Vulnerabilities in social anxiety: Integrating intra- and interpersonal perspectives

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Rivkah Ginat-Frolich[1*], Eva Gilboa-Schechtman[2*], Jonathan D. Huppert[1*],

Idan M. Aderka[3]

Lynn E. Alden[4]

Yair Bar-Haim[5]

Eni S. Becker[6]

Amit Bernstein[3]

Ronny Geva[2]

Richard G. Heimberg[7]

Stefan G. Hofmann[8]

Todd B. Kashdan[9]

Ernst H.W. Koster[10]

Joshua Lipsitz[11]

Jon K. Maner[12]

David A. Moscovitch[13]

Pierre Philippot[14]

Ronald M. Rapee[15]

Karin Roelofs[6, 25]

Thomas L. Rodebaugh[16]

Franklin R. Schneier[17]

Oliver C. Schultheiss[18]

Ben Shahar[19]

Ulrich Stangier[20]

Murray B. Stein[21]

Lusia Stopa[22]

Charles T. Taylor[21]

Justin W. Weeks[23]

Matthias J. Wieser[24]

[1] Department of Psychology, Hebrew University, Israel. [2] Department of Psychology, Bar Ilan University, Israel, [3] School of Psychological Sciences, University of Haifa, Israel. [4] Department of Psychology, University of British Columbia, Canada. [5] School of Psychological Sciences and Sagol School of Neuroscience, Tel Aviv University, Israel. [6] Behavioural Science Institute, Radboud University Nijmegen, Netherlands. [7] Department of Psychology, Temple University, Philadelphia. [8] Department of Clinical Psychology, Philipps-University Marburg, Marburg, Germany. Department of Psychological and Brain Sciences, Boston University, Boston. [9] Department of Psychology, George Mason University, Virginia.[10] Department of Experimental Clinical and Health Psychology, Ghent University, Belgium. [11] Department of Psychology, Ben Gurion University, Israel. [12] Department of Psychology, Florida State University. [13] Department of Psychology and Centre for Mental Health Research & Treatment, University of Waterloo, Canada. [14] Department of Psychology, Université Catholique de Louvain, Belgium. [15] Centre for Emotional Health and School of Psychological Sciences, Macquarie University, Australia. [16]Department of Psychological and Brain Sciences, Washington University in St. Louis, Missouri. [17] New York State Psychiatric Institute, Columbia University Irving Medical Center, New York. [18] Department of Psychology, Friedrich-Alexander University, Erlangen, Germany. [19]The Paul Baerwald School of Social Work and Social Welfare, Hebrew University, Jerusalem, Israel. [20] Department of Psychology, Goethe University Frankfurt, Germany. [21] Department of Psychiatry and School of Public Health, University of California San Diego. [22] Department of Psychology, University of Southampton. England. [23] Nebraska Medicine, Department of Psychology; University of Nebraska Medical Center, Department of Psychiatry. [24] Department of Psychology, Education, and Child Studies, Erasmus University Rotterdam, Netherlands. [25] Donders Institute, Radboud University Nijmegen, Netherlands.

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Correspondence concerning this article should be addressed to Jonathan D. Huppert, Department of Psychology, The Hebrew University of Jerusalem, Mount Scopus, Jerusalem 91905, Israel. E-mail: jonathan.huppert@mail.huji.ac.il. Telephone: 972-2-5883376; Fax: 972-2-5881159.

Social anxiety disorder (SAD) involves marked anxiety about social situations (DSM-5-TR; American Psychiatric Association, 2022), with rates for estimated lifetime prevalence ranging from 4% (Stein et al., 2017) to 13% (Kessler et al., 2012). Fears of criticism, rejection, and social incompetence lead to significant avoidance and safety behaviors, which, in turn, are related to disruptions in psychological, interpersonal, and professional domains (Aderka et al., 2012). Theoretical models of SAD consider excessive responsivity (e.g., physiological, cognitive, behavioral, and emotional) and impaired emotion regulation when encountering perceived social threats as core features of SAD (Clark & Beck, 2010; Clark & Wells, 1995; Hofmann, 2007; Morrison & Heimberg, 2013; Moscovitch, 2009; Rapee & Heimberg, 1997). However, the mechanisms underlying this reactivity are not fully understood. To this end, in the present paper, we review the basic psychological maintaining processes involved in social anxiety (SA)[1]. We focus on maintaining processes that are theory-based, psychological factors that are proposed to partially underlie and sustain a target problem.

The first three authors solicited responses from attendees at an in-person conference on the topic of individual differences in reactivity to social stress and intervention approaches geared toward reducing this reactivity. Leading experts in the field of SA research were identified as individuals who had published five or more articles relating to SA following an informal survey of the published literature by the second and third author. They were then invited to participate in the conference and subsequently in the writing of this narrative review, with an eye toward including diverse scientific perspectives, methodologies, and theoretical views. Experts were asked what they considered the core vulnerabilities of SAD and which mechanisms would best

[1] For the sake of clarity, when referring to individuals high on the continuum of SA severity (including those likely to be diagnosed with SAD), the term high-SA (highly socially anxious) individuals is used, whereas clinical samples are referred to as individuals with SAD.

facilitate change in these core vulnerabilities. In addition, experts were asked to reflect on the ways these vulnerabilities and mechanisms related to the treatment of SAD, which is discussed in a companion paper (see Huppert et al., submitted). After providing their answers, the lead authors integrated responses into an initial draft of the current narrative review. All authors then provided feedback and edits on multiple drafts of the review prior to its submission.

The lead authors conceptualized the answers as belonging to two general categories: intrapersonal (or self-related) and interpersonal processes. Prominent cognitive models of SA (e.g., Clark & Beck, 2010; Clark & Wells, 1995; Hofmann, 2007; Morrison & Heimberg, 2013; Moscovitch, 2009; Rapee & Heimberg, 1997) are mostly intrapersonal in nature and are concerned with the ways SA individuals process incoming information and the way this processing affects their own cognitions, behaviors and emotions. While referencing interaction partners, these theories are less concerned with the way these cognitions and emotions affect those who interact with an individual with SA. Interpersonal theories highlight the transactional nature of social processes, focusing on the ways SA individuals impact and are impacted by social interactions (e.g., Alden & Taylor, 2004; Hofmann, 2014). We view intrapersonal and interpersonal factors as likely influencing each other bidirectionally, with social interactions influencing intrapersonal processes and the latter, in turn, feeding back into the experience of the self and others. In the present review, we attempt to elucidate how these intrapersonal and interpersonal factors are likely to interact.

In addition, the distinction between processes and content is emphasized to describe the basic vulnerabilities in SA better. Processes are methods of gathering, contextualizing, distilling, and evaluating information about the self and others (both of which are particularly important in the case of SA). Content (e.g., thoughts, beliefs, emotions) is typically the resultant product of these processes. The most common intrapersonal processes are self-referential, cognitive (e.g., attention, interpretation, memory, imagery), and emotion regulation. Intrapersonal processes in

SA involve a complex interplay of content and processes regarding the self and others. They can be considered an essential determinant of how individuals respond to social stress. Interpersonal processes occur within the context of either dyadic or group interactions. Both intrapersonal and interpersonal processes are informed by the motivations and goals surrounding social interactions and are observed in cognitive, interpersonal, and evolutionary models of SA (Clark & Beck, 2010; Clark & Wells, 1995; Hofmann, 2007; Moscovitch, 2009; Rapee & Heimberg, 1997). Examples of intrapersonal motivations related to SAD include reward processing (e.g., the ability to learn from reward) and behavioral strategies to prevent devaluation, shame, and possible rejection. Interpersonal motivations are often oriented toward affiliation (or belongingness) versus competition (social rank) or approach versus avoidance. These motivational and behavioral outcomes are often conceptualized as being directed by biologically based systems such as the threat evaluation, behavioral activation, behavioral inhibition, affiliation, and/or social-rank systems.

Intrapersonal Processes

Self-representations and Self-referential Processes

Cognitive models of SAD highlight negative views of the self as maintaining factors (Clark & Wells, 1995; Clark & Beck, 2010; Hofmann, 2007; Moscovitch, 2009; Rapee & Heimberg, 1997). Some research has focused on self-concept[2] (i.e., how someone thinks about, evaluates, or perceives oneself; e.g., Stopa et al., 2010; Ritter et al., 2013) as a core vulnerability in SA. Self-concept is determined by automatic, implicit processes and strategic, explicit evaluations. Negative self-beliefs typically center on perceived deficits in social skills, personality traits, visible signs of anxiety, and physical appearance. These are uniquely elevated among individuals with SAD relative to anxious, non-SA individuals, and healthy controls (Moscovitch

[2] This construct has also been studied under terms including self-schema, self-evaluation, self-portrayal, self-concept clarity, and self-esteem.

et al., 2015). In individuals with SAD, these concerns are activated via context-specific cues that signal that a given social situation could expose their flaws to others who could, in turn, ridicule or reject them. We define implicit self-evaluations as unconscious self-evaluations that are typically measured via individuals' performance on response latency or psychophysiological measures (with self-evaluation associated with delayed responses and greater physiological arousal), whereas explicit self-evaluations are more deliberative and can be measured via self-report and verbal accounts. There is evidence that implicit, negatively biased self-evaluation processes are activated in individuals with SAD in socially threatening situations. In contrast, such implicit self-evaluations may be less negative when not under threat (Hiller et al., 2017). However, the evidence for implicit negative self-evaluations when not under threat is mixed and may be influenced by the examined content (Gilboa-Schechtman et al., 2017). With regard to explicit self-evaluations, individuals with SAD often report experiencing negative self-related images in which they recall themselves behaving in socially incompetent ways (Hackmann et al., 1998). They often erroneously believe that these self-images are accurate reflections of how they appear to others, which might in part be related to low levels of self-compassion found among these individuals (Werner et al., 2012). Interestingly, such self-evaluations have been found to be more closely associated with SA severity than with depression severity or self-esteem (Berger et al., 2017). Importantly, although negative self-judgments occur in various psychopathologies (Werner et al., 2019), negative social expectations, interpretations, and self-images predict SAD symptoms even when depression is statistically controlled (e.g., Huppert et al., 2007).

We postulate that a variety of self-referential processes maintain the negative self-images. For example, self-criticism, which is elevated in SAD (Cox et al., 2004), may serve both to activate and perpetuate negative self-views while also serving as a potential regulatory strategy designed to prevent exposure of perceived flaws (Lazarus & Shahar, 2018; Regev et al., 2012; Shahar et al., 2015; see below). Metacognitive processes (i.e., a person's beliefs about thinking)

may also serve to maintain SA symptoms (Hartman, 1983). For example, positive beliefs about worry (e.g., that worrying might increase motivation/decrease negative outcomes) were found to correlate significantly with SA in non-clinical samples and were unique predictors of SA (Gkika et al., 2018). In addition, positive beliefs about worry were found to predict negative self-evaluation following a social interaction in individuals suffering from SAD (Nordahl et al., 2016). Another prominent self-referential process is excessive self-focused (i.e., internally focused) attention, which has been implicated as important in maintaining SAD (Clark & Beck, 2010; Clark & Wells, 1995; Mellings & Alden, 2000). Indeed, the more one engages in self-focused processing, the more difficult it becomes to attend to information present in the surrounding environment (Clark & Beck, 2010; Clark & Wells, 1995; Mor & Winquist, 2002). Of note, self-focus in SAD has been associated with activation of specific brain regions involved in self-reflective processes and theory of mind, the ability to infer the mental states of others. These regions include cortical midline structures as well as regions of the intrinsically activated default mode network, such as the medial prefrontal cortex (MPFC) and posterior cingulate cortex (PCC)/precuneus (Yoon et al., 2019). In this way, excessive self-focus may be associated with dysfunction of underlying brain systems that utilize self-related information to understand the mental state of others. In addition, the brainstem (Geva et al., 2017) has been proposed to underlie social arousal and social initiation alterations in SAD (Li, 2018). In short, self-referential processes appear to be central to the generation of negative self-beliefs and images and thus contribute to the maintenance of SA.

Emotions and Emotional Processes

Many studies have examined the relation of SA to negative emotions, such as anxiety, anger, embarrassment, humiliation, and shame (Gilbert & Trower, 2001; Keltner & Buswell, 1997; Lazarus & Shahar, 2018). Although anxiety and anger are associated with other disorders such as generalized anxiety disorder and depression, research suggests that shame,

embarrassment, and humiliation are interpersonally-based, negative emotions particularly relevant to SAD and are an important part of evolutionary models focused on affiliation and social status (Gilboa-Schechtman, Shachar, et al., 2014; see below). Due to its theoretical centrality in cognitive, interpersonal, and evolutionary models, robust lines of research have examined the role of shame in SAD, which some consider being a vulnerability contributing to the development of the disorder and a driver of avoidance and self-concealment (Elliott & Shahar, 2017; Swee et al., 2021).

Whereas negative affect is a key characteristic of multiple psychopathologies, SAD is the only anxiety disorder to consistently have a significant cross-sectional association with low positive affect, even when statistically controlling for depression (Kashdan, 2007). Positive affect might be routinely reduced due to negative events (e.g., adverse parental and peer interactions; see Richey et al., 2019) and attempts to suppress or conceal emotional expressions (Kashdan & Steger, 2006). Yet, some evidence points to low positive affect as being involved in the prospective maintenance of SAD symptoms (Naragon-Gainey et al., 2013). Notably, low positive affect has also been shown to moderate the relation between positive interpretation bias and adaptive emotion regulation (Romano et al., 2020). A series of studies suggested that the main constituent of positive affect lacking in SA is pride (a self-evaluative, interpersonal emotion) rather than joy, with the potential secondary contribution of love (Cohen & Huppert, 2018; Chin et al., 2023). Interestingly, these emotional deficits converge with Gilboa-Schechtman's social rank/affiliation model of SAD (see below) and its focus on shame and pride as central emotions in SAD (Gilboa-Schechtman, Shachar, et al., 2014).

Further research is necessary to better understand several questions regarding the role of emotion in SA. The scope of negativity magnification and positivity impairment (i.e., are all negative emotions amplified? Are all positive emotions dampened?) in SA needs to be further explored. In addition, whether SA is related to over-and under-reactivity in negative and positive

affect, respectively, or to less flexibility or different beliefs about emotions and their malleability (cf., De Castella et al., 2014) could be further elucidated. Finally, it is important to examine the causal relation between SA and the experience of specific negative (e.g., shame, humiliation) and positive (e.g., pride) emotions.

Emotion regulation (ER) refers to the processes through which individuals seek to influence which emotions they feel, when they feel them, and how they experience and express them (Gross, 2015). Dysregulation in these processes has been proposed to underlie many psychological disorders, including SAD (Sheppes et al., 2015). Individuals with SAD show deficits in describing, labeling, and accurately understanding their emotional experiences (Farmer & Kashdan, 2015; O'Toole et al., 2013) and exhibit less negative emotion differentiation (i.e., the use of elaborate descriptions of the discrete emotions being felt) than healthy controls (Kashdan & Farmer, 2014). Notably, dysfunctional ER is postulated as a key vulnerability to SAD (Dryman & Heimberg, 2018), with research centering on situation selection (discussed below in the section on avoidance), cognitive reappraisal, and expressive suppression (Gross, 2015).

Cognitive reappraisal, one commonly researched ER strategy, refers to individuals altering their emotions by changing their thought patterns. This can be done by changing the meaning, or the goals or intrinsic motivations assigned, to a given situation in order to alter its emotional charge (Gross & Thompson, 2007). Individuals with SAD report lower cognitive reappraisal self-efficacy than individuals low in SA (Kivity & Huppert, 2018, 2019). However, high-SA individuals appear to successfully use reappraisal when being instructed to do so in the lab (Kivity & Huppert, 2018) and when trained to do so outside the lab (Kivity & Huppert, 2016). Thus, questions remain regarding the specific difficulties in reappraisal that characterize SAD. Furthermore, another possibility is that impaired cognitive reappraisal in individuals with SAD might reflect a tendency to prefer avoidance strategies (e.g., McMahon & Naragon-Gainey, 2020). In addition, avoidance in SA may be supported by the findings that individuals with SAD

tend to engage in avoidance-motivated, overgeneral emotional information processing in social situations (e.g., Philippot et al., 2006).

Whereas a strong overt emotional reaction can lead high-SA individuals to feel more publicly exposed, suppression of emotional expression may dominate their emotional regulation repertoire (Kashdan et al., 2013; Kivity & Huppert, 2019). Indeed, individuals with SAD show a greater tendency toward experiential avoidance as an attempt to manage and control their emotions rather than engage in activities that offer opportunities for well-being (Goodman et al., 2019). Decreasing emotionally expressive behavior enhances negative and dampens positive emotions (Gross, 2015). Future research might consider whether individuals with SAD demonstrate greater intolerance of specific negative social emotions (e.g., embarrassment, shame) or whether SAD is also characterized by a similar intolerance of all negative emotions. In addition, how adaptively and flexibly high-SA individuals and individuals with SAD use different ER strategies need to be further examined (cf. O'Toole et al., 2017). Finally, as interpersonal relationships can enhance individuals' emotion-regulatory ability by aiding in engaging in regulatory strategies (e.g., through aiding in selecting and engaging in regulatory strategies; Hofmann, 2014; Zaki & Williams, 2013), a better understanding of interpersonal ER in SA is an important area for development (see also Barthel et al., 2018).

Informational Processing Biases

Attentional Biases. Several dysfunctional attentional processes have been implicated as potential vulnerability factors in SAD. Selective attention to and difficulties with disengagement from social threats (e.g., criticism, facial expressions of contempt) are often cited as key processes in SAD (Hirsch & Clark, 2004), with some evidence suggesting that individuals with SAD have difficulty disengaging from threats (Taylor et al., 2016). Relatedly, vigilance (i.e., the degree to which one is attuned to a threat) and early engagement (i.e., how quickly one identifies a threat) have been proposed as critical processes in SA, with some studies showing excessive

early engagement for both socially threatening and positive stimuli (Lazarov et al., 2016). It is important to note there are drawbacks to the cognitive/experimental paradigms frequently used to measure attention, such as the modified dot-probe task, due to their limited scope, their difficulty differentiating between vigilance and disengagement, and poor reliability (Rodebaugh et al., 2016). Indeed, a recent meta-analysis found no evidence for attentional bias among individuals with anxiety disorders, including SAD (Kruijt et al., 2019; cf. Price et al., 2016 regarding threat-specific attentional biases among individuals with SAD). Additional methods for measuring these biases should be explored (Amir & Bernstein, 2022; Wieser & Keil, 2020).

The redirection of one's attention toward or away from a stimulus to modify emotional intensity has also been proposed to be involved in maintaining SAD (Heinrichs & Hofmann, 2001). One example is controlled attentional avoidance. Individuals preferentially avoid a threat cue - or a neutral stimulus previously associated with a threat - by focusing their attention elsewhere, often observed among high-SA individuals. Notably, mechanisms related to fear learning (e.g., threat-safety discrimination, generalization, extinction) and avoidance are still under-investigated in the SA literature. Whereas there is no evidence of fear overgeneralization among high-SA individuals, recent studies offer evidence of issues with threat discrimination learning in this population (Ahrens et al., 2016; Stegmann et al., 2020). Whether the nature of the threatening stimulus (i.e., inherent or learned) is important in attentional processes in SA needs to be further elucidated (cf. Fung & Alden, 2020).

It seems likely that attentional biases among high-SA individuals lead to interference with learning new, beneficial information from one's surroundings and may result in avoidant behaviors, thereby preventing disconfirmation or inhibition of one's beliefs about oneself and others. Questions remain regarding the most appropriate ways to measure attentional biases in SA, with current directions focusing on advanced EEG-based and eye-tracking methodologies (Wieser & Keil, 2020) and examining updated scoring techniques that quantify attentional bias as

a dynamic process in time, rather than a stable static trait (e.g., Zvielli et al., 2015). In addition, recent work has examined mindfulness as a specific type of attentional awareness (e.g., Hadash & Bernstein, 2019), which could be adapted to studies on SA. More research is needed to establish better the nature and conditions of attentional processes in SA.

Evaluation Biases: Interpretation and Judgment. Evaluation biases, such as interpretation and judgment biases, play an important role in SA. Interpretation biases in SA are typically defined as negative (and less positive) inferences derived from ambiguous social information. Judgment biases (also known as expectancy biases) are typically viewed as the elevated perception of probability (i.e., risk or likelihood) or cost (i.e., emotional impact) for relatively unambiguously negative social events.

There is strong evidence that high-SA individuals tend to negatively interpret ambiguous social information and lack positive interpretations in social situations (Mobini et al., 2013; Azoulay et al., 2020). Such biases are relatively specific to SA (Huppert et al., 2007; Stopa & Clark, 2000) and appear in high-SA adults and children with SAD (Klein et al., 2019; Mobach et al., 2019). Induction of negative interpretation biases in non-anxious individuals has been found to lead to similar avoidance responses as those seen in individuals with SAD, suggesting that interpretation biases may lead to or exacerbate certain forms of automatic attentional biases and play a causal role in SA (Lange et al., 2010). In addition, the processes of negatively biased self and other-related judgments (e.g., I will disappoint others; others will expect too much from me) influence the relation between SA and low positive affect (Alden et al., 2008).

Autobiographical Memory Biases. High-SA individuals tend to show a bias for personal memories congruent with a socially inadequate self and may ascribe more threatening meanings to these memories (Peschard & Philippot, 2016). Further, negative autobiographical memories and self-representations may interfere with both retrieval of positive memories and learning positive information about the self (Brewin, 2006; Button et al., 2015). Recent work has

also found that autobiographical memory for positive feedback in a social task erodes over time, suggesting that positive social information does not "stick" in SA (Glazier & Alden, 2019), likely leading to negative autobiographical memories dominating. Relatedly, the aversive memories of individuals with SAD have been found to contain richer episodic detail and are appraised as more intrusive and distressing than the aversive memories of non-anxious controls (Moscovitch et al., 2018). Of note, evidence is mixed regarding lab-based, non-autobiographical memory biases of threat stimuli (e.g., recall of threatening words or faces) in SA (Kuckertz & Amir, 2014).

There are specific characteristics of autobiographical memories in high-SA individuals (Morgan, 2010). Autobiographical memories of social events in individuals with SAD contain more self-referential information and fewer external sensorial details than those of non-anxious individuals (D'Argembeau et al., 2006). Further, individuals with SAD tended to remember social interactions more from an observer perspective than from a field perspective (Hulme et al., 2012). Finally, increases in post-traumatic symptoms following socially stressful events are positively related to SA severity (e.g., Azoulay & Gilboa-Schechtman, 2022; Sapach & Carleton, 2020). Together, these findings suggest that the continued examination of characteristics of autobiographical memory pertaining to socially stressful events, such as exclusion or social defeat, may be an important avenue for better understanding the etiology and maintenance of SA symptoms (Moscovitch et al., 2023).

The Interplay of Cognitive Biases. Cognitive models of SAD assume that early information-processing biases (e.g., attention) have downstream effects on other information-processing mechanisms such as interpretation (Lange et al., 2010). Indeed, the combined influence of cognitive biases might more greatly impact the maintenance of SA than any one bias in isolation (combined cognitive bias hypothesis; Hirsch et al., 2006), although research on this hypothesis is scarce (Pergamin-Hight et al., 2016; Rinck & Becker, 2005). The combined cognitive bias hypothesis may be extended to imply that interpretation biases may affect

attentional biases "upstream" by conferring negative meaning to a wide range of stimuli and impact judgment and autobiographical memory biases "downstream" (for a review, see Everaert et al., 2020). Future research is needed to examine the associations between various cognitive biases and how these patterns account for SA severity.

Intrapersonal Processes: Summary and Integration

The preceding sections illustrate the richness and the diversity of the intrapersonal approach, which is primarily concerned with self-related content and processes. Many of the reviewed lines of research have proceeded independently of one another and without explicit consideration of investigations on the definition and structure of the core organizing structure -- that of the self (e.g., Northoff, 2016). Despite the many theories postulating associations between the biased interpretation of social events and negative self-content, data supporting the causal role of interpretation biases in forming negative self-representations are lacking. The increased interest in and evidence for autobiographical memory biases provides important avenues for further research on their relations with other proposed central intrapersonal processes in SA. Moreover, enhanced attention to social threat may contribute to an ongoing experience of rejection and defeat (such as enhanced shame and diminished pride experiences), which negatively impacts self-representations. These experiences may, in turn, lead to more consistent and less context-dependent use of avoidance strategies. Furthermore, it is likely that the presence of others moderates intrapersonal processes (e.g., amplified when around rejecting or dominant others).

Interpersonal Processes

Approach and Avoidance Systems and Processes

Avoidance. SAD is often conceptualized and treated as a disorder of the avoidance (negative valence) system (Stein & Stein, 2008), focusing on avoiding criticism, rejection, and humiliation. Avoidance has also been cited as a predictor of the onset of SAD (Vriends et al.,

2011), with evidence that higher cortisol responses to social stress are related to increased avoidance tendencies among individuals with SAD (Roelofs et al., 2009). Individuals with SAD show alterations in frontal-amygdalar circuitries related to the anticipation of social stress (Cremers & Roelofs, 2016). Various dimensions of avoidance observed among individuals with SAD may contribute to the maintenance of this condition. These dimensions include automatic versus strategic, active (engaging followed by disengaging/escape) versus passive (not engaging), and overt (e.g., situational avoidance) versus subtle avoidance (e.g., mentally rehearsing what one is about to say to avoid making a mistake). However, it should be noted that not all avoidance behaviors are maladaptive. Maladaptiveness depends on the functionality of these behaviors in the short and long-term (e.g., leaving a social situation in which one is overwhelmed may be adaptive, particularly if the intent is to engage again later; Hofmann & Hay, 2018). In addition, not all avoidance in SA is of negative feedback, it can also be of positive feedback (Weeks & Howell, 2012; see below)

Overt avoidance of social situations (known as situation selection in the ER literature) is a core aspect of many models of SA, contributing to the maintenance of negative beliefs and lack of positive affect. Indeed, while anxiety is uncomfortable, avoidance of situations could ultimately lead to fewer meaningful or enjoyable interactions (Kashdan et al., 2013). Although avoidance of social situations is characteristic of SAD and significantly elevated compared to other mental disorders such as depression (Stangier et al., 2006), most individuals with SAD do not avoid all social interactions (Russell et al., 2011). Therefore, additional levels of regulation are also likely disrupted, beginning with how SA individuals' approach (or avoid) social interactions.

Safety behaviors (i.e., actions used to prevent feared outcomes without complete disengagement from the situation) are a frequently studied category of avoidance behavior and may influence the development and maintenance of SAD (Piccirillo et al., 2016). For example,

safety behaviors among high-SA individuals (e.g., expressive suppression) may result in self-concealment and the presentation of an inauthentic facade (Aiken et al., 2014). These behaviors prevent the potential disconfirmation of beliefs that the self is unworthy, unlikeable, or deficient. The use of safety behaviors during in vivo social threat has been found to mediate the strong association between negative self-portrayal concerns and elevated negative affect (Moscovitch et al., 2013), resulting in decreases in positive affect and increasing the likelihood of social performance deficits (Langer & Rodebaugh, 2013; Rowa et al., 2015). Additional studies have highlighted that safety behaviors make individuals with SAD less socially attractive and less likely to receive positive feedback from others (e.g., Plasencia et al., 2011; Voncken et al., 2008).

A consequence of safety behaviors is the maintenance of core negative self-schemas (i.e., negative views about oneself), illustrating the close connection between the self and social relationships in SAD (Taylor & Alden, 2010). In addition, elimination of safety behaviors in social interactions has been shown to result in an increased sense of authenticity, which, in turn, mediated increases in positive affect, social approach motivation, and more positive perceptions of partners' responses among individuals with SAD (Plasencia et al., 2016). Safety behaviors have a fundamental impact on individuals with SAD's sense of self, perceptions of others, and ability to function in social situations adaptively.

Approach. It is increasingly documented that SAD is characterized by a dysregulation of the approach (positive valence) system on behavioral (e.g., Weeks & Heimberg, 2012) and neurobiological (e.g., Brühl et al., 2014) levels. The approach system guides people toward situations with reward potential and is critical in developing and maintaining satisfying social relationships (Blalock et al., 2018). Individuals with SAD are less reward-driven (Cremers et al., 2015) and experience diminished approach motivation and behaviors in situations in which implicit and explicit positive social cues are salient (Roelofs et al., 2010). Further, individuals with SAD demonstrate diminished activation in reward-related neural regions (e.g., striatum)

when anticipating and receiving positive social feedback (Cremers et al., 2015; Richey et al., 2017) — suggesting a specific neurobiological basis for blunted approach motivation and reactivity (Richey et al., 2019). Evidence suggests that imbalance between the approach and avoidance systems (i.e., inhibited social approach and enhanced social avoidance) independently contribute to the severity and impairment of SAD (Rodebaugh et al., 2017).

Affiliation and Social Rank Systems and Processes

Affiliation. The affiliation system, which supports the formation, maintenance, and restoration of close social bonds (Feldman, 2012; Weinberger et al., 2010) is crucial among social species as it facilitates social inclusion (Baumeister & Leary, 1995). Yet, it appears to be under-utilized among high-SA individuals (Trower & Gilbert, 1989). Indeed, individuals with SAD have been found to display lower frequency and intensity of affiliative intent (e.g., smiling) during relationship formation (Pearlstein et al., 2019). Additionally, high-SA individuals showed less unintentional movement synchrony, a possible marker for decreased affiliation attunement (Abbott et al., 2018). Of note, progesterone is involved in social bonding. It may be associated with a woman's level of implicit social affiliative motivation (Schultheiss et al., 2004), which may be related to the increase in SA symptoms observed in the luteal phase of the menstrual cycle. For example, although women low in SA display increases in progesterone in response to rejection (consistent with a desire to re-affiliate; Maner et al., 2010), high-SA women display inhibited release of progesterone (Reynolds et al., 2018), possibly signaling a decrease in affiliative motivation (cf. Köllner & Schultheiss, 2014). Such a decrease appears to be related to impaired affiliative functioning.

Indeed, individuals with SAD report marked impairments in social relationship functioning (Richey et al., 2019). Having close relationships satisfies a basic human need, and the ability to relate to others is linked to health and success in many domains across the lifespan (Hofmann & Doan, 2018). Evidence points to social isolation and deficits in relationship

formation being different dimensions of the clinical presentation in SA and not merely an epiphenomenon of the anxiety-related symptoms and avoidance (Alden & Taylor, 2011). From a relational perspective, self-protective motivation, safety behaviors, and discounting positive social overtures are proximal vulnerability factors that maintain social impairment in SA. These motivations and behaviors constrain high-SA individuals' capacity to engage in authentic self-expression and prosocial actions that lead to emotional closeness (Alden & Fung, 2020).

Consistent with the emphasis on impaired close relationships in SA, several studies of face-to-face interactions in couples have found that high-SA individuals and individuals with SAD engage in expressive suppression and self-concealment (e.g., Aiken et al., 2014). Such behaviors may be contextual: for example, high-SA participants, compared to non-SA participants, showed reduced eye contact when interacting with a friend or romantic partner after, but not before, a conflict (Langer et al., 2017). Interestingly, a recent study found that individuals with SAD are under-synchronized with others' movements in approach contexts, as opposed to non-SA individuals, which likely leads to less interpersonal relatedness (Asher et al., 2020). These interpersonal tactics result in high-SA individuals being perceived as deriving less enjoyment and as less interested in interpersonal contact (Voncken et al., 2008). Moreover, studies of close interpersonal relationships (e.g., friendships) suggest that high-SA individuals report more impaired friendship and intimacy quality than individuals low in SA. However, notably, it is not clear that their friends view their friendship as impaired (Rodebaugh et al., 2014). SA is also associated with diminished satisfaction in romantic relationships (Porter & Chambless, 2017). For example, compared to non-anxious individuals, individuals with SAD were more critical of their partners and perceived their partners as being more critical (Porter et al., 2019). This line of research points to an impairment in affiliative functioning observed across multiple aspects of analysis – self-report, behavioral, and hormonal.

Social Rank. The social rank system involves monitoring one's standing in relation to others to maintain or negotiate changes in the hierarchical organization of a group (e.g., Kraus & Torrez, 2020). When examined from the vantage point of this system, SA is characterized by negative biases in the perception of one's position in the social hierarchy (Gilboa-Schechtman et al., 2017). High-SA individuals tend to inflexibly perceive their social standing as low (Button et al., 2015; Zabag et al., 2018) and exhibit increased sensitivity to social put-downs and non-verbal cues indicative of social hierarchies (Parsons et al., 2021; Peschard et al., 2019).

Moreover, high-SA individuals respond to social rank challenges (e.g., when one's place in the hierarchy is threatened by social defeat) with marked decreases in testosterone (Maner et al., 2008), one of the most frequently studied indices of dominance (Schultheiss & Wirth, 2018). Notably, there is evidence of decreased basal testosterone levels in SAD compared to other psychiatric disorders (Giltay et al., 2012). High-SA individuals also seem to respond to social status changes by lowering their social profile (e.g., as indicated by lowering their vocal profile, e.g., Gilboa-Schechtman, Galili et al., 2014). Further, individuals with SAD sought less information about dominant individuals than non-anxious controls (Aderka et al., 2013). SA has also been related to decreased expression of interpersonal aggression, a sign of dominance (DeWall et al., 2010). These findings suggest that high-SA individuals exhibit enhanced sensitivity to hierarchical cues (Trower & Gilbert, 1989) and display submissive behaviors when challenged (Dijk et al., 2018). Furthermore, SA appears to be specifically associated with low implicit and explicit social-rank evaluations (Gilboa-Schechtman et al., 2020).

Related to the dominance/social rank system, the need for power has relevance for individuals with SAD. This need is defined as a motivation to experience one's impact on and dominance over others as rewarding and others' impact on oneself as aversive. SA could be associated with a low implicit power motive, which is thought to represent an actual fear of having power due to the social consequences it may entail (Schultheiss & Köllner, 2021). On the

other hand, research shows that individuals who have a high need for power show attentional avoidance of others' dominance signals, similar to SA behavior (Janson et al., 2022). Taken together, SA might be reflected by the antagonistic implicit motives for power and affiliation, with anxiety resulting from the friction between the competing needs to impact others and have harmonious relationships.

The importance of social rank is also emphasized by the bivalent fear of evaluation model (Weeks & Howell, 2012). According to this model, the main vulnerability in SAD is a fear of evaluation, regardless of whether it is negative or positive. Given the dynamics between giving and receiving feedback, evaluation can be viewed as a hierarchical situation where the evaluator has more power than the evaluated individual. Apprehension about and distress regarding positive evaluation appear to be an additional feature of SAD (Fredrick & Luebbe, 2020; Rodebaugh et al., 2017; Weeks et al., 2019) and neurobiological substrates for both fears of positive evaluation (FPE; Miedl et al., 2016) and fear of negative evaluation (FNE; Birk et al., 2019) have also been proposed. Individuals who perceive themselves as ranking socially lower than others are motivated: (a) to fear and avoid giving a positive impression that might lead to them being viewed as a threat by other members of the group (i.e., FPE), and (b) fear of appearing so socially undesirable as to be ostracized from the group (Reichenberger & Blechert, 2018; Weeks & Zoccola, 2016; i.e., FNE). In other words, individuals with SAD might view themselves as walking a very thin tightrope between being shunned due to failures and being threatened over successes.

Examined together, the affiliation and social rank systems show evidence suggesting an enhanced coupling in SA. A negative change in one system carries over to the other. For example, SA may involve linking exclusion to demotion and defeat to rejection (Gilboa-Schechtman, Shachar, et al., 2014). Based on evolutionary considerations, the linkage between the activation of the two systems may contribute to enhanced social cautiousness in that it alerts

the individual to changes in social fortunes. Whereas such sensitivity may be advantageous in unstable hierarchies and shifting alliances, it may backfire in moderately benevolent and cohesive social groups (Gilboa-Schechtman et al., 2020). Findings suggest that the combination of several distinct factors serve as central pathological processes in SAD: (a) perceiving one's power as low while also overemphasizing the importance of hierarchy; (b) enhanced sensitivity to social-rank challenges and a tendency to respond to these challenges in a submissive manner; (c) failing to engage in affiliative behaviors, especially when affiliative bonds are threatened; and (d) an entanglement between affiliation and social rank, resulting in enhanced difficulties for them to act independently.

Interpersonal Perspective: Summary and Integration

The preceding sections illustrate the complex processes that constitute interpersonal interactions in SAD. The approach/avoidance perspective and the affiliation/social-rank perspective consistently suggest that the difficulties of high-SA individuals are not limited to one domain. Specifically, the imbalance between the two systems – overactivation of one system (e.g., avoidance) and under-activation of the other (e.g., approach) – appears to contribute to ongoing difficulties in SA. Moreover, the two lines of research within the interpersonal perspective have proceeded in relative isolation. Approach and avoidance tendencies can be activated within both affiliation and social rank. The motivational systems of affiliation and social rank are often fused in SA, leading to approach-avoidance conflicts and ultimately to impaired interpersonal relationships. Furthermore, recent evidence suggests that SA does not only lead to interpersonal weaknesses but can have some strengths as well. Specifically, SA has been associated with increased, accurate emotional empathy towards others (Auyeung & Alden, 2020).

Discussion

The current paper highlights ideas from a wide array of scientific areas. Notably, the many core deficits discussed in this paper are likely not unique to SAD. This is perhaps not

surprising in light of very high rates of comorbidity between SAD and other anxiety, mood, and substance use disorders and the plethora of interpersonal issues in many other psychopathologies. In addition, focusing on systems and their underlying processes fits well with calls for research examining distinct mechanisms and systems more so than disorders (e.g., Kotov et al., 2017; Insel et al., 2010). Indeed, more recent methods of examining networks may allow for advancing such integrations (Heeren & McNally, 2016). To integrate the presented narrative review into a coherent picture, we discuss the implications of these processes for vulnerability to SA, the developmental underpinnings of SAD, and the impact of culture and minority stress on SA.

Vulnerability

One of the key questions we posed concerned the nature of vulnerability in SA. Whereas there was a degree of convergence regarding several aspects of vulnerability, answers revealed some important – but mostly implicit – distinctions in the viewpoints adopted by the respondents. The first issue concerned the utility of thinking about the core vulnerabilities of SA from a processes and systems perspective. The processes perspective highlights the utility of examining whether and how SA affects and is affected by specific mechanisms such as disengagement from threat, resolving ambiguous social feedback, and expressive suppression of shame and pride. The advantages of the processes view include the ability to conduct experimental analyses of specific tasks against the background of knowledge regarding said tasks and, in some cases, their underlying neurobiological structures. The systems perspective, which is often used when examining the biobehavioral, evolutionary-inspired social rank and/or affiliation in the context of SA (e.g., Johnson et al., 2012; Weisman et al., 2011), highlights the utility of searching for one or more systems that appear to be involved in SA. The advantages of the systems view include the link to a functionalist perspective of the disorder (i.e., can explain the advantages of operating in specific ways) and biobehavioral indices. Looking at both the whole and the parts (i.e., systems and processes) can be a powerful method of advancing knowledge.

The second issue concerned the strong interplay among the distinct vulnerabilities underlying SA. Although some respondents primarily research specific processes, most agreed that SA results from several interrelated processes (e.g., reduced disengagement from threat coupled with increased avoidance; or enhanced avoidance and decreased approach motivations). This speaks to the multiple domains of vulnerability inherent to SAD. Increased synergy and enhanced crosstalk among diverse research areas and greater attempts at integration are called for. Further, we suggest that assessing how processes interact across the intrapersonal/interpersonal divide may allow for the emergence of improved models of SAD and thus more effective assessment and treatment modalities. Intrapersonal processes such as negative self-appraisal, autobiographical memory bias, interpretation bias, and self-focused attention all impact a high-SA individual before, during and after a social interaction (for examples, see Clark & Beck, 2010; Clark & Wells, 1995). Further, the high-SA individual's view of the other as being stronger and more attractive makes the interaction seem more intimidating and overwhelming. Concurrently, the other (i.e., the interaction partner) often begins an interaction with an unfamiliar high-SA individual with a positive expectation regarding the ability to connect and enjoy the encounter. However, the high-SA individual's submissive behaviors and avoidance during the interaction can lead the other to view them as being aloof or arrogant and decrease the other's desire to interact with the high-SA individual moving forward. We present an illustration of this dynamic in Figure 1.

The third issue emerging from our review is the need to clarify conceptual and definitional issues. For example, in the present paper, we have mentioned "negative feedback" or "positive life events." However, the notions of positivity and negativity need to be clarified, as what may be rewarding to some may be emotionally threatening to others. Such clarity may assist both in bringing coherence to a somewhat conflicted literature of responding to "positive" evaluations and finding and highlighting areas of resilience.

Many questions remain: For example, are emotions or cognitive processes causes or effects of pathological processes and biopsychosocial systems gone awry? How much do these processes oppose or interact with one another, and could they function independently or simultaneously, depending on the context? How do we consider the dynamic nature of these processes and systems when building our theories and models? Do these processes play out differently for various aspects of the SA continuum, from shyness to SAD? Can examining the various proposed vulnerabilities in SA within avoidant personality disorder also help elucidate whether they are distinct or continuous constructs? How does manipulation or intervention in one proposed process or system impact others?

Assessment

The review of vulnerability has significant implications regarding the directions of evidence-based assessment of SA. First, there is a need to expand the scope of assessment beyond the emotions of anxiety and fear to include both specific negative (e.g., shame, humiliation) and specific positive (e.g., pride) emotions. Moreover, the focus on concerns with negative evaluations could be profitably extended to fears of evaluation in general. Second, it was argued that examining responses to a wider range of expressive behaviors, such as vocal and postural characteristics, would be advantageous to understand the nature of mechanisms and systems involved in SA. Third, the need to examine the interpersonal cues and behaviors involved in not only the interactions SA individuals have with strangers and with acquaintances but also with close friends and partners was discussed. Fourth, it was suggested that too often, static, cross-sectional snapshots of groups of individuals using averages are presented, rather than examining processes dynamically, within individuals, over time, and across/between contexts. Thus, more refined analyses examining dynamic changes over shorter or longer intervals and in different contexts are necessary to obtain more accurate measures (e.g., Rodebaugh et al., 2016; Wieser & Keil, 2020). Finally, considering the influence of culture and constructs such as gender identity

and sexual orientation (e.g., Butler et al., 2019) could increase understanding of how symptoms of SA manifest.

Developmental Underpinnings of SAD

Though outside the scope of this review, the developmental underpinnings of SAD are of particular importance in understanding the disorder, as early intervention may prevent the later onset of this condition (Rapee, 2013). SAD is most likely to onset during early adolescence and may be triggered by several changes during this developmental stage, such as early-onset puberty, increased emotional reactivity, interpersonal difficulties, and poorly developed self-concept (Rapee et al., 2019). Notably, from a developmental perspective, models of SAD include several modifiable risk factors: inhibited/shy temperament, parent anxiety; overprotective parenting, anxious modeling; and poor peer relationships (including peer victimization; Spence & Rapee, 2016). The biological basis of SAD has been reviewed with the suggestion that identifying an early "at-risk" phenotype may be possible, with obvious early intervention ramifications (Fox & Kalin, 2014). Further, parent emotionality has been found to confer risk for offspring SAD in various ways, including genetic transmission, with two likely mechanisms: modeling of anxious responding and parental overprotection (Spence & Rapee, 2016). Indeed, some research suggests that individuals with SAD respond with shyness and reticence to a stranger, which increases the likelihood of withdrawal in response to the same stranger among their infants (Murray et al., 2008). Understanding the natural process of recovery across the developmental trajectory may further aid in elucidating the etiological and maintaining factors of SAD.

Culture and Minority Stress in SA

Culture shapes development, values, and perceptions of the self and of others through gender roles, group status, and the implied and actual consequences of social evaluation (e.g., Moscovitch et al., 2005; Ryder et al., 2013; Spence & Rapee, 2016). Indeed, the

"conceptualization of the social self" is likely influenced by what aspects of interpersonal behavior are expected as part of accepted social norms, including needs and rights of the individual versus those of the group. Further, some ways in which individuals are viewed by their society, whether in terms of minority or immigrant status, race (Hofmann et al., 2010), gender identity (Butler et al., 2019), and sexual orientation (Mahon et al., 2022), have been suggested to significantly increase rates of SA. As an example, the identity and social environment of an African-American, lesbian, cisgender woman suffering from SA will likely influence her self-evaluations and her interpretations of ambiguous feedback. Her concerns about how she will be viewed by peers will likely be impacted by identity-laden autobiographical memories of various incidents of exclusion, ridicule, or ostracism as well as by memories of acceptance and appreciation. Notably, there are few empirical studies that attempt to understand the enhanced prevalence of SA in minority groups in terms of basic intra and interpersonal processes. Questions remain as to whether existing effects of minority stress amplify problems or lead to qualitatively different issues. To date, the evidence points to amplified risk factors (e.g., Mahon et al., 2022). More research is necessary to better understand the role of culture, race, minority stress, and gender and sexual identity in the etiology and maintenance of SA.

A Note of Skepticism and Limitations

Some of the authors expressed healthy skepticism regarding what might be called the entire "psychopathology research" project: the notion that examining differences among people who lie on a continuum of a given disorder, construct, or problem will lead to clear causal mechanisms specific to that issue, which, in turn, will lead to treatment innovations (e.g., Insel et al., 2010). Whereas this skepticism is not specific to research on SA, it is related to how research in psychopathology is usually pursued. Whereas such investigations uncover many factors that characterize the disorders or problems, these differences may not be specific to the disorder in question and normalizing them may not result in symptom reduction or functional improvement.

To date, it is also not clear how current endeavors such as the novel classification via HiTOP (Kotov et al., 2017) and network models (e.g., Heeren & McNally, 2016) have contributed to advancing knowledge of the mechanisms underlying SA. Compounding this issue, such investigations are most often cross-sectional, occasionally longitudinal, and rarely experimental (manipulating the proposed causal agent). Furthermore, at least in SAD, research is hardly ever developmental in covering multiple developmental periods. Thus, confidence in the causal inference of a specific mechanism derived from such studies should be quite low. Further magnifying this cautious skepticism is a set of practices highlighted by proponents of the open science movement (Tackett et al., 2019). Much research that we reviewed above was not pre-registered (although we hope this is changing), often utilized small sample sizes, and rarely involved a direct replication of previous work. Again, none of these issues are specific to SAD research, but it should be noted that SAD research has not escaped these general problems.

The current review included authors with different theoretical and clinical orientations. However, it should be noted that researchers specializing in some of the more common transdiagnostic approaches (e.g., psychodynamic approaches) did not contribute to this review. In addition, although we strove to gather a wide range of perspectives in SA, there are likely perspectives that were not included. Relatedly, the conference that served as the point of departure for this manuscript took place in 2011. Had the conference taken place today it is likely that additional researchers would have been invited. Additional authors as well as a wider range of theoretical perspectives might lead to the inclusion of additional intra- and interpersonal processes in SA.

Coda

Both intrapersonal and interpersonal processes are integral to our understanding of SAD and likely form an interconnected web that explains the clinical presentation of the disorder. One of the goals of the current endeavor was to confront our own biases and open a wide breadth of

perspectives on SA. One of the messages we take from our work is the importance of such forms of broad collaborations, which can lead to more integrative frameworks. We feel that the process of integrating intrapersonal and interpersonal perspectives enriched our understanding of SA and contributed to a more comprehensive, yet nuanced, understanding of this condition. We look forward to continued dialogue with researchers from basic and applied domains.

In the aftermath of a global pandemic, we reflect on the crucial importance of face-to-face meetings for the advancement of science, which was the impetus for this review. The lack of these kinds of experiences highlights what is often missing from the lives of individuals with SA – the ability to be excited about the prospect of meeting peers, the enthusiastic discussions of thoughts, ideas, and emotions with people they sometimes meet for the first time, and the propensity to savor these memories.

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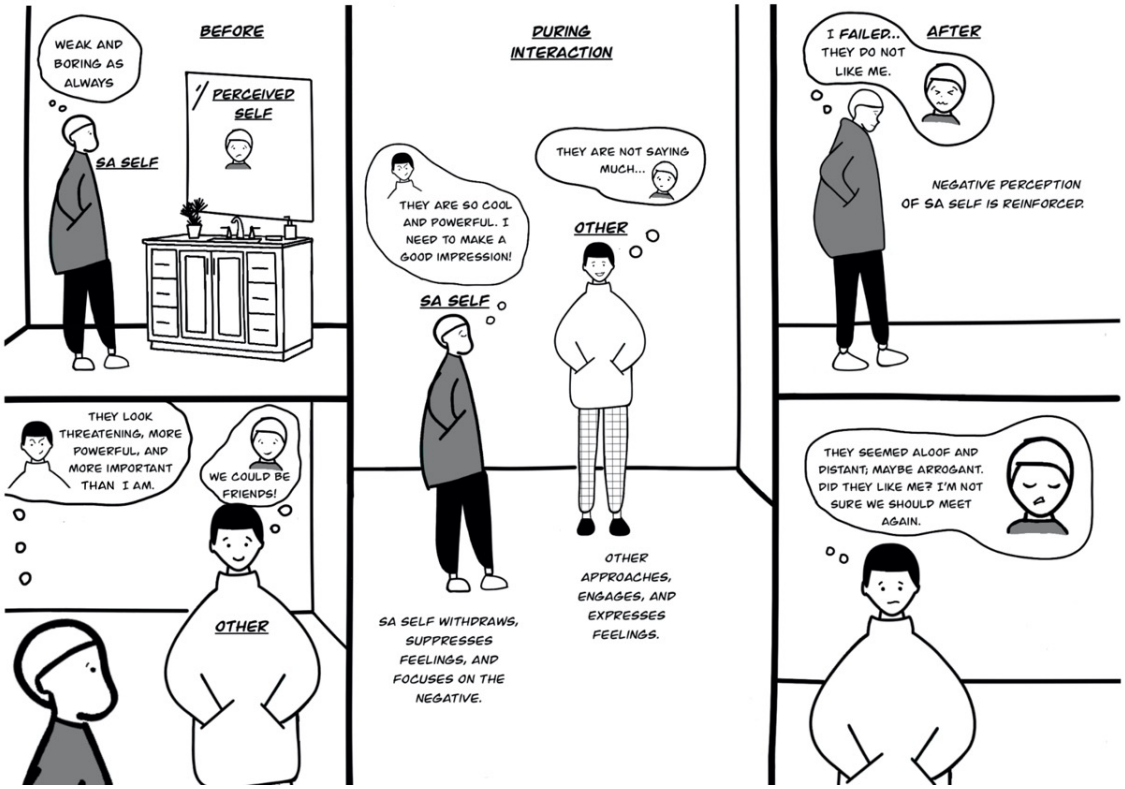

Figure 1

An Illustrative Representation of the Interplay Between Intrapersonal and Interpersonal Processes Occurring During a Casual Interaction Between a High Socially Anxious Individual and a Peer (Other)

Note. As in most cognitive models of SA which focus on intrapersonal processes, we view the high-SA individual entering the interaction with intrusive, negative autobiographical images, self-appraisals, and interpretation and attentional biases. The high-SA individual views the interaction as hierarchical (a test) and that the other is more dominant and likely to humiliate them. This prediction is reinforced by the belief that the other sees the individual similarly to how the high-SA individual views themselves. The interpersonal model adds that the peer, on the other hand, engages in the conversation with a desire for affiliation/connection, viewing the high-SA individual as a candidate for friendship. However, the safety (submissive) behaviors, lack of attention to/engagement in the conversation (excessive self-focus), and avoidance lead the peer to question the interaction-feeling the high-SA individual is somewhat distant, aloof, and possibly arrogant. This

reinforces the high-SA individual's sense of a failed interpersonal interaction, and of their inadequate interpersonal self. Thus, the intrapersonal processes engaged in by the high-SA individual impact the interaction, which reinforces their negative view of themselves in a vicious intrapersonal-interpersonal cycle. Note that perception is indicated by images of faces, whereas thoughts/interpretations are written in words in the thought bubbles.