Self-Representation in Social Anxiety Disorder: Linguistic Analysis of Autobiographical Narratives

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Abstract

Cognitive models of social anxiety disorder (SAD) posit aberrant beliefs about the social self as a key psychological mechanism that maintains fear of negative evaluation in social and performance situations. Consequently, a distorted self-view should be evident when recalling painful autobiographical social memories, as reflected in linguistic expression, negative self-beliefs, and emotion and avoidance. To test this hypothesis, 42 adults diagnosed with SAD and 27 non-psychiatric healthy controls (HC) composed autobiographical narratives of distinct social anxiety related situations, generated negative self-beliefs (NSB), and provided emotion and avoidance ratings. Although narratives were matched for initial emotional intensity and present vividness, linguistic analyses demonstrated that, compared to HC, SAD employed more self-referential, anxiety, and sensory words, and made fewer references to other people. There were no differences in the number of self-referential NSB identified by SAD and HC. Social anxiety symptom severity, however, was associated with greater self-referential NSB in SAD only. SAD reported greater current self-conscious emotions when recalling autobiographical social situations, and greater active avoidance of similar situations than did HC. These findings support cognitive models of SAD, and suggest that autobiographical memory of social situations in SAD may influence current and future thinking, emotion, and behavioral avoidance.

Keywords

Social Phobia; Autobiographical Memory; Self Concept

1.1 Social Anxiety Disorder

Social anxiety disorder (SAD, also known as social phobia) is a highly prevalent and often debilitating condition characterized by fear of negative evaluation and high levels of anxiety and avoidance when engaged in social or performance situations (Jefferys, 1997). Community surveys demonstrate that SAD is common with up to 13% lifetime prevalence (Kessler et al., 2005; Wittchen & Fehm, 2001), has an early modal age of onset (Otto et al., 2001), and often precedes the onset of other anxiety, mood, and substance abuse/dependence disorders (Lampe, Slade, Issakidis, & Andrews, 2003; Matza, Revicki, Davidson, & Stewart, 2003; Randall, Thomas, & Thevos, 2001).

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One of the cardinal features of SAD is construing social situations as presenting threats that overwhelm the self's adaptive capacities. If we assume that memories of salient social interactions powerfully shape our sense of self, it seems likely that repeated encounters with subjectively overwhelming social situations will lead to a deeply ingrained negative view of self that interferes with interpersonal functioning (Hirsch, Meynen, & Clark, 2004). In the present study, we tested this hypothesis by asking SAD and HC participants to recall and describe painful autobiographical social situations, and rate their current emotional responses.

1.2 Memory and the Self

The development of autobiographical memory coincides with the development of knowledge structures linking individual identity with personal experience (Howe & Courage, 1997). According to the self-memory system (SMS) model, specific autobiographical memories are constructed by the interaction between an autobiographical knowledge base and current goals (Conway & Pleydell-Pearce, 2000). The current goals function as a control process that modulate the construction of memories, and intense emotional experiences are a consequence of discrepancies between the current state of the self and goal states. In SAD these discrepancies result from high perceived social standards and poorly defined goals in social situations (Hiemisch, Ehlers, & Westermann, 2002; Moscovitch & Hofmann, 2007). Autobiographical memories have the potential to reinstate goals and emotions featured in earlier experiences, which can have powerful disruptive effects on current cognition (Wheeler, Stuss, & Tulving, 1997). An individual's ability to respond to these dissonant autobiographical memories with appropriate cognitive reactions is positively related to a sense of well-being (Swann & Read, 1981). In SAD, however, anticipation of a social event often leads to intrusive, anxiety-inducing memories of past failures. Even after the event, the interaction is often reviewed in detail with a particular focus on anxious feelings and negative self-perceptions (Clark, 2001). These memories of social failure reinforce negative beliefs about the social self (Sutin & Robins, 2005).

1.3 The Self in Social Anxiety Disorder

Cognitive models of SAD describe several cognitive processing biases which can lead to and reinforce a negative internal representation of the social self (Clark et al., 1995; Hofmann, 2007; Rapee & Heimberg, 1997). These include high perceived social standards (Moscovitch & Hofmann, 2007; Wallace & Alden, 1995), poorly defined social goals (Hiemisch, Ehlers, & Westermann, 2002; Leary & Kowalski, 1995), increased self-focused attention in social situations (Clark & McManus, 2002; Hirsch & Clark, 2004; Hofmann & Heinrichs, 2003), a bias to interpret ambiguous information in an exaggeratedly negative way (Clark, 2001), and a tendency to overestimate the negative evaluations of oneself made by others (Hackmann, Surawy, & Clark, 1998; Strauman, 1989; Wells & Papageorgiou, 1998). Negative self-images also play an important role in the maintenance of anxiety in these models. Distorted images of the self are drawn from both long-term memory and exaggerated interpretations of immediate physiological feedback (Clark et al., 1995). Spontaneously recurring negative images of the social self are linked to early memories of aversive social experiences, which are resistant to change based on subsequent positive social experiences (Hackmann, Clark, & McManus, 2000). These processes and negative self-images result in dysfunctional views of the social self and distorted appraisals of social situations as dangerous to the self.

Under social threat, attention is withdrawn from processing external aspects of the situation, and is instead re-focused on the social self. This heightened focus on the self as a social object results in a variety of safety behaviors, cognitive distortions, and physiological symptoms in SAD, which, in turn, undermine performance in social situations and reinforce distorted assumptions about the self in the social world. The cognitive model of SAD predicts that during

social threat SAD will recall more information related to the social self, with a specific emphasis on negative self-referential information (Mansell, Clark, Ehlers, & Chen, 1999).

1.4 Autobiographical Memory in Social Anxiety Disorder

Studies of autobiographical memory in social anxiety have provided mixed evidence for differential memory processing in SAD. When retrieving autobiographical memories based on self-concept related cues, anxious individuals tend to produce more negative emotional content (Strauman, 1992). Individuals with SAD tend to adopt the perspective of an external observer in their autobiographical memories, and to recall more self-referential information and fewer external sensory details (D'Argembeau, Van der Linden, d'Acremont, & Mayers, 2006). SAD who held a negative self-image in mind during an autobiographical memory retrieval task were more anxious, had lower self-ratings of performance, and took more time to retrieve positive memories and less time to retrieve negative memories (Stopa & Jenkins, 2007). When recalling autobiographical memories in response to a social threat cue, compared to HC, SAD show more negative affect as rated by independent observers (Wenzel, Jackson, & Holt, 2002). During post-event processing, compared to HC, SAD recall significantly more negative and shameful memories (Field, Psychol, & Morgan, 2004). Other studies, however, have observed no differences between SAD and HC in the anxiety associated with or the specificity of memories retrieved in response to social threat cues (Rapee, McCallum, Melville, & Ravenscroft, 1994). One dimension that has yet to be examined in the context of autobiographical memories is linguistic analysis of the narratives produced by SAD. Application of computational methods to analyze the content of such memories may provide further evidence of cognitive biases in SAD.

There are two significant advantages of linguistic analysis of autobiographical narratives in the case of SAD. First, the act of writing about an aversive social experience does not itself require social interaction and is therefore less likely to induce stress than the verbal reports obtained in other autobiographical retrieval tasks. Second, it is possible to address predictions of the cognitive model, such as increased self-focused attention, by carefully examining specific aspects of language (e.g., greater use of first-person or negatively valenced emotional words). By selecting specific word categories related to distinct psychological processes, it is possible to examine natural language for evidence of cognitive biases identified by cognitive models of SAD.

1.4 Negative Self-Beliefs in Social Anxiety Disorder

In SAD, beliefs associated with autobiographical memory for painful social situations often involve negative self-evaluations, for example, "I'm stupid", or "No one likes me," which can interfere with social performance (Trower, O'Mahony, & Dryden, 1982). In conjunction with exaggerated self-focused attention and taking the outside observer's view of self during social situations, SAD may produce negative self-beliefs which make reference only to the self (e.g., "I'm such a fool") as well as how SAD believe others see them (e.g., "Everyone is laughing at me"). Negative self-beliefs are better at differentiating SAD during social interactions than negative beliefs about other's reactions, as individuals with SAD are less likely to explicitly mention evaluation by other people (Stopa & Clark, 1993). This is consistent with the increase in self-focused attention in SAD during stressful social situations. Furthermore, this bias toward self-focused attention in SAD may reduce exposure to evidence that disconfirms these negative self-beliefs (Wells & Papageorgiou, 1998). More recently, studies have found that after treatment, SAD endorse significantly fewer negative self-beliefs, and that these changes are significantly correlated with changes in social anxiety (Hofmann, 2000; Hofmann, Moscovitch, Kim, & Taylor, 2004).

1.5 The Present Study

In the present study, we conducted a linguistic analysis of autobiographical memories in order to provide a window into experiences that have been integrated into an individual's self concept. Linguistic Inquiry and Word Count (LIWC2001;Pennebaker, Francis, & Booth, 2001) is a software program that has previously been used to examine linguistic variables in text produced by individuals with psychiatric disorders, including eating disorders (Lyons, Mehl, & Pennebaker, 2006) and dysphoria (Sloan, 2005). Applications of this method have delineated cognitive processes underlying these disorders, such as increased self-focused attention in dysphoria (Sloan, 2005), and fewer social references in suicidal individuals (Stirman & Pennebaker, 2001). Linguistic analysis of autobiographical narratives has revealed an association between insight and the successful treatment of addiction disorders (Stephenson, Laszlo, Ehmann, Lefever, & Lefever, 1997), and between positive emotions and the successful treatment of substance abuse (Vano, 2002).

To generate predictions regarding self-representation in SAD, we focused on specific aspects of the Clark and McManus (2002; Clark et al., 1995) cognitive model of social anxiety. In addition to the influence of cognitive biases during a social situation, we focused on the impact of post-event processing, and the important role of autobiographical memory in shaping self-concept (Figure 1). The model suggests that exaggerated self-focus and distorted assumptions about the social self will impact self-focused representations beyond the immediate social situation. This is supported by work identifying the role of anticipatory (Vassilopoulos, 2005) and post-event (Field, Psychol, & Morgan, 2004) processing in social anxiety. Biased attention during retrieval of autobiographical memories can reinforce distorted assumptions about the self, and influence the content of self-reported memories, powerfully shaping positive and negative self-beliefs (Showers, Limke, & Zeigler-Hill, 2004).

Based on Clark and McManus's cognitive model, we expected that, compared to HC, SAD would (a) demonstrate exaggerated self-focused attention as indexed by greater use of words related to anxiety and self in autobiographical narratives of painful social memories, (b) generate more self-referential negative self-beliefs, and (c) report more negative self-conscious emotions (i.e., humiliation, embarrassment, or shame) in relation to recalling the autobiographical memory.

Methods

2.1 Participants

Participants included 42 adults (22 females) who met DSM-IV criteria for a current primary diagnosis of social anxiety disorder and 27 (17 females) healthy controls (HC) with no lifetime history of any DSM-IV psychiatric disorders. All participants were free of psychotropic medications use, reported no neurological and medical health problems, and provided informed consent in accordance with Stanford University's Human Subjects Committee guidelines. SAD and HC did not differ significantly in gender, current age, ethnicity, or education (Table 1).

2.2 Clinical Diagnostic Assessment

Clinical assessments were conducted by two PhD-trained clinical psychologists using the Anxiety Disorder Inventory Schedule–IV (ADIS-IV; DiNardo, Brown, & Barlow, 1994) to diagnose current and lifetime psychiatric disorders based on DSM-IV criteria. The ADIS, which was designed for differential diagnosis of anxiety disorders, was used to select participants with a current primary (rated higher in severity than any other Axis-I disorder) diagnosis of generalized social anxiety disorder (defined as at least four social situations rated

as moderate or higher anxiety; SAD group) or individuals with no lifetime history of any psychological disorders (HC group).

2.3 Exclusion Criteria

Participants were excluded if they reported current use of any psychotropic medication, psychotherapy, history of neurological or cardiovascular disorders, diabetes, hypo- or hyperthyroidism, or head trauma with loss of consciousness greater than five minutes, substance/alcohol abuse in the past year, or a lifetime diagnosis of a psychotic disorder, mania, hypomania, or bipolar disorder. SAD participants were excluded if they met criteria for any current DSM-IV Axis I psychiatric disorders other than social anxiety, generalized anxiety, agoraphobia, or specific phobia disorders. Current MDD was an exclusion criterion because this behavioral study was used as the basis for a series of fMRI investigations to examine SAD not confounded by MDD, PTSD, OCD, and alcohol/substance abuse/dependence.

2.4 Procedure

Participants were recruited from local mental health clinics and online bulletin boards. All potential participants were administered a phone screen. Eligible participants underwent a clinical diagnostic interview to determine psychiatric status, and were then administered questionnaires, and the autobiographical memory task.

2.5 Clinical Assessments

Social anxiety symptom severity was measured using the Liebowitz Social Anxiety Scale – self-report version (Liebowitz, 1987) and the Brief Fear of Negative Evaluation scale (Leary, 1983). Depressive symptoms were assessed using the Beck Depression Inventory II (Beck, Steer, Ball, & Ranieri, 1996).

2.6 Autobiographical Memory Task

Participants were asked to recall three distinct autobiographical situations from any time in their life characterized by vivid social humiliation, embarrassment and/or shame. The goal was to have participants remember events of comparable vividness and intensity for SAD and HC. For each situation, participants were asked to complete the following three tasks (see Appendix for precise instructions).

Recall autobiographical situation—Participants were instructed to recall a distinct autobiographical socially painful situation, and then compose a single paragraph describing the thoughts, feelings, and behaviors that occurred in that situation as well as their age at the time of the situation. Socially painful situations were requested, rather than milder or ambiguous social situations, to ensure recollection of intense autobiographical social situations potent enough to produce emotional reactivity in each group.

Identify negative self-beliefs (NSB)—Participants were asked to identify four NSB related to their self in each autobiographical social situation. The NSB were then categorized as "Self" if only the self was referenced (e.g., "I am so stupid"), or as "Self plus Other" if there was an explicit reference to other people's view of oneself (e.g., "They think I am so stupid"). Self focused beliefs were explicitly requested (rather than any negative belief) because this behavioral study was used as the basis for a series of fMRI investigations of the neural bases of self-focused attention and beliefs.

Rate emotion and avoidance—Participants provided ratings on a 9-point scale from 1 (not at all) to 9 (very much) for each of the following questions: (1) "How vividly can you re-imagine or re-experience that situation NOW?" (Vividness of Memory); (2) "How much

humiliation, embarrassment or shame did you feel when you experienced this situation when it happened?" (Emotion THEN); (3) "How much humiliation, embarrassment or shame do you feel NOW when you recall this situation?" (Emotion NOW); and (4) "How much do you actively avoid situations similar to this event?" (Active Avoidance)

For each participant, linguistic variables and ratings across all three autobiographical situations were averaged before subsequent group analysis. Each participant's number of Self-referential and Self plus Other-referential NSB were summed rather than averaged, because of the small range of possible values in each category.

2.7 Linguistic Analysis of Narratives

Narratives were analyzed using Linguistic Inquiry and Word Count software (LIWC2001;Pennebaker, Francis, & Booth, 2001) which evaluates written text on 74 dimensions including grammatical, psychological (affective or emotional, perceptual, cognitive, and social words), and personal (occupation, leisure activity, etc.) content. Categories in the LIWC2001 were developed by drawing words from common emotion rating scales and standard English dictionaries, with the intent to identify words associated with basic emotional and cognitive dimensions. Words and categories went through several phases of evaluation by independent judges, and subsequent studies have supported their internal reliability and external validity (Guastella & Dadds, 2006;Pennebaker & Francis, 1996).

To focus our analysis on specific linguistic variables related to the cognitive model of social anxiety, we examined five linguistic variables: (1) first-person singular, which reflects self-focused attention, (2) anxiety/fear words, which reflect psychological symptoms, (3) references to other people, which reflect behavioral symptoms, and (4) sensory/perceptual processes and (5) physical touch words, which reflect physiological symptoms. The dependent variables reported below are the mean word count for each narrative.

Results

3.1 Demographic, Clinical, and Control Measures

Between-group t-tests showed that SAD and HC did not differ on age, gender, education or ethnicity (all ps<.05). Compared to HC, SAD reported greater social anxiety symptom severity (LSAS), fear of negative evaluation (BFNE), and depressive symptoms (BDI-II) (Table 1). There were no between-group differences in Age at Time of Event (p>.92), Time Since Event (p>.88), Words per Narrative (p>.65), or Words per Sentence (p>.35), Vividness of Memory (p>.71) or Emotion THEN (p>.22).

3.2 Linguistic Analysis of Autobiographical Narratives

Multivariate analyses of variance demonstrated that, compared to HC, SAD used significantly more first-person singular (SAD: M=11.8, SD=2.3, HC: M=9.3, SD=2.4 t(67)=4.39, p<.005, partial eta^2(η_p^2)=.22), and anxiety/fear (SAD: M=1.2, SD=0.9, HC: M=0.5, SD=0.4 t(67)=4.02, p<.005, η_p^2=.19) words, made fewer references to other people (SAD: M=3.1, SD=1.8, HC: M=4.7, SD=2.4 t(67)=4.39, p<.01, η_p^2=.12), and used more sensory/perceptual processes (SAD: M=4.1, SD=1.7, HC: M=2.9, SD=1.2 t(67)=4.39, p<.005, η_p^2=.13), and physical touch (sensation) (SAD: M=1.4, SD=1.1, HC: M=0.8, SD=0.6 t(67)=4.39, p<.01, η_p^2=.10) words (Figure 2).

To determine whether words used in recall were influenced by current levels of anxiety, current self-conscious emotion was added as a covariate. Current self-conscious emotion could reflect anxiety induced by both the experimental situation and the autobiographical memory itself. This addition resulted in no changes in significance in the linguistic analysis, first-person

singular (t(66)=4.24, p<.001, η_p^2=.21), anxiety/fear (t(66)=4.58, p<.001, η_p^2=.24), sensory/perceptual processes (t(66)=4.40, p<.005, η_p^2=.15), physical touch (sensation) (t(66)=2.73, p<.01, η_p^2=.10) words, references to other people (t(66)=3.00, p<.005, η_p^2=.12.

3.3 Negative Self-Beliefs

A between-group t-test resulted in no difference in the percentage of Self-referential NSBs (SAD: M=57.0%, SD=18.9% vs. HC: M=64.0%, SD=18.5; t(64)=1.48, p>.14), and Self plus Other referential NSBs (SAD: M=42.8%, SD=19.1% vs. HC: M=36.1%, SD=18.5%; t(64)=1.43, p>.16). A paired t-test indicated that across all participants more Self-referential NSBs (M=59.7%, SD=18.9%) were generated, compared to Self plus Other referential NSBs (M=40.2%, SD=19.0%), t(65)=4.19, p<.001. Social anxiety symptom severity (LSAS) was associated with more Self-referential NSBs in SAD (r=.34, p<.05), but fewer Self-referential NSBs in HC (*r*= −.41, *p*<.05).

3.4 Emotion and Avoidance

Between-group t-tests showed that, compared to HC, SAD experienced greater current self-conscious emotions (Emotion NOW) when recalling a painful social autobiographical memory (SAD: *M*=5.1, *SD*=1.8 vs. HC: *M*=4.0, *SD*=1.5; *t*(67)=2.9, *p*<.01, η_p^2=.09), and more active avoidance of similar situations (SAD: *M*=5.9, *SD*=1.8 vs. HC: *M*=4.6, *SD*=2.0; *t*(67)=2.9, *p*<.01, η_p^2=.12) (Table 2). Social anxiety symptom severity was associated with greater current self-conscious emotion (BFNE: *r*=.43, *p*<.05) and active avoidance of similar situations (BFNE: *r*=.37, *p*<.05; LSAS: *r*=.35, *p*<.05) in SAD, and with greater current self-conscious emotion (LSAS: *r*=.58, *p*<.01) in HC.

Discussion

4.1 Overview

The goal of this study was to examine the role of self-representation in autobiographical memories of social situations in individuals with SAD. To accomplish this, we investigated the influence of autobiographical memory on (a) linguistic expression, (b) negative self-beliefs, and (c) emotion and avoidance. We found evidence of enhanced self-focused attention in relation to memory of painful autobiographical social situations supporting the Clark and McManus cognitive model of social anxiety into the context of autobiographical memory.

4.2 Linguistic Analysis of Autobiographical Narratives

Analysis of autobiographical memories demonstrated that, compared to HC, SAD made greater use of self-referential and negative emotion words, and less use of words that referenced other people. Increased self-reference under conditions of social threat is consistent with the increased self-focused attention predicted in the cognitive model of SAD. Similarly, greater use of sensory and perceptual process words (see, touch, listen), especially physical sensation words (touch, hold, felt), may be related to enhanced encoding of physiological processes at the time of the autobiographical situations and greater accessibility of these bodily self-representations in the context of self-focused attention during recall of social anxiety related situations (Mansell, Clark, & Ehlers, 2003).

The linguistic analysis used in this study provides a quantitative examination of the content of autobiographical memories. The results highlight the impact of the social anxiety related cognitive biases on word choice, providing additional support for the Clark-McManus model and supporting its extension to autobiographical recall of social situations. If the influence of these cognitive biases is revealed in a few hundred words of personal narrative, then their influence on present thinking, emotion and behavior is likely pervasive. Additionally, the

association of social anxiety symptom severity and greater use of negative emotion words provides further evidence for enduring negative emotional biases in individuals with SAD.

4.3 Negative Self-Beliefs

Contrary to expectations, we did not find differences in the negative self-beliefs generated by SAD and HC. Rather than parse negative self-beliefs into several categories, we focused only on the distinction between self-referential and self plus other-referential negative self-beliefs. This coarser division may explain the lack of between-group differences in our study. It is also possible that the phrasing of our instruction to generate negative self-beliefs led participants to be less likely to report self plus other-referential beliefs, as all participants reported more self-focused (rather than other-focused) negative self-beliefs. Unlike previous studies examining negative self-beliefs in SAD, we explicitly instructed participants to list negative self beliefs, rather than asking them to list all of their thoughts (Hofmann, 2000; Hofmann, Moscovitch, Kim, & Taylor, 2004), and we focused on the distinction between self-referential and self plus other-referential, rather than between self-referential and not (Hofmann, 2000, 2007; Hofmann, Moscovitch, Kim, & Taylor, 2004; Stopa & Clark, 1993). We did not find evidence of greater self-reference in the negative self-beliefs in SAD compared to HC. Social anxiety symptom severity, however, was associated with greater self–referential negative beliefs only in SAD. This finding is consistent with increased self-focused attention in SAD that leads to the generation of self-focused negative self-beliefs, as predicted by the Clark-McManus cognitive model.

4.4 Self-Conscious Emotion and Avoidance

Compared to HC, SAD reported greater self-conscious emotion when recalling autobiographical situations and greater current avoidance of similar social situations. These two variables were highly correlated across all participants, suggesting that self-conscious emotions may play an important role in maintaining avoidance behaviors. This interpretation is supported by the association of social anxiety symptom severity with (a) current self-conscious emotion in HC and SAD, but with active avoidance of social situations only in SAD, supporting the conceptualization of avoidance as a key maintaining factor in adults with SAD. In terms of the Clark-McManus model, this pattern of post-event processing during memory recall is likely associated with reinforcing maladaptive beliefs, emotions and behaviors that maintain a distorted view of the social self.

4.5 Clinical Implications

One of the primary psychological interventions for SAD is cognitive-behavioral therapy (CBT; (Heimberg, 2002). A key component of CBT for SAD is identifying participant-specific social situations (past and current) that cause distress and that can be used in the context of cognitive restructuring and exposure. Results from this study suggest that autobiographical memories of salient, painful social situations may play a role in maintaining social anxiety and may also serve as a potent target for graded exposure during the course of CBT for SAD. Specifically, our findings highlight the link between autobiographical memory, exaggerated current emotional reactivity, and increased behavioral avoidance.

The linguistic analysis performed in this study suggests that the way that individuals with SAD describe their experience may reflect distorted cognitive-affective processes. Greater awareness and sensitivity to linguistic variables during the course of CBT as both a mediator and treatment outcome variable may be of interest to clinical researchers. Furthermore, examining change in self-representation via linguistic analyses of autobiographical writing may serve as a potential treatment outcome measure in future clinical intervention trials.

4.6 Limitations and Future Directions

The LIWC2001 program provides a method for automating and standardizing analysis of written content. However, it examines texts only at the level of individual words and does not take into account context or any higher level properties of the writing sample. Although there were no significant differences in education between SAD and HC, there was no separate measure of verbal ability. This study obtained only autobiographical social situation writing samples. It is possible that higher levels of self-conscious emotions during recall were induced by the experimental situation, which may have had an impact on word choice and negative self-beliefs. Using state anxiety before recall as a covariate could have been used to test for this possibility. Future studies would benefit from examining the differential effects of recalling autobiographical memories associated with a range of social emotions and with more ambiguous social situations. However, given the bias in SAD to misinterpret ambiguous stimuli as more negative than HC would, it might be difficult to match SAD and HC on recall of ambiguous social memories. Future studies may also consider collecting samples of neutral and positive memories, and examining changes in written content over the course of treatment. Such studies promise to extend our understanding of the links among autobiographical memories, self-referential processing, and SAD.

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Appendix

Social event 1

Please recall a specific <u>autobiographical social or performance situation</u> from any period in your life (e.g., childhood, teenage, adulthood) during which you felt social anxiety, a situation that you can see clearly in your mind's eye, a vivid memory characterized by strong social humiliation, embarrassment and/or shame. Please write a single paragraph describing what happened, who was with you, what you thought and felt during the event.

<u>Social event 1</u> (one paragraph)

Age at the time of the event

With respect to the specific situation you described above, you may notice self-focused negative self-beliefs, for example, "I was so stupid," "Others must think I am so insecure," etc.

Please compose 3–4 distinct negative self-beliefs about yourself in the situation above. These should be self-critical beliefs.

Negative self-beliefs:

Now rank order from 1 to 4 the statements in terms of how negative the statement is for you by placing the number 1 (strongest), 2 (next strongest) and so on.

Please go to the next page and answer 4 questions regarding this social situation.

1. Social event 1

(S1.1) How vividly can you re-imagine or re-experience that situation **NOW**?

```
    1 .......... 2 .......... 3 .......... 4 .......... 5 ..........
6 .......... 7 .......... 8 .......... 9Not at all
Slightly              Moderately              A lot
Very much
```

(S1.2) How much humiliation, embarrassment or shame did you feel when you experienced this situation **when it happened**?

```
    1 .......... 2 .......... 3 .......... 4 .......... 5 ..........
6 .......... 7 .......... 8 .......... 9Not at all
Slightly              Moderately              A lot
Very much
```

(S1.3) How much humiliation, embarrassment or shame do you feel **NOW** when you recall this situation?

```
    1 .......... 2 .......... 3 .......... 4 .......... 5 ..........
6 .......... 7 .......... 8 .......... 9Not at all
Slightly              Moderately              A lot
Very much
```

(S1.4) How much do you **actively avoid** situations similar to this event?

```
    1 .......... 2 .......... 3 .......... 4 .......... 5 ..........
6 .......... 7 .......... 8 .......... 9Not at all
Slightly              Moderately              A lot
Very much
```
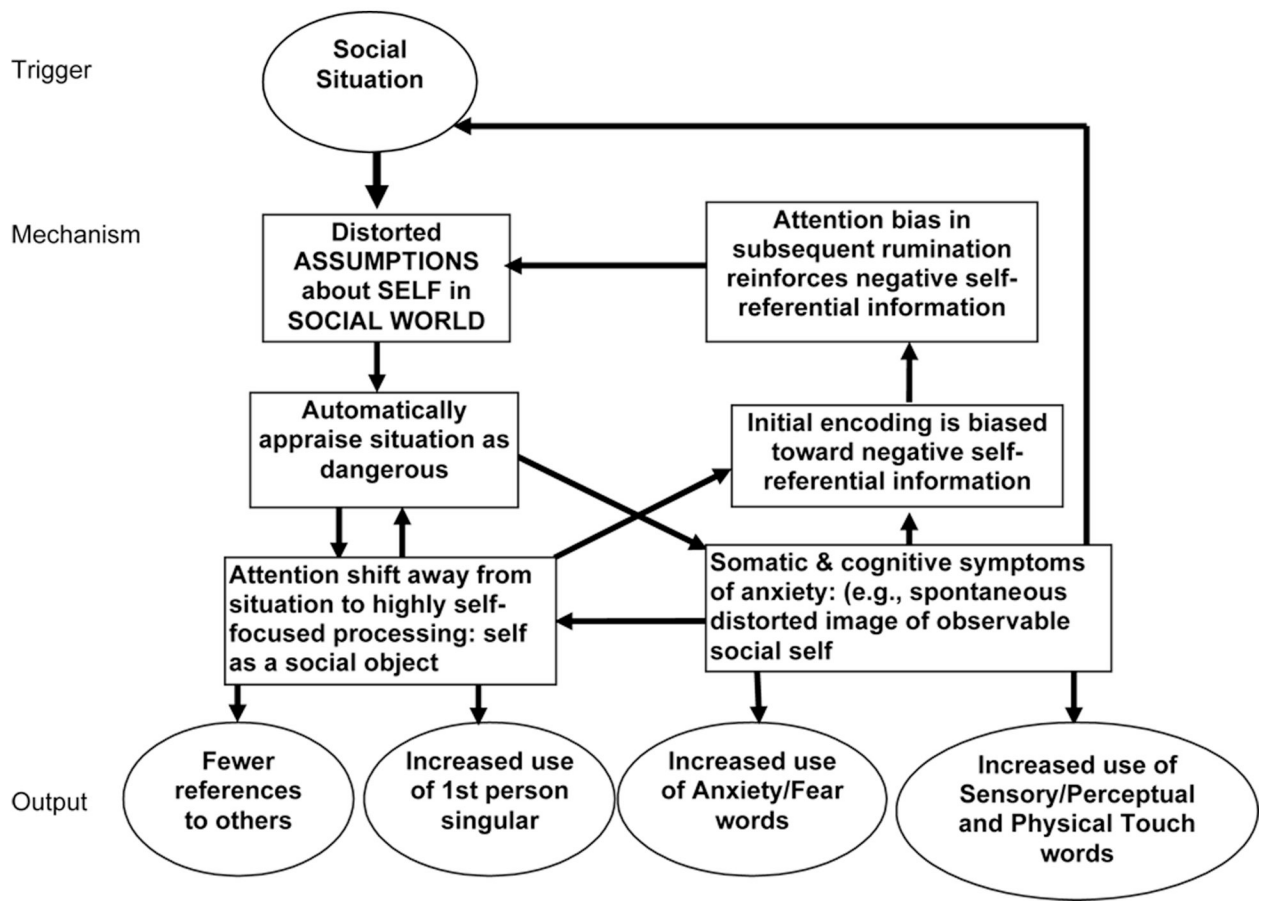
Figure 1.
Cognitive model of social anxiety during retrieval of autobiographical memory. Adapted from Clark and McManus, 2002.
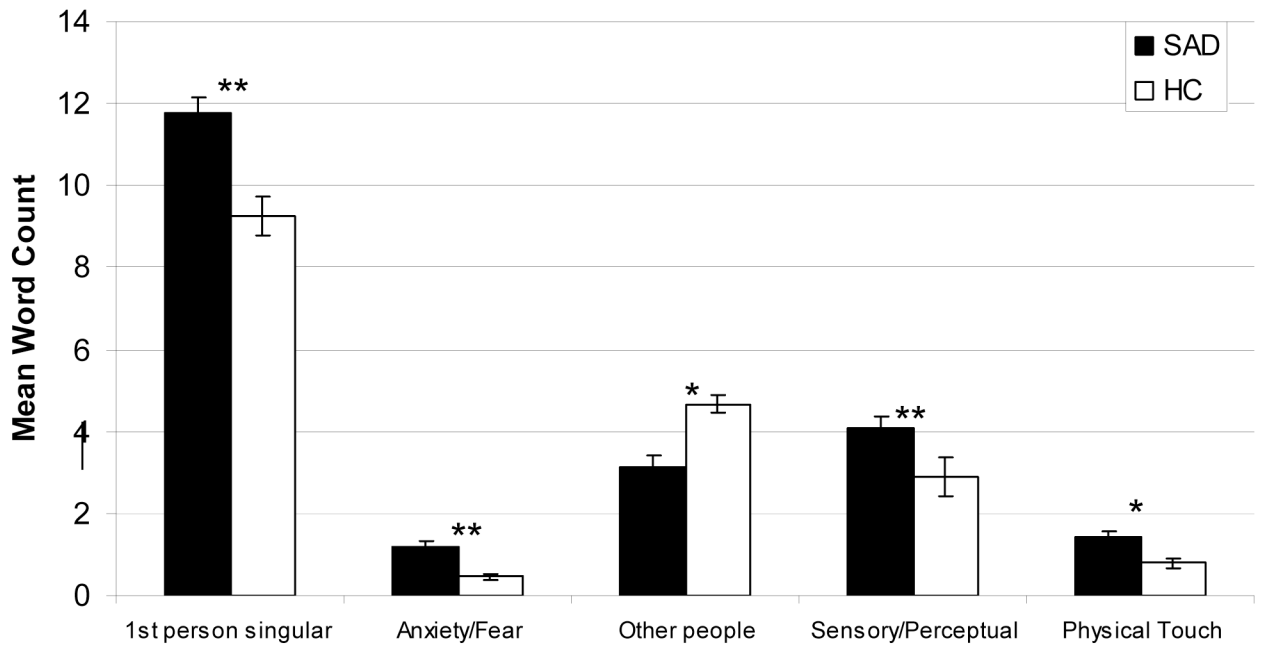
Figure 2.
Linguistic variables in SAD and HC. * p<.01, ** p<.005. Error bars display standard error of the mean.

Table 1

Demographic and Clinical Variables by Group

Variable	SAD Mean ± SD	HC Mean ± SD	t, χ^2, p-value
Age (years)	33.9 ± 9.5	33.6 ± 11.2	t = 0.59
Gender	20 male, 22 female	10 male, 17 female	χ^2 = 0.75
Education (years)	16.2 ± 1.8	16.3 ± 2.0	t = 0.11
Ethnicity			
Anglo-American	26 (38%)	16 (23%)	χ^2 = 8.96
Asian-American	10 (14%)	4 (6%)	
Latin-American	5 (7%)	0	
Native-American	0	1 (1%)	
LSAS	65.6 ± 19.4	24.7 ± 19.5	2.40[*]
BDI-II	12.8 ± 10.9	4.7 ± 3.5	7.45[***]
BFNE	45.1 ± 9.2	36.2 ± 11.8	2.54[*]

[*] Note: p<.05

[**] p<.01

[***] p<.001

SAD=social anxiety disorder, HC=healthy controls, LSAS=Liebowitz Social Anxiety Scale, BDI-II=Beck Depression Inventory-II, BFNE=Brief Fear of Negative Evaluation

Table 2

Autobiographical Narrative Variables by Group

Variable	SAD Mean ± SD	HC Mean ± SD	t, p-value
Age at time of event (years)	20.5 ± 5.6	20.3 ± 6.5	0.11
Time since event (years)	13.6 ± 10.1	13.2 ± 8.4	0.01
Words per Narrative	114.9 ± 49.2	120.0 ± 40.9	0.45
Words per Sentence	23.3 ± 13.6	20.8 ± 6.0	0.94
Vividness of Memory	7.3 ± 1.3	7.2 ± 1.6	0.38
Emotion THEN	8.2 ± 0.7	8.0 ± 0.1	1.23
Emotion NOW	5.1 ± 1.8	4.0 ± 1.5	2.91**
Active Avoidance	5.9 ± 1.8	4.6 ± 2.0	2.92**