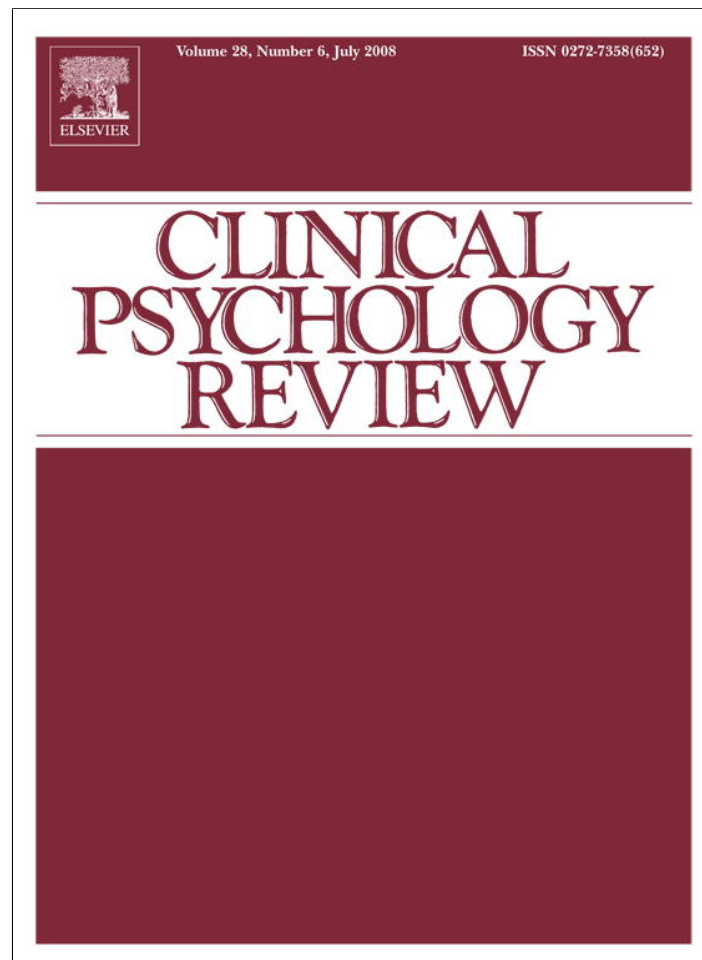


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# An analysis of post-event processing in social anxiety disorder

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## Abstract

Research has demonstrated that self-focused thoughts and negative affect have a reciprocal relationship [Mor, N., Winquist, J. (2002). Self-focused attention and negative affect: A meta-analysis. *Psychological Bulletin*, 128, 638–662]. In the anxiety disorder literature, post-event processing has emerged as a specific construction of repetitive self-focused thoughts that pertain to social anxiety disorder. Post-event processing can be defined as an individual's repeated consideration and potential reconstruction of his performance following a social situation. Post-event processing can also occur when an individual anticipates a social or performance event and begins to brood about other, past social experiences. The present review examined the post-event processing literature in an attempt to organize and highlight the significant results. The methodologies employed to study post-event processing have included self-report measures, daily diaries, social or performance situations created in the laboratory, and experimental manipulations of post-event processing or anticipation of an upcoming event. Directions for future research on post-event processing are discussed.

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All individuals entertain self-focused thoughts on a daily basis. A healthy amount of self-reflection is a useful tool. Self-focused thinking enables one to evaluate one's goals, actions, the consequences of one's actions, and one's relationship to one's environment. It is a natural human process. Why is it, then, that several of the psychological

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disorders in the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR; American Psychiatric Association, 2000)* revolve around self-focused thoughts?

Self-focused thoughts can be benign or useful for healthy individuals. However, a recent meta-analysis conducted by [Mor and Winquist \(2002\)](#) revealed that self-focused thinking may lead to negative affect or the experience of depressive and anxious symptoms. Moreover, negative affect may, in turn, lead to an increase in the frequency or intensity of self-focused thoughts, and this bidirectional process may influence the maintenance of mood and anxiety symptoms. One aim of the current review is to examine the impact of one type of self-focused thinking, also known as post-event processing, in social anxiety disorder.

Post-event processing occurs when an individual engages in a detailed review of his performance following a social situation. Studying this process may allow researchers to better understand why socially anxious individuals' fears of social situations are not extinguished with the repeated exposure to these situations that may occur in the natural environment. Individuals with most anxiety disorders other than social anxiety are quite successful in avoiding their feared stimuli. For example, an individual with a fear of flying might believe that if he flies he will die in a plane crash. As a result, the person always avoids flying by taking other means of transportation. Hence, on an extremely basic level, the individual's fear of flying persists because he never gathers evidence to disconfirm his fear that if he flies he will die in a plane crash.

Individuals with social anxiety disorder, however, are faced with social situations on a daily basis. Even minor interactions, such as talking to a cashier while paying for groceries or bumping into a neighbor on the street, are social situations that may occur with some frequency and may be quite difficult to avoid. Thus, if socially anxious individuals are engaging in these social interactions, it is reasonable to hypothesize that they may be mentally discounting their efforts in the time thereafter. In sum, post-event processing may fuel individuals' anxiety about their performance in social situations by reinforcing negative beliefs about or evaluations of that performance. It is important for researchers to better understand post-event processing so that methods of circumventing this negative cognitive process can be implemented during cognitive-behavioral treatment.

## 1. Models of social anxiety disorder and post-event processing

Cognitive-behavioral models of social anxiety disorder ([Clark & Wells, 1995](#); [Rapee & Heimberg, 1997](#)) provide useful frameworks for understanding the role of post-event processing. Most often socially anxious individuals possess assumptions about themselves and how they interact with others based on early experiences. When confronted with novel social situations, they tend to draw upon these assumptions to interpret social events in a threatening manner. These threatening interpretations lead to a variety of negative consequences, such as increases in subjective anxiety, physical symptoms of arousal, and avoidance of similar future social situations. The models suggest that following a social event, socially anxious individuals selectively retrieve negative information about themselves and others during the social situation, although research on memory biases in social anxiety disorder has been mixed ([Coles & Heimberg, 2002](#)). The models also propose that individuals may brood over this negative material (post-event processing), further distorting or reconstructing their memory for the index event over progressively longer intervals after that event has concluded.

[Clark and Wells \(1995\)](#), as well as [Rapee and Heimberg \(1997\)](#), describe how post-event processing contributes to the maintenance of social anxiety disorder. Individuals may engage in post-event processing, or post-mortem thinking, following a social event or when they anticipate another social event. The content of socially anxious persons' thoughts while engaging in post-event processing often includes a mental representation of the self as they think they appear to others, usually incorporating negative images and perceptions of the self in the social situation and memories of the self in other social situations. A meta-analysis of studies examining self-focused attention in mood and anxiety conducted by [Mor and Winquist \(2002\)](#) specifically supported this aspect of [Rapee and Heimberg's \(1997\)](#) cognitive-behavioral model of social anxiety. [Mor and Winquist \(2002\)](#) found that social anxiety was related to public self-focused attention, or thoughts and behaviors that take into account others' reactions or desires. [Rapee and Heimberg's \(1997\)](#) model specifically posits that the socially anxious individual has a predominantly negative mental representation of himself in social situations based on what he believes the audience perceives. The model also suggests that the socially anxious individual believes that the audience is inherently critical and holds high expectations for his performance; as a result, he can never live up to the audience's standards. Thus, [Mor and Winquist's \(2002\)](#) meta-analysis supports [Rapee and Heimberg's \(1997\)](#) model which includes the audience's perspective in the socially anxious individual's mental representation of the self. For a more complete review of self-focused attention in social anxiety disorder, we refer the reader to [Spurr and Stopa \(2002\)](#).

Because socially anxious individuals believe that they can never live up to the idealized audience's standards for their performance, following a social event, they often perceive and judge themselves in a much more negative manner than is justified by objective observation of their performance (Rapee & Lim, 1992; Stopa & Clark, 1993). Over time, post-event processing can affect individuals' memory for events because they continuously reconstruct their memory of the initial event so that it becomes altered to fit with their negative image of themselves in social situations. As a result, it also fuels their anticipatory anxiety, negative affect and negatively biased interpretations of social situations.

Several studies have investigated post-event processing in persons with social anxiety; however, to date, there has not been a thorough review of the literature. The following review of studies examining post-event processing in clinical and analogue samples is an attempt to organize and make sense of what is known about the nature and effects of this cognitive process and in what ways it relates to other cognitive phenomenon in the perpetuation of social anxiety.

## 2. Review of studies of post-event processing

Researchers have employed a variety of methods to study post-event processing among individuals with social anxiety disorder as well as non-clinical populations. This review outlines and draws conclusions from studies utilizing self-report measures, diary records, social situations generated in the laboratory, and experimental manipulations. Table 1 summarizes the design and findings of each of these studies.

### 2.1. Self-report

Foremost, researchers have utilized self-report questionnaires to measure individuals' tendencies to engage in post-event processing. Rachman, Gruter-Andrew, and Shafran (2000) developed the first measure of post-event processing, the Post-Event Processing Questionnaire (PEPQ). This 13-item measure consists of 100-point visual analogue scales which assess how much and how often participants engage in post-event processing following an anxiety-provoking social event in the last few months (e.g., 'Did your memories and thoughts about the event keep coming into your head even when you did not wish to think about it again?'). They recruited 130 undergraduate participants to complete the Beck Depression Inventory, Second edition (BDI-II; Beck, Steer, & Brown, 1996), the Social Phobia and Anxiety Inventory, (SPAI; Turner, Beidel, Dancu, & Stanley, 1989), and their new measure, the PEPQ. Socially anxious individuals reported higher levels of post-event processing. Post-event processing was also correlated with a tendency to avoid similar potentially negative social situations. Additionally, individuals with high levels of social anxiety reported that they remembered negative events more frequently than low socially anxious individuals, and they rated these memories as more intrusive and as interfering more with their concentration. The authors conducted a principal components analysis and found that all but three items loaded onto one factor, accounting for 42.8% of the variance. This study provided a useful measure of post-event processing and offered preliminary support for the cognitive-behavioral models of social anxiety disorder: post-event processing was related to social anxiety, avoidance behaviors, and biased memory for social events.

To test post-event processing in a clinical sample, McEvoy and Kingsep (2006) administered a slightly modified version of the PEPQ to 117 individuals with social anxiety disorder. The modified PEPQ demonstrated strong internal consistency, and a highly similar one-factor structure arose in this clinical sample. Post-event processing was not significantly correlated with measures of social interaction or performance anxiety. However, when levels of depression, anxiety and stress were controlled, post-event processing was correlated with state anxiety. This interesting finding suggests that post-event processing is not specific to social anxiety *per se* but may be more generally related to elevated anxiety.

Fehm, Schneider, and Hoyer (2007) investigated whether post-event processing was unique to social situations or if it also characterized thoughts following anxiety-evoking non-social situations. Student volunteers, who were not selected for levels of social anxiety, were asked to recall a social anxiety-evoking event and a non-social anxiety-evoking event that had occurred within the last six months. They then completed a modified version of the PEPQ for each event.

Participants engaged in post-event processing more often following social situations than non-social ones, and the post-event processing following social events was of greater intensity and duration. However, post-event processing following one event strongly predicted the amount of post-event processing in which an individual engaged after a second event. It should be noted that this finding was most likely influenced by method variance because post-event processing for both social and non-social situations was measured with the same questionnaire, the PEPQ.

Table 1  
 Characteristics of post-event processing studies in social anxiety

Study	Sample	Social induction	PEP induction	Follow up	PEP measure	Summary
<i>Self-report</i>						
1. Rachman et al. (2000)	130 students	No	No	No	PEPQ	PEP was associated with social anxiety, avoidance behaviors, and memory biases for social events.
2. McEvoy and Kingsep (2006)	117 SAD	No	No	No	PEPQ	PEP was not specifically related to social anxiety but was related to elevated state anxiety.
3. Fehm et al. (2007)	281 students	No	No	No	PEPQ	PEP was greater in intensity and duration for social events. PEP was greater after social interaction situations.
4. Kocovski and Rector (2007)	439 students	No	No	No	PEPQ ARQ	Social anxiety and anxious rumination predicted PEP. Anxiety sensitivity did not. PEP was greater after performance.
<i>Diary method</i>						
1. Lundh and Sperling (2002)	62 students	No	No, diary method	1-week follow-up session	PEPR	Highly socially anxious students were more likely to engage in PEP after negative-evaluative events.
<i>Social and performance situations</i>						
1. Coles et al. (2002)	22 SAD 30 NAC	Speech Cocktail party	No	3-week follow-up session	Memory perspective scale	Over 3-week interval, SADs remembered role-plays more from observer/less field perspective. NACs did not show this effect.
2. Edwards et al. (2003)	Students: 26 hi-SA 27 lo-SA	Speech	No	1-week follow-up session	TQ	Hi-SAs showed memory bias for negative feedback and negative elements of speech after 1 week.

3. Abbott and Rapee (2004)	43 SAD 32 NAC	Speech	No		1-week follow-up call	TQ	SADs showed memory bias for appraisal of speech performance and more negative PEP after 1 week.
4. Perini et al. (2006)	40 SAD 20 NAC	Speech	No		1-week follow-up session	PERQ	Relationship between social anxiety and PEP was mediated by individuals' perception of their performance in speech task.
5. Dannahy and Stopa (2007)	Students: 25 hi-SA 25 lo-SA	Interaction w/ confederate	No		1-week follow-up session	DTQ TQ	Hi-SA had greater negative PEP after 1 week compared to lo-SA.
<i>Experimental manipulations</i>							
1. Mellings and Alden (2000)	Students: 58 hi-SA 58 lo-SA	Interaction w/ confederate	No		Next day	RQ	Manipulation not successful. Hi-SA did have more PEP, memory bias for negative self-related info, and recalled less partner-related info than lo-SA.
2. Kashdan and Roberts (2007)	83 students	Interaction w/ confederate: – Personal disclosure – Small talk	No		Next day	RQ	In the self-disclosure condition, hi-SA showed a relationship between PEP and NA after 24 h.
3. Field and Morgan (2004)	Students: 33 hi-SA 33 lo-SA	No	Positive, negative, or neutral PEP	No		PEPQ	Manipulation not successful. Hi-SA recalled more negative and shameful autobiographical memories.
4. Kocovski et al. (2005)	Students: 55 hi-SA 57 lo-SA	No	Thought-listing or directive instructions	No		RSQ	Manipulation not successful. More negative and upward counterfactual thoughts in both PEP conditions.

*Note.* Social induction = social situation manipulation in the laboratory; PEP induction = post-event processing manipulation in the laboratory; PEPQ = Post-Event Processing Questionnaire; PERQ = Post-Event Rumination Questionnaire; ARQ = Anxious Rumination Questionnaire; PEPR = Post-Event Processing Record; RQ = Rumination Questionnaire; RSQ = Response Style Questionnaire; TQ = Thoughts Questionnaire; DTQ = Daily Thoughts Questionnaire; SAD = Social Anxiety Disorder; NAC = non-anxious control; SA = social anxiety; N/A = not applicable.

Additionally, individuals' fear of negative evaluation predicted whether they engaged in post-event processing following social situations; however, fear of negative evaluation did not predict post-event processing following non-social situations. Last, the degree of post-event processing varied as a function of the type of social situation. Interpersonal social situations were associated with greater levels of post-event processing than performance situations. This finding contrasts with the report of [McEvoy and Kingsep \(2006\)](#) that post-event processing was not associated with either social interaction or performance anxiety in a clinical sample. [Fehm et al. \(2007\)](#) suggest that interpersonal situations might be more ambiguous than performance situations and, therefore, individuals who are unsure of their social skills might be more likely to entertain thoughts about the interaction after it had occurred. One could argue, however, that certain performance situations, such as a class presentation or job interview, could certainly be ambiguous in nature and predispose individuals to post-event processing, as they try to better understand others' impressions of them in these highly evaluative situations. An alternative hypothesis is that individuals who reported on social interaction situations were those individuals who were more likely to endorse or engage in greater levels of post-event processing compared to those individuals who reported on performance situations. This hypothesis cannot be tested in this study; however, it is a potentially important confounding factor since participants in this study did not recall both types of social situations. It is also important to keep in mind that the [McEvoy and Kingsep \(2006\)](#) study included individuals with social anxiety disorder, whereas the [Fehm et al. \(2007\)](#) study did not select participants based on social anxiety. The different samples employed in the two studies may have affected whether individuals were more or less likely to engage in post-event processing following social interaction or performance situations.

A study by [Kocovski and Rector \(2007\)](#) examined whether social anxiety, anxious rumination, and anxiety sensitivity predicted the degree to which an individual engages in post-event processing following a social situation. Undergraduate students completed a revised 7-item version of the PEPQ (the PEPQ-R), the Social Phobia Scale (SPS; [Mattick & Clarke, 1998](#)), the Anxiety Sensitivity Index, ([Reiss, Peterson, Gursky, & McNally, 1986](#)), and the Anxious Rumination Questionnaire, ([Rector, Antony, Kocovski, & Swinson, in preparation](#)). Individuals with higher levels of social anxiety reported that they engaged in higher levels of post-event processing following an anxiety-provoking social situation. In addition, individuals with higher levels of anxious rumination also displayed higher levels of post-event processing after a social anxiety-evoking event. Anxiety sensitivity did not significantly add to the prediction of post-event processing beyond the contribution of social anxiety and anxious rumination. Individuals also engaged in post-event processing to a greater degree following presentation situations than social interaction situations, which conflicts with the findings of both [McEvoy and Kingsep \(2006\)](#) and [Fehm et al. \(2007\)](#). In this particular study, the authors used the SPS, a measure of scrutiny fear, rather than other measures that focus on anxiety in social interaction situations, which may have biased individuals' responses to think more about social anxiety in performance situations. Once again participants did not report on levels of post-event processing for both a social and performance situation, but chose one anxiety-provoking situation before answering post-event processing questions. Therefore, as above, it is difficult to determine whether individuals who reported on a type of social situation were also more inclined to report higher levels of post-event processing. The authors also investigated the possibility that ethnicity might influence the degree of post-event processing. However, Asian Canadians and Caucasian Canadians did not differ in this regard. Degree of social anxiety predicted post-event processing in both ethnic groups, but anxious rumination was a significant predictor only for Caucasian Canadians. The role of ethnicity in post-event processing (and in other cognitive processes related to social anxiety) has not been well studied and warrants future research attention.

These studies employed self-report measures of post-event processing for events that had occurred in the participants' life within the last six months. They provide a solid first step toward understanding this cognitive phenomenon. It is evident that socially anxious individuals report that they engage in post-event processing following social events whether or not they meet criteria for social anxiety disorder. However, the research is mixed regarding whether post-event processing is related more to social situations or performance situations. It is also apparent that post-event processing affects specific elements of individuals' cognition and behavior that might perpetuate social anxiety, such as avoidance behaviors and recollection of other negative social situations, at least at the level of self-report.

## 2.2. Diary method

A study conducted by [Lundh and Sperling \(2002\)](#) attempted to gain a more detailed and accurate picture of individuals' thoughts while engaged in post-event processing by employing diary recording over the course of one week. Undergraduate student participants were not recruited based on levels of social anxiety; however, all participants

completed the SPS and a diary record designed for the study, the Post-Event Processing Record. This record was divided into three sections. The first section was to be completed immediately after a participant had experienced a socially distressing event during the week of the study. In this section, participants indicated an event that elicited social anxiety and then proceeded to answer questions about when and where the event occurred, the context of the event and thoughts and feelings surrounding the event. Participants completed the second section the evening of the same day and the final section the evening of the next day. The latter two sections were based on [Rachman et al.'s \(2000\) PEPQ](#). Thus, participants answered questions regarding post-event processing immediately following the event, the evening of the event, and again the following evening. These questions addressed topics such as how distressing they found the event at the present time, the frequency of their thoughts about the event during the time period, as well as how much these thoughts interfered with their current activities. In sum, the participants recorded current levels of post-event processing about a recent, real-life event.

Twenty-four participants had experienced negative-evaluative events in the one-week period. Participants who had not experienced negative-evaluative events tended to report distressing social events that included feelings of guilt and anger. Scores on the SPS correlated with individuals' post-event processing scores for the evening and the next day after experiencing negative-evaluative events. The authors used the SPS instead of another social interaction anxiety measure which may have affected these results. Furthermore, individuals' levels of post-event processing on the day of the event predicted their levels of post-event processing the next day, although all participants' levels of post-event processing decreased from the evening of the event to the next day. Interestingly, when all distressing social events were analyzed together (without regard to whether the event stimulated social anxiety or some other distressing emotion), scores on the Post-Event Processing Record and SPS were not correlated, suggesting a degree of specificity of this phenomenon to social anxiety.

This is an extremely compelling study because it sheds light on how post-event processing operates in the natural environment. The most poignant finding is that individuals with high levels of social anxiety were more inclined to engage in post-event processing following negative-evaluative events. This finding supports current cognitive-behavioral models of social anxiety. As described earlier, the models assert that socially anxious individuals are more likely to make negatively biased interpretations, demonstrate biased recall of themselves in evaluative social situations, and that post-event processing perpetuates these cognitive distortions.

Taken together, the self-report and diary studies provide evidence that individuals with social anxiety disorder as well as analogue samples engage in post-event processing particularly after social anxiety-evoking events. It is still unclear whether social or performance situations elicit greater levels of post-event processing. The [Lundh and Sperling \(2002\)](#) study, however, points to the fact that events in which individuals fear negative evaluation may be more likely to elicit post-event processing. Further replication of this finding may resolve the discrepancy in the current research.

One of the issues with the self-report and diary studies is that individuals could recall a variety of events. Most studies asked participants to describe the events they recalled when filling out the questionnaires; for example, in the study by [Kocovski and Rector \(2007\)](#), 33.5% of participants reported on post-event processing levels regarding performance situations, whereas 25.7% of participants reported on post-event processing levels regarding social interaction situations. However, not all studies reported these results, which makes it difficult to link variations in individuals' levels of post-event processing to the type of event recalled. More importantly, self-report studies are retrospective in nature. If participants recall anxiety-provoking events that happened at any time in the past six months, there may be substantial individual differences in how recently the events occurred, and recency effects may contribute to reporting bias in some participants. We now turn our attention to studies that control these possible methodological flaws by presenting social and performance situations in the laboratory when studying post-event processing.

### *2.3. Social and performance situations*

Several studies have created mock social situations in the laboratory to elicit post-event processing. This methodology is useful because it allows researchers to control the type of situation participants encounter and, as a result, provides a standard to bring forth varying degrees of post-event processing following the event. [Coles, Turk, and Heimberg \(2002\)](#) investigated post-event processing by examining individuals' memory perspective for a speech and social interaction. The authors were primarily interested in finding out whether socially anxious individuals remembered social anxiety-evoking events from more of an observer perspective (i.e., viewing themselves in the same manner as other people in the situation would have viewed them) compared to a field perspective (i.e., viewing the

situation as they would have seen it through their own eyes). Twenty-two individuals with social anxiety disorder and 30 non-anxious controls engaged in two 4-min role-plays: an impromptu speech in front of two audience members and a casual conversation “at a party” with two other people. The participants were asked to think about the image they had of themselves during each situation and to rate the degree to which the image was from a field or an observer perspective. Participants made these ratings after the role-plays and during a session three weeks later.

As the authors predicted, the socially anxious participants recalled the social situations from more of an observer perspective/less of a field perspective after the situation occurred and three weeks later than non-anxious control participants. More relevant to the current context, over the three-week time interval, socially anxious individuals' memories for the social situations became more strongly from an observer perspective and less from a field perspective, whereas the non-anxious control participants' memories did not change significantly. These findings suggest that socially anxious individuals are processing social anxiety-evoking events over time in a manner in which they progressively construct a mental representation of themselves from an audience member's perspective. This study further demonstrates that laboratory performance situations elicit cognitive biases in socially anxious individuals and that this method may be a useful one for better understanding post-event processing.

Edwards, Rapee, and Franklin (2003) examined post-event processing following a speech task in a sample of students with high and low levels of social anxiety. During the first session, participants were asked to give a 3-min impromptu speech. Following each speech, a researcher provided half positive and half negative feedback relevant to the individual's performance. At the end of the session, participants were asked to freely recall the feedback they received after their speech. One week later, participants came to the laboratory for another session and were told that they would be giving another speech, a deception utilized to elicit levels of anxiety in the individuals comparable to their anxiety levels during the first session. Next, they were asked to recall the feedback they had received in the initial session and completed the Thoughts Questionnaire, created by the authors for this study to measure post-event processing. The Thoughts Questionnaire is comprised of 29 items that participants rate on a 5-point scale. The questionnaire measures the frequency of negative (e.g., I made a fool of myself) and positive (e.g., My speech was good) thoughts over the past week.

The researchers found support for their hypotheses: individuals with elevated levels of social anxiety recalled more negative feedback than positive feedback at both sessions, whereas the controls did not show this memory bias. With regards to post-event processing, the participants with high levels of social anxiety brooded over the negative elements of the impromptu speech and negative feedback over the one-week interval, whereas the control group did not show this tendency. The two groups did not differ in their levels of positive post-event processing (i.e., thinking about the positive aspects of the speech experience) during the week.

Abbott and Rapee (2004) conducted a similar study examining post-event processing in individuals with social anxiety disorder and non-anxious controls. In the first session, participants completed the impromptu speech as in Edwards et al. (2003). Immediately after the speech, participants completed a Perception of Speech Performance Questionnaire (Rapee & Lim, 1992). This measure assesses the individuals' appraisals of their performance and their physical responses. One week later, participants were telephoned by a researcher and answered the questions on the Perception of Speech Performance Questionnaire and the Thoughts Questionnaire. The socially anxious clients' negative appraisals of their performance in the speech task persisted over the one-week interval, and they had higher levels of negative post-event processing during the week than the control participants. After completing 12 weeks of cognitive-behavioral treatment, socially anxious clients had fewer negative appraisals of their performance and reported less negative post-event processing. Overall, these findings underscore that individuals with social anxiety disorder evaluate their performance in a negative light and engage in perseverative negative thinking. It also provides promising evidence that these cognitive biases can be reduced.

In a follow-up study, Perini, Abbott, and Rapee (2006) examined post-event processing among socially anxious clients and controls. Once again, participants completed a battery of questionnaires and gave a 3-min impromptu speech. Following the speech they completed the Perception of Speech Performance Questionnaire. After one week, each participant filled out the Post-Event Rumination Questionnaire, which was modeled after the Thoughts Questionnaire developed by Edwards et al. (2003). The measure includes items targeting positive and negative rumination as well as the frequency of the thoughts and the controllability and the distress the thoughts caused the individual. This study replicated the finding reported by Abbott and Rapee (2004) that socially anxious individuals engaged in negative post-event rumination more frequently than controls in the one week following their speech. Furthermore, the relationship between social anxiety and post-event rumination was mediated by individuals'

perception of their performance in the speech task. Overall, these two studies offer support that socially anxious individuals tend to engage in negative post-event processing following a performance event.

Furthermore, [Dannahy and Stopa \(2007\)](#) examined how undergraduates, who were selected for their high or low scores on the Fear of Negative Evaluation Scale (FNE; [Watson & Friend, 1969](#)), judged their own performance in a social interaction as well as the frequency of their post-event processing over the course of one week. During the first session, participants engaged in a social interaction in which they were asked to get to know another person for at least 5 min. The other person in the situation was a confederate who was neither overtly positive nor negative during the interaction. Thereafter, the participant and the confederate both rated the participant's performance using the Social Performance Rating Scale ([Fydrich, Chambless, Perry, Buergener, & Beazley, 1998](#)). Over the course of one week, the participant completed the Daily Thoughts Questionnaire, which measures the frequency of an individual's thoughts concerning the interaction during each day of the week. During the second session, participants were instructed that they would be having another social interaction after they filled out questionnaires, such as the Social Performance Rating Scale and the Thoughts Questionnaire. Again, this deception was intended to increase individuals' levels of anticipatory anxiety and the likelihood that any cognitive biases would be elevated; no additional social interaction actually took place.

As the authors hypothesized, participants with high scores on the FNE expected that they would perform more poorly in the interaction compared to the control group. After the interaction, these participants rated their performance more negatively than the confederates did. Individuals with high FNE scores engaged in more negative post-event processing after the social interaction than individuals with low FNE scores. The groups did not differ on levels of positive post-event processing. This finding corresponds with that of [Edwards et al. \(2003\)](#) and raises the question why levels of positive post-event processing are not lower among socially anxious individuals compared to controls; however, negative post-event processing seems to be characteristic of high socially anxious individuals. We return to this issue later in this paper.

One drawback of the studies reviewed thus far is that they rely solely on the accuracy of participants' reports. It is often difficult for one to assess the frequency, content, and intensity of a habitual thinking style simply by answering questions on a questionnaire. It is for this reason, that experimental manipulations of post-event processing, social situations, or the anticipation of an event can be extremely enlightening when examining this process.

#### 2.4. *Experimental manipulations*

In a study conducted by [Mellings and Alden \(2000\)](#), high and low socially anxious students engaged in an unstructured 10-min social interaction with a confederate of the opposite gender. Participants then completed questionnaires measuring self-focused attention, anxiety, physiological symptoms, and anxiety-related behaviors. The next day, participants returned for another session and were assigned to either an anticipation condition or a control condition. In the anticipation condition, participants were told that they would have to interact with another person in front of an audience. The anticipation condition was, in fact, a deception, which the authors utilized in order to elevate levels of anticipatory anxiety among the participants. In the control condition, participants were not told that they would have a second interaction. After the manipulation, participants recalled information about their social interaction in a free recall task and a structured recall task asking about specific information concerning the confederate and the room in which the interaction took place the day before. They also completed the Rumination Questionnaire (RQ), a five-item measure created by the authors, to assess the degree of post-event processing in the previous 24-h interval. Participants responded to items on a 7-point Likert scale (e.g., To what extent did you think about the anxiety you felt during the interaction?).

The analysis of the results revealed that the manipulation was not successful. The individuals in the anticipation condition did not engage in greater levels of post-event processing. Overall, however, there was a significant group effect. Individuals with high levels of social anxiety displayed greater levels of post-event processing than controls. RQ scores predicted recall of negative self-related information on the open-ended recall measure, but not on the structured memory task. RQ scores also predicted negative bias in self-judgments and recall of anxiety-related sensations at the follow-up. Thus, one can conclude from these results that post-event processing following a social interaction reinforces negative self-appraisals of one's performance and contributes to memory biases found in highly socially anxious individuals.

Other researchers have investigated post-event processing after manipulating the type of social interaction. [Kashdan and Roberts \(2007\)](#) recruited a sample of students and randomly assigned them to one of two 45-min social interaction

conditions with another participant of the opposite sex. In the structured personal disclosure condition, participants asked personal questions presented on cards to get to know intimate details about their partner. In the small-talk condition, participants asked more general and superficial questions. All participants completed a battery of questionnaires following the interaction. The next day, participants returned to the laboratory to complete the RQ (Mellings & Alden, 2000). In the self-disclosure condition, the socially anxious individuals' responses showed a relationship between post-event processing and increased negative affect following the 24-h interval, whereas the socially anxious individuals' answers in the small-talk condition showed a relationship between post-event processing and decreased negative affect. Also, individuals with elevated levels of social anxiety and depressive symptoms experienced greater levels of negative post-event processing following the social interaction, so it appears that post-event processing was exacerbated among socially anxious individuals who were also depressed. It would be interesting to try and replicate this study with a clinical sample to see whether non-disclosure social interactions are seen as threatening. This study also draws attention to the comorbidity of social anxiety and depression as well as the overlap of cognitive consequences that might occur in both disorders.

In addition to manipulating social interactions in the laboratory, some studies have examined manipulations of post-event processing. Field and Morgan (2004) selected student volunteers who scored high or low on the SPAI. Participants were asked to think about a recent ambiguous social situation and were then randomized to different post-event processing conditions: a positive or negative post-event processing task or a distraction task. In the positive condition, participants were asked to focus on the positive elements of the situation, whereas in the negative condition, participants were asked to focus on the negative elements. In the distraction condition, participants simply read some text. Following the manipulation, participants freely recalled several specific events or experiences and completed the PEPQ. Regardless of the post-event processing manipulation, individuals with elevated levels of social anxiety recalled more negative and shameful memories. Surprisingly, the socially anxious individuals in the negative post-event processing condition rated their anxious and shameful memories as more calming. The researchers did not expect this outcome; however, it might provide some explanation of the reinforcing qualities of post-event processing. However, this finding arose from a single-item rating, and its reliability is thus open to question. Replication of these results is necessary before further discussion.

Kocovski, Endler, Rector and Flett (2005) also performed a study manipulating post-event processing in high and low socially anxious participants. Participants read scripts about two mildly embarrassing social situations: a social interaction and a performance situation. Participants were then randomly placed in the thought-listing or directive questioning post-event processing conditions. Participants in the directive condition were asked to generate counterfactual thoughts about the stories they read. Counterfactual thoughts consist of thoughts about a past event and how it could have turned out differently. Independent raters scored the valence of the thoughts and whether counterfactual thoughts were negative (upward counterfactual, "if only" types of statements), positive (downward counterfactual, "at least it's done"), or neither (not a counterfactual, "there's something wrong with me"). The researchers were interested in seeing whether high socially anxious participants generated more negative upward counterfactual thoughts about the embarrassing situations because it would seem to correspond with their negative view of the self in social situations. The participants also completed a variety of questionnaires including the Response Styles Questionnaire (RSQ; Nolen-Hoeksema & Morrow, 1991).

Individuals with elevated social anxiety experienced more negative thoughts in both post-event processing conditions, and they produced more upward counterfactual thoughts. Thus, the high socially anxious participants produced more negative "what if" statements after they had read the mildly embarrassing social situations. On the RSQ, highly socially anxious participants were more likely to engage in ruminative/post-event processing after social situations. These findings correspond with those of Mellings and Alden (2000).

It is evident from these studies that post-event processing is a phenomenon in which many individuals engage following social situations. It makes intuitive sense that individuals would entertain thoughts about social interactions or performance situations after the fact because these situations are often ambiguous and demand some sort of interpretation. The self-report and diary studies demonstrated that if individuals have high levels of social anxiety, post-event processing often becomes negatively self-focused and perseverative. The findings of the studies including social and performance situations as well as experimental manipulations suggest that post-event processing maintains negative interpretations that one might have about oneself and leads to retrieval of other negative memories. This has been evident for individuals with social anxiety disorder as well as individuals with high levels of social anxiety. Therefore, the literature has provided support for the role of post-event processing in cognitive models of social anxiety

disorder. Post-event processing is a cognitive process which perpetuates social anxiety by maintaining negative impressions of oneself, negative memories of social situations, and negative assumptions of future social events.

### 3. Future directions for post-event processing research

To date, researchers have focused on studying post-event processing from either a retrospective point of view on self-report measures or over the course of one to three weeks between laboratory sessions. Thus, studies in the current literature assess post-event processing at only one or two points. However, post-event processing is an ongoing process. It is likely that, as time passes, different thoughts unfold along the way. The cognitive-behavioral models postulate that, over time, post-event processing becomes more negative and less positive among socially anxious individuals. Multiple repeated assessments of post-event processing would enable researchers to test whether there are temporal patterns in post-event processing. It would be interesting to track the course, valence, and frequency of individuals' thoughts following a social event over progressively longer periods of time. Furthermore some individuals may engage in post-event processing only when anticipating a similar situation. There is also the replicated finding that socially anxious participants and non-anxious controls exhibit no differences in their levels of positive post-event processing following a speech task or a social interaction situation (Edwards et al., 2003; Dannahy & Stopa, 2007). Perhaps studying post-event processing over a longer time interval would provide some insight as to the frequency, nature and intensity of these positive thoughts.

Researchers should also pay close attention to the measures they use to assess social anxiety when studying post-event processing in the future. Questionnaires such as the FNE or SPS measure distinct aspects of social anxiety but do not capture the entire range of social anxiety symptoms. We suggest using multiple measures to assess fear of negative evaluation and anxiety in both social interaction and performance situations. This will also help readers interpret results across studies. One of the discrepancies in the post-event processing literature thus far involves the degree of post-event processing following social interaction situations compared to performance situations. Post-event processing among individuals with social anxiety disorder does not appear to be related to the degree of anxiety experienced in social versus performance situations (McEvoy & Kingsep, 2006). However, research utilizing college students has reported that post-event processing is more related to performance situations (Kocovski & Rector, 2007) or just the reverse (Fehm et al., 2007). It is difficult to compare these studies because one sample was diagnosed with social anxiety disorder and the analogue studies used unselected students and then assessed levels of social anxiety using different questionnaires. It is imperative for researchers to thoughtfully choose their measures of social anxiety.

In addition, researchers should have participants report on levels of post-event processing for both social interaction and performance situations. This would shed light on whether or not post-event processing is more characteristic following one type of event than the other. The discrepancy in the literature regarding post-event processing following social interaction versus performance situations has been confounded by the fact that participants did not report on both types of social situations. By employing within-subjects designs, researchers will be better able to determine whether the findings represent situational or individual differences in post-event processing.

At the present time it is difficult to measure how well a questionnaire measures post-event processing due to the lack of construct validation. It would be helpful for future studies to report correlations between measures of trait social anxiety and post-event processing. This way researchers would have better evidence that post-event processing is, in fact, a construct separate from social anxiety.

Researchers should also try to consider employing an idiographic approach to study post-event processing. Diary methods and journaling techniques can be extremely useful in attempts to understand the nature of individuals' thoughts and how individuals perceive and remember situations. One drawback of using diary methods is that they prompt individuals to engage in post-event processing on an artificial basis and thus may influence the very phenomenon they are meant to assess. However, this can be an issue for any study that asks individuals to reflect on their own thoughts and is something that researchers should always keep in mind when analyzing their results.

It might also be useful to further study imagery in post-event processing. Several studies have investigated socially anxious individuals' self-imagery in social situations and found that it is predominantly negative (Coles et al., 2002; Hackman, Clark, & McManus, 2000; Hackman, Surawy, & Clark, 1998; Mellings & Alden, 2000). Researchers have also found that socially anxious individuals remember social anxiety-evoking events from more of an observer perspective and less of a field perspective over the course of three weeks (Coles et al., 2002). Post-event processing likely incorporates this negative imagery as well as the tendency for it to come more from an observer perspective.

These components of imagery in post-event processing might be related to why some individuals who are socially anxious report that post-event processing is intrusive and distracting.

Further research should also investigate how post-event processing relates to other cognitive biases in social anxiety. We have started to acquire knowledge that post-event processing increases individuals' memory biases in some cases. It would also be useful to measure whether individuals' interpretations of events are affected by post-event processing. Perhaps only negative post-event processing amplifies interpretation biases. Hirsch, Clark, and Mathews (2006) have put forth a combined cognitive bias hypothesis, suggesting the integrated and interactive nature of cognitive biases in social anxiety. It is likely that researching these processes concurrently will capture the inner workings of social anxiety in a much deeper and meaningful way.

Finally, the empirical evidence for post-event processing has begun to be addressed in new treatment protocols for social anxiety disorder (Clark, 2001; Clark et al., 2003; Hofmann & Scepkowski, 2006; Hope, Turk, & Heimberg, 2006). For example, Hope et al.'s (2006) cognitive-behavioral therapy instructs therapists to train their clients to identify automatic thoughts and thinking errors, likely components of post-event processing, and to develop rational responses to dispute their automatic thoughts. The treatment also includes more advanced worksheets for homework exposures, which include a large emphasis on post-event processing. Ultimately, clients are taught to evaluate their reactions to social situations and engage in a cognitive debriefing of these reactions as they occur in real life. Situations are evaluated in terms of whether clients have met predetermined behavioral goals, not on the basis of their cognitive and emotional responses to these situations. In addition, Clark's (2001) cognitive therapy for social anxiety addresses post-event processing. First, clients inform the therapist about how they think about social situations after they have occurred. The disadvantages of post-event processing are discussed and the client is encouraged to refrain from all post-event processing activities. Therapists discuss alternative ways to process a situation, such as reviewing it from a field perspective or focusing on elements of their behavior that discount their negative self-image. Clearly, both Hope et al.'s (2006) and Clark's (2001) social anxiety treatment protocols provide useful strategies to counteract post-event processing.

Little research has yet been devoted to an examination of how techniques that address post-event processing contribute to the outcome of cognitive-behavioral treatment. It would be interesting to study whether these techniques affect the frequency of post-event processing, the negative nature of the thoughts, or both. Also, researchers should investigate the valence and attributes of post-event processing imagery over time as well as how it may relate to individuals' mental representations of themselves during social situations. Overall, there is a wealth of knowledge to be garnered from the study of post-event processing, from how it maintains social anxiety to how cognitive-behavioral techniques can interrupt the vicious cycle of negative thinking.

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