies combined provide strong support for the notion that positive emotional experiences, as well as associated positivity deficits, cannot be explained by a single factor. Indeed, across studies, cognitive, behavioural and motivational variables were all identified as significant predictors of variance in PA and associated positive social experiences. Our results in studies one and two suggest that holding in mind an affiliative orientation toward social interaction may provide an avenue for promoting positive affective and interpersonal experiences during one-on-one conversation because such an orientation facilitates increased curiosity, authenticity, and reciprocity. Interestingly, although the overall association between affiliative goals and positive outcomes was stronger for participants with lower rather than higher levels of trait SA, the significant mediators of this association – curiosity, authenticity, and reciprocity – exerted similarly robust effects for both high and low socially anxious

individuals, suggesting that they represent key processes that function as the “interpersonal glue” of affiliative engagement, irrespective of SA status.

When examining mediators of participants’ own outcomes across studies one and two combined, results indicated that participants’ self-reported authenticity and curiosity as well as their expressed reciprocity mediated the relationship between their own affiliative goals and their own positive overall outcomes (as measured by the composite variable). However, only curiosity mediated the association between participants’ affiliative goals and their own emotional outcomes (i.e., PA). When examining mediators of partner outcomes, the data revealed indirect effects of affiliative goals on partners’ emotional outcomes through increases in self-reported authenticity and expressed reciprocity. Yet, participants’ reciprocity alone emerged as a unique mediator of the relationship between their affiliative goals and partners’ overall positive outcomes. Thus, although individuals’ own felt authenticity and expressed reciprocity may provide them with certain interpersonal benefits during one-on-one interactions with others, harnessing an elevated sense of curiosity appears influential in allowing people to derive emotional benefits, such as elevated PA, from such encounters. Moreover, whereas engaging in conversation that feels authentic may elevate the positive emotions of one’s conversation partner, behaving during an interaction in ways that promote conversational reciprocity appears to be one mechanism for fueling broader emotional and interpersonal benefits for one’s conversation partner.

This pattern of data carries implications for theoretical accounts of SAD, and opens up avenues for additional research. Despite a large body of literature demonstrating diminished PA phenomenologically (e.g., Kashdan, 2007), these studies are among few that contribute to an understanding of the mechanisms of action through which individuals with social anxiety derive

interpersonally generated PA. Accounting for the unique roles of diminished motivation to affiliate and the role of curiosity in SAD may lead to a better understanding of the modest response to treatment and lingering symptoms after treatment (e.g., Jazaieri et al., 2017; Loerinc et al., 2015). Considering the unique impact of curiosity on PA, future research should ensure consistent measurement methodology and operational definition. Curiosity has been previously defined as an approach-oriented motivational state (Kashdan & Roberts, 2004), a positive emotional-motivational system (Kashdan et al., 2004) and a positive emotional experience (Kashdan & Silvia, 2009), with the varied definitions carrying implications as to whether curiosity is seen as a contributor to PA, or an affective end-state. This may account for disparate outcomes in the literature as to whether SAD is associated with diminished curiosity.

The dissociation between emotional outcomes and social outcomes observed across studies one and two is intriguing and important for theory and future research. Our results suggest that researchers may not be able to solely rely on a measure of approach motivation as a proxy for positive experiences, as affective outcomes were dissociable from social outcomes, and predicted by different variables. A substantial proportion of previous research has used approach motivation as the sole “positive” outcome, which may fail to capture positive affective states. Solely targeting variables such as reciprocity or authenticity may confer social benefits without immediate affective benefits. This is consistent with previous research that promoted prosocial behaviours in socially anxious individuals, and found decreases in avoidance motivation but no increases in positive affect (Trew & Alden, 2015). This may help to unify what was previously seen as inconsistent outcomes, and promote a more nuanced understanding of the wide range of outcomes that may have been unjustly amalgamated under the umbrella of “positive”.

The dyadic models tested in studies one and two also demonstrated significant cross-over effects, indicating that affiliative social goals of both parties in the conversation are important for experienced social outcomes. To this end, the adage often used in the treatment of SAD that “any one individual only holds half of the responsibility for conversational outcomes” appears to hold true, suggesting that socially anxious individuals are responsive to and affected by the social goals of their interaction partners. Partners of HSA individuals in our study experienced less positive affect, reported poorer quality of interaction, and trended towards lower desire to engage in future interactions. These data complement and extend previous findings that interaction partners of socially anxious individuals experience fewer positive outcomes (Alden & Taylor, 2004; Bielak et al., 2018; Heerey & Kring, 2007) and are more likely to reject the socially anxious individual (Alden & Wallace, 1995; Meleshko & Alden, 1993; Voncken, Dijk, De Jong, Roelofs, 2010). It appears that higher SA constrains experiences and behaviours, such as authenticity and reciprocity, that promote PA and positive interpersonal outcomes in conversation partners. Further, socially anxious individuals are sensitive to the conversational goals and outcomes of their interaction partners. Together, these factors may contribute to a self-perpetuating negative cycle in which those who interact with socially anxious individuals may come to expect less pleasurable conversations, which in turn leads them to adopt less affiliative goals as the conversation progresses or in anticipation of a subsequent interaction with the same person. This may contribute to partners communicating subtle or overt signs of rejection to which those with SAD may be particularly sensitive (e.g., Bielak et al., 2018; Harb, Heimberg, Fresco, Schneier, & Liebowitz, 2002).

Outcomes from the sample used in study one and two generally support Trower and Gilbert’s (1989) theory of impaired affiliative drive in social anxiety. In our study, those high in

social anxiety approached a conversation with less affiliative social goals, and maintained lower goals throughout the duration of the conversation. Although affiliative social goals proved to be an important predictor of almost all outcomes assessed (PA and positive experiences in individuals and positive experiences in their conversation partners), it is important to note that the between-group differences in affiliative goals were small to medium, and that we were the first to apply this measure of affiliative goals. As there is no established measure for affiliative drive, measurement of the construct remains a potential methodological limitation of the current work. Nonetheless, in studies one and two, overall levels of affiliation and PA were lower in HSA participants relative to HCs.

Curiously, the hallmark deficits in PA observed in studies one and two within the non-clinical HSA sample were not as clearly evident in study three within the clinical sample. As discussed in study three, methodological differences in the assessment of PA may hold the key to this puzzle. The fact that study three contained no imminent social threat may have also played an important role, as participants completed the study alone from their own homes. However, some evidence obtained from daily-diary studies has shown deficits in PA among high SA individuals even when participants are alone (e.g., Farmer & Kashdan, 2012; Kashdan & Collins, 2010), suggesting it may not be the presence of social threat alone that determines SA-related deficits in PA. Rather, a key consideration may be whether the affective stimulus or context is perceived by participants as potentially rewarding. That is, stimuli whose rewarding qualities are perceived as being primarily interpersonal in nature less likely to elicit PA reactivity among higher SA individuals, and pleasant stimuli whose rewarding qualities are perceived as primarily non-interpersonal in nature (such as pleasant music or pleasant qualities of a natural environment, as in study three) more likely to elicit PA reactivity among HSAs, particularly for

activated PA and those components of positive emotionality that are not linked to social attachment goals.

Therefore, we cautiously conclude that our data across the three studies is broadly consistent with cognitive theories, with little evidence gathered in these studies that socially anxious individuals suffer from innate or biologically-driven impairments in PA. The strongest piece of evidence for a unique and global impairment in SA was related to relative impairments in affiliative goals among HSAs in studies one and two, which seemed to confer less benefit to PA for those high in SA, and warrants further examination, particularly in light of other recent studies arguing that SAD is not associated with impaired affiliation (Dijk, van Emmerik, & Grasman, 2018), and in light of the modest effect size observed in our study. However, despite our first two studies identifying key contributors to the experience of interpersonally generated PA, as noted above, affiliative goals and the various mediators examined in those studies largely influenced PA in the same manner for those high and low in SA. Across the three studies, we found evidence of intact emotional reactivity, with high socially anxious participants experiencing a similar increase in PA as low socially anxious participants following a conversation with a stranger in studies one and two, and individuals with SAD in study three experiencing similar increases as HCs across a variety of affect measures in response to both social and non-social stimuli. Therefore, we are inclined to conclude, in line with cognitive models, that SA-related deficits in PA are likely the result of behaviours, cognitions, and interpretations, rather than an inability for HSA individuals to derive PA either broadly or uniquely in social situations. Indeed, socially anxious individuals appear to benefit affectively from positive social interactions and from positive non-social stimuli, and these benefits are driven by the same underlying processes as non-socially anxious individuals.

We approach this conclusion with optimism, as it suggests that interventions designed to restore positive emotions may be geared primarily toward encouraging and promoting opportunities to experience these emotions rather than resolving an inherent deficit per se. This conclusion is consistent with recent data suggesting that those with elevated social anxiety derive equal or greater benefits from experiencing positive events relative to low social anxiety individuals (Doorley et al., 2020). Positive events in the daily lives of those with social anxiety (e.g., seeing friends, watching television, working out) contributed to greater decreases in anxiety, avoidance motivation and greater increased sense of belonging. When the authors examine positive outcomes, high socially anxious individuals displayed similar increases to approach motivation and happiness from positive events as those with low social anxiety. The fact that socially anxious individuals can experience intact positive affective responding does not diminish the importance of this variable in the experience of SAD, nor its importance in treatment. As discussed in greater detail below, it is likely that interventions designed to promote the experience of PA can be integrated relatively seamlessly into contemporary evidence-based treatment approaches for SAD.

Strengths and limitations

The present series of studies were designed so that the cumulative data from the three studies would contain important strengths that were unattainable in a single study. However, these design choices also conferred some general limitations that must be acknowledged. A major consideration in the approach to the three studies was the trade-off between internal and external validity. For example, we opted to use a real-life interaction partner for study one and two, but used carefully controlled and selected stimuli in study three. We also chose to vary how we conceptualized and measured our dependent variables, ensuring we incorporated behavioural

coding so that we did not rely solely on participants' self-report. Furthermore, we did not wish to rely solely on an analogue sample, opting to recruit community participants with clinical levels of SAD for one of the three studies so that, as a whole, we could draw some conclusions about clinical manifestations of SA and provide corresponding treatment recommendations.

In addition, we were sensitive to issues of measurement, and opted to employ a variety of tools and measures to assess our primary variables of interest across the three studies. For example, to measure symptoms of SA, we employed the SIAS (Mattick & Clarke, 1998) for studies one and two, but employed the SPIN (Connor et al., 2000) for study three, as we were aware that the SIAS better captured interaction anxiety than the SPIN, which is more symptom-focused. In our assessment of dependent variables, we employed the standard PANAS (Watson et al., 1988) in our first two studies, but investigated discrete emotions in our second study with the Gilbert and colleagues (2008) scales. These efforts yielded more robust data to enhance our understanding of PA in SAD, but also yielded methodological differences that made it more challenging at times to compare and contrast results directly across the three studies.

Moreover, in studies one and two, we developed and used a new measure of affiliative goals. Although we examined psychometric properties through exploratory factor analysis, we did not confirm these results with a different sample and a confirmatory factor analysis. We also did not examine convergent and divergent validity with other scales used to infer affiliative drive such as attachment measures (Weisman et al., 2011) or self-evaluative words (Gilboa-Schechtman et al., 2013). Furthermore, we assessed affiliative goals in studies one and two, but did not assess the role of this variable in study three, as we felt it was not applicable to the design. As study one and two drew from the same sample, one consequence of this decision was

that we could not replicate our findings on the role of affiliative goals, which limits our conclusions about the data and requires future replication.

Although we endeavoured to maximize ecological validity, we acknowledge that data from our first two studies were derived from a semi-scripted conversation with a low-anxiety stranger that was being videotaped, and our third study relied on imagined vignettes while participants sat alone at their computer. Ideally, future research can replicate and extend our findings by examining these variables within the context of close friendships, romantic partners, and family members, as these situations are likely to be better representative of the everyday lives of socially anxious individuals.

Across our three samples, participants' characteristics reflected significant diversity across demographic and clinical variables, which helps to improve generalizability of our findings. However, we did not directly assess the role of these variables in our analyses. This may prove to be important in light of recently published research that employed a similar paradigm as in studies one and two and found that males benefitted from the closeness-generating task in ways that women did not (Asher & Aderka, 2019). Although this is a single finding, and the study in question investigated opposite-sex interactions rather than same-sex pairings, as in our studies, Asher and Aderka's findings clearly highlight the fact that our results may not generalize to all individuals with SAD.

Common to our three studies is the issue of causality. In studies one and two, we were unable to manipulate affiliative goals successfully and did not attempt to manipulate our mediating variables. Ultimately, this resulted in a correlational design and we must remain highly tentative in interpreting our results. For study three, although we used an experimental design and highly controlled stimuli as well as multiple measures of affect across time, the study

was conducted entirely online, which limited our ability to observe participants' reaction to stimuli and, though we administered attention checks, we could not directly assess how engaged and attentive participants were throughout the study.

Finally, observed effect sizes from the three studies indicated that statistical power may have limited which effects emerged as statistically significant. We were powered to detect medium to large effect sizes across the three studies, but several of the observed effects were small to medium and non-significant or trending towards statistical significance, possibly representing type II error. Replication, ideally with larger samples, is needed to corroborate the results of these studies.

Treatment implications and future directions

The aspirational goal of this line of research is to improve outcomes for those seeking treatment for SAD. While our program of research may have yielded results that suggest new, testable hypotheses within a treatment context, the studies themselves did not include a treatment component, nor did it include a treatment seeking sample. As such, we present a discussion of the treatment implications within the context of future directions for research. Our data do not have direct implications for treatment, and the ideas discussed in the following section are speculative and exploratory in nature.

In discussing the results of individual studies, we briefly highlighted ideas for promoting curiosity, authenticity, and affiliative goals in intervention protocols in order to promote and enhance experiences of PA. These ideas can likely be readily incorporated into social skills training modules of CBT for SAD. Indeed, research has found that a social skills training component added to, or in place of traditional CBT improves a variety of outcomes for those with SAD (e.g., Herbert et al., 2005; Beidel et al., 2014). Modifying or supplementing

contemporary social skills training protocols may demonstrate improved benefits for positive outcomes. For example, social skills training that emphasizes reciprocity and effective displays of empathy may result in positive influences to the social relationships for those with SAD, which may help to enhance experiences of PA and promote approach motivation for future encounters.

Given our findings that individuals with SAD can experience normal or near-normal levels of PA in response to pleasant stimuli, and recent evidence from Doorley et al. (2020) suggesting that positive experiences may decrease avoidance motivation, there may be benefit to incorporating simple positive mood inductions prior to behavioural experiments into treatment of SAD in order to increase the likelihood of complying with and fully engaging in therapeutic exercises. Another interesting possibility would be to explore whether there may be clinical benefits associated with incorporating elements of the dyadic interaction paradigm employed in studies one and two (Aron et al., 1997) within a treatment context. The paradigm effectively generates closeness, promotes PA, and provides sufficient structure to decrease avoidance behaviour and encourage high SA participants to engage fully in social interaction even in the face of heightened state anxiety. We also posit that the paradigm likely serves to promote state curiosity, as the back-and-forth question format encourages discovery of increasingly intimate information about one's interaction partner.

Another issue for future research is to what extent treatment of the negative cognitions, avoidance behaviours, negative affect and anxiety implicated in SAD could conceivably be tailored in simple ways to promote PA alongside the usual targets of symptom and distress reduction. Recent studies have yielded mixed results, with some indicating that PA is of key importance to promoting approach behaviours in a way that is not addressed by current treatment

protocols that focus on reducing anxiety and negative affect (Sewart et al., 2019; Taylor et al., 2017), and others suggesting that contemporary CBT protocols that explicitly address interpersonal dimensions of SAD succeed in promoting approach behaviour and feelings of satisfaction in relationships without directly targeting PA (Alden et al., 2018). Fully examining the effects of treatment on anxiety and negative cognitions alongside PA, approach motivation, and positive experiences is an ambitious goal, but future clinical research would benefit from careful and separate measurement of these constructs.

Incorporating a dyadic perspective into research and treatment is an area with substantial room for growth. Given the myriad ways in which SAD negatively impacts friendships and romantic relationships it may be beneficial to examine partner and family ratings of outcomes of interest throughout treatment. Our data relied on interactions with a stranger, and do not shed much light onto the complex topic of how SAD impacts ongoing relationships, and whether there is a self-perpetuating cycle of SAD's negative impact on the PA of oneself and others. However, significant correlations between outcomes for participants and their partners in our first two studies suggest that this is an important area to further examine. Assessing PA and social outcomes from the perspective of the patient and their social support systems may provide important insight into whether changes within the individual result in positive changes reported by others, such as increased relationship satisfaction, PA, and approach motivation. These questions would be best-served by longitudinal designs, which could address questions such as "to what is the optimal point of intervention to improve outcomes for those with SAD?" It may be that improving social outcomes through social-behavioural interventions will lead to cascading effects that promote PA in those with SAD, or it may be ideal to target improvements in PA in those with SAD, which may in-turn lead to downstream effects on social relationships.

Whatever its focus, future clinical research on positive emotions in SAD must keep pace with the rapid developments in basic research on positive emotions. In study three, we applied Gilbert and colleagues' (2008) framework to measuring sub-facets of positive emotions in SAD. However, this approach to positive emotions is rapidly becoming outdated. After the start of data collection, new articles emerged in the area of positive emotion science that contribute to a more refined approach to measurement. For example, a recent article by Weidman and Tracy (2019) conducted three studies with over 3000 participants to identify 15 different types of subjectively experienced positive emotions derived from a pool of 475 non-redundant emotion words. Using factor analytic techniques, the authors created and provided initial validation for a comprehensive scale of positive emotions. This represents one of the largest studies to endeavour to better categorize positive emotions and create a system for reliable assessment. Through integrating this kind of new research into clinical research and practice, we will develop increasingly nuanced understanding of positive emotions in SAD, which will inform high quality interventions leading to enduring positive change.

General conclusion

We conducted three studies that served to advance our knowledge of positive emotion deficits in social anxiety. Results broadly supported intact PA reactivity in social anxiety, and illustrate the importance of authenticity, curiosity, reciprocity, and affiliative goals in the experience of positive emotions and social outcomes for high and low socially anxious individuals alike, as well as their social partners. Future research expanding upon these results by employing longitudinal designs and treatment studies designed to promote PA in SAD will, no doubt, further improve our understanding of the role of positive emotions in longer-term social, emotional, and clinical domains for people across the SA spectrum.

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Appendix 1

Task Instructions and Visualisation Exercise

Impression condition visualization exercise:

This is a study of impression formation, and your task is simply to make a positive impression on your partner. We believe that the best way for you to make a good impression on your partner is for you to share with them and for them to share with you.

In order to help you form a positive impression we've arranged for the two of you to engage in a kind of sharing game. Your sharing time will be for about forty five minutes, after which time we will ask you to fill out a questionnaire concerning your experience of interacting with your partner.

Regardless of how you typically approach a social situation, it is important to keep in mind the goal of this particular exercise, which is to make a positive impression on your partner. In order to help you adopt this mind-set, please take a moment and close your eyes... now think about a friend you have made a positive impression on. Try to think of what it means to you to make a good impression on someone else, what making a positive impression looks and feels like, and how you would approach an interaction if making a good impression on another person was your primary goal. There is no right or wrong way to make a good impression on someone, so how you approach this is completely up to you.

I will give you a moment to consider this while I go get your conversation partner. When you feel like you have given your approach some thought, please complete this short questionnaire.

Affiliation condition visualization exercise:

This is a study of interpersonal closeness, and your task is simply to get close to your partner. We believe that the best way for you to get close to your partner is for you to share with them and for them to share with you.

In order to help you get close we've arranged for the two of you to engage in a kind of sharing game. Your sharing time will be for about forty five minutes, after which time we will ask you to fill out some questionnaires concerning your experience of getting close to your partner.

Regardless of how you typically approach a social situation, it is important to keep in mind the goal of this particular exercise, which is to develop a sense of closeness to your partner. In order to help you adopt this mind-set, please take a moment and close your eyes... now think about a friend you have grown close to. Try to think of what it means to you to become close with someone else, what building closeness to another person looks and feels like. Think of how you would approach an interaction if getting close to the other person was your primary goal. There is no right or wrong way to become close and bond with another person, so how you approach this is completely up to you.

I will give you a moment to consider this while I go get your conversation partner. When you feel like you have given your approach some thought, please complete this short questionnaire.

Appendix 2

Coding Schemes for Behavioural Ratings

1. Empathic Support Behaviours

Please record the total number of instances of empathic support behaviours displayed by the primary participant, and not those received by the primary participant, during the interaction. Empathic support behaviours include comments such as "I would have felt the same way", statements that defend the participant's partner like "I would have done the same thing", and advice such as "you should go talk to a professor about that".

**Note:*

- Do not count comments made during the exchange for card number 36 in the third set of slips which states "Share a personal problem and ask your partner's advice on how he or she might handle it. Also, ask your partner to reflect back to you how you seem to be feeling about the problem you have chosen".
- Unsolicited advice is still to be included in the count, as long as the intent remains to support the other individual.
- Gratitude and pleasantries are not to be included (e.g., "thank you for saying that", "you are very nice") nor is simply agreeing with one's partner (e.g., "yeah", "that's true", "for sure").
- Do include empathic statements about how an individual handled a situation (e.g., "it sounds like you had a tough decision to make")

	Number of Empathic Comments Made	TOTAL:
Set 1 Slips		
Set 2 Slips		
Set 3 Slips*		
TOTAL Number of Comments Made Throughout Entire Conversation =		

2. *Follow-Up Questions*

Please record the number of follow-up questions asked by the primary participant, and not the interaction partner, throughout the entire 45-minute conversation. Follow-up questions are specific questions asked after a general or open question to clarify or elicit further information.

- If a comment is both an “empathic support” and a “follow-up question” code it **only as empathic support**

Number of Follow-Up Questions Asked		TOTAL:
Set 1 Slips		
Set 2 Slips		
Set 3 Slips		
TOTAL Number of Follow-Up Questions Asked Throughout Entire Conversation =		

3. Emotional Expressivity

Please rate the primary participant's degree of emotional expressivity, defined as the participant's range of affect displayed throughout the entire 45-minute conversation (i.e., provide a single, global score), using the scale below.

**Note:*

- Both positive emotional expressions (smiling, laughing) and negative emotional expressions (tearful, demure) are to be included in determining the total range of affect displayed.
- Scores will reflect whether the degree of emotional expression is consistent with the topic matter. For example, if the participant discusses emotionally vulnerable topic but fails to display consistent affect or emotional expression, he/she will receive a lower score.

1	2	3	4	5	6	7	8	9
No variability in Affect			Occasional Affective Expression					Wide Range of Affect Displayed

Participant with a score of 1:

- Showed obvious signs of lack of emotionality when responding to partner's narratives or emotional displays
- Content of own narratives was exclusively devoid of emotional content
- In the presence of own emotional narrative, he/she stated emotional content in a matter-of-fact manner without any deviation in affect from baseline

Participant with a score of 5:

- Reacted emotionally to some, but not all, of partner's emotional disclosures
- May have disclosed emotional narrative content in own responses but only occasionally displayed affect when discussing the matter; display of emotion was muted or blunted when considering the content
- Was selective in which emotions to display (e.g., readily displays positive but not negative emotionality)

Participant with a score of 9:

- Reacted emotionally to partner's affective disclosures
- Displayed wide range of affect (both pleasant and unpleasant) on multiple occasions throughout conversation
- Almost always included some affective content in own disclosures
- Always expressed emotionality consistent with the narrative

5. *Reciprocity*

Please rate the overall responsivity of the primary participant in matching his/her partner's affective content and depth of content throughout the entire conversation using the scale below.

- *Affective responsivity* refers to matching the emotional nature of the content (i.e., partner tells a sad story, participant responds with similar affective content).
- *Depth responsivity* refers to matching the level of intimacy in the disclosed response/narrative (i.e., partner tells a story that is deeply reflective of their beliefs, morals, or is an extreme event, participant responds with similar depth).

Participant with a score of 1:

Seemingly no correlation between partner's content (affective or depth) and that of participant

Participant with a score of 5:

Tended to respond in kind with similar (depth or affective) content, but occasionally mismatched by either under or over-disclosing.

Participant with score of 9:

Participant's content (depth or affective) was fluidly in sync with that of partner, and almost always matched.

(a) *Affective Content*

1	2	3	4	5	6	7	8	9
No				Moderate				High
Responsivity				Responsivity				Responsivity

(b) *Depth of Content*

1	2	3	4	5	6	7	8	9
No				Moderate				High
Responsivity				Responsivity				Responsivity

(c) *Overall Reciprocity Score*

$$\text{Overall Reciprocity} = \frac{(\text{Affective Content} + \text{Depth of Content})}{2} = \underline{\hspace{2cm}}$$

Appendix 3

Social and Non-Social Imagery Audio-File Scripts and Sound Effects

Non-social script

0:00 today is your day off. You're looking forward to a relaxing day in the country. Perhaps a nice campfire, an evening under the stars

0:12 As you gaze around the woodland trail, you can hear the sounds of the forest surrounding you, a gentle breeze is blowing (bird sound effect 0:15-0:25), birds are singing, you can see the trees shift and sway in the soft wind. As you make your way through the maze of trees, you can hear the sounds of rushing water from a nearby stream (water sounds 0:30-0:33). You take in a "deeeep" breath of the fresh air as you walk down the trail (footsteps 0:37-0:34). The path is soft beneath your shoes, a mixture of soil, fallen leaves, pine needles and moss. As the sun fades in the distance, you pick out a spot for your campfire and reach into your pocket for some matches.

0:49 You flinch backwards as the tinder quickly ignites (striking match 0:52- 0:53), and the evening forest is quickly filled with the sound of your crackling fire (fire sound effect 0:55). The flames lick upwards towards the colourful autumn leaves hanging overhead, but quickly subside to mellow dancing columns of orange and red. Your heartbeat begins to slow in your chest as you comfortably sit by the fire you created. You close your eyes and feel the warmth emanating off the fire on your arms and face, like a warm embrace surrounding you. Your body feels relaxed(?). You feel a slight smile pulling at the corner of your mouth, as you open your eyes and look up at the evening sky. You can see the first stars of the evening starting to appear in the distance. You take another deep breath of the fresh country air and pull out your favorite snack to enjoy under the stars by the fire.

Social variant of forest script (bolded text to highlight differences)

0:00 today is your day off. You're looking forward to a relaxing day in the country **with a close friend**. Perhaps a nice campfire, an evening under the stars

0:12 As you **and your friend** gaze around the woodland trail, you can hear the sounds of the forest surrounding you, a gentle breeze is blowing (bird sound effect 0:15-0:25), birds are singing, you can see the trees shift and sway in the soft wind. **Together, you** make your way through the maze of trees, you can hear the sounds of rushing water from a nearby stream (water sounds 0:30-0:33). You take in a "deeeep" breath of the fresh air as you walk down the trail (footsteps 0:37-0:34), **casually chatting with your friend**. The path is soft beneath your shoes, a mixture of soil, fallen leaves, pine needles and moss. As the sun fades in the distance, you **agree on a spot** for your campfire and reach into your pocket for some matches.

0:49 You flinch backwards as the tinder quickly ignites (striking match 0:52- 0:53), and the evening forest is quickly filled with the sound of your crackling fire (fire sound effect 0:55). The flames lick upwards towards the colourful autumn leaves hanging overhead, but quickly subside to mellow dancing columns of orange and red. Your heartbeat begins to slow in your chest as you comfortably sit **next to your friend** by the fire you created. You close your eyes and feel the

warmth emanating off the fire on your arms and face, like a warm embrace surrounding you. Your body feels relaxed. You feel a slight smile pulling at the corner of your mouth, as you open your eyes and **both** look up at the evening sky. You can see the first stars of the evening starting to appear in the distance. You take another deep breath of the fresh country air **as you talk with your friend** and pull out your favorite snack to **share** under the stars by the fire.