

It hurts but I still need it:
A qualitative investigation of post-event processing in social anxiety disorder
(EXTENDED VERSION)

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Introduction

A cognitive behavioural model of social anxiety disorder (SAD) regards biased processing of social information as a key mechanism for the maintenance of SAD (Clark & Wells, 1995; Rapee & Heimberg, 1997): self-schemata, self-focused attention, safety behaviours, and anticipatory and post-event processing. The current study focuses on one part of the fourth maintaining factor, post-event processing (PEP).

Pre-eminent theoretical models (Clark & Wells, 1995; Rapee & Heimberg, 1997), as well as the modern conceptualisation of SAD (Hofmann, 2007), describe how PEP contributes to maintaining SAD. A feature of PEP is the tendency to remain in a prolonged backwards-directed self-focus after social events. In particular, following social situations, individuals with SAD continue to process their social performance/interaction in a manner that is consistent with their negative biases (Clark & Wells, 1995; Hofmann, 2007; Rapee & Heimberg, 1997). For example, a person who perceives that s/he is blushing noticeably during a presentation is likely to continue thinking about it after the presentation is over, focusing on the negative meanings and consequences. PEP is dominated by one's negative self-perceptions and anxious feelings since these aspects are processed in detail within social situations and are more likely to be encoded into memory. Such reviewing prolongs adverse effects and strengthens negative appraisals and self-beliefs (Clark & Wells, 1995; Hofmann, 2007; Rapee & Heimberg, 1997).

In support of the proposed empirical theory of PEP, previous studies have employed a questionnaire or an ambulatory assessment (e.g. diary) method to investigate PEP among non-clinical samples and/or individuals with SAD. These studies showed that levels of social anxiety were significantly correlated with the degree of PEP following social events, and that the degree of PEP was consistently high over several days (Helbig-Lang, von Auer, Neubauer, Murray, & Gerlach, 2016; Lundh & Sperling, 2002; McEvoy & Kingsep, 2006; Rachman, Gruter-Andrew, & Shafran, 2000). Further, several studies used an experimental methodology that included creating social or performance situations in the laboratory, and experimental manipulation of PEP and/or anticipation of an upcoming social event. The findings from these experimental studies suggest that PEP maintains negative interpretations that one might have about oneself and leads to the retrieval of other negative memories, especially among individuals with SAD and individuals with high-social anxiety (Brozovich & Heimberg, 2011; Edwards, Rapee, & Franklin, 2003; Mellings & Alden, 2000). Furthermore, there is growing evidence that several variables influence subsequent engagement in PEP, such as self-focused attention, the type of social situation, and state anxiety (e.g. Gaydukevych & Kocovski, 2012; Kiko, 2012; Makkar & Grisham, 2012).

Although it is clear that PEP involves recollections of social events that tend to be recurrent and intrusive (Rachman *et al.*, 2000), it is still unclear why individuals with SAD engage in PEP. It has recently been proposed that positive metacognitive beliefs play an important role in initiating and maintaining PEP among SADs (Wells, 2005, 2007). The metacognitive process is well-known and has been studied in generalised anxiety disorder, but has received relatively little attention in SAD, and is not highlighted in the Clark & Wells model (Papageorgiou & Wells, 2001; Wells, 2005). Wong and Moulds (2010) developed the Positive Beliefs about Post-Event Processing Questionnaire (PB-PEPQ) to measure positive beliefs about rumination and/or motivations for reviewing social interactions (e.g. I think about previous social interactions... “To know if I did something embarrassing” [Item 1]; “To avoid saying something wrong in the future” [Item 23]). Several studies have used PB-PEPQ or similar questionnaires, and have revealed a significant relationship between positive beliefs, social anxiety, and PEP (Fisak & Hammond, 2013; Gavric, Moscovitch, Rowa, & McCabe, 2017; Wong & Moulds, 2010). A recent study (Gavric *et al.*, 2017) also demonstrated that the relationship between social anxiety and PEP was mediated by positive metacognitive beliefs and negative self-perceptions. Interestingly, a few studies have demonstrated that some individuals with high-social anxiety experience PEP as ultimately calming and helpful (Field, Psychol, & Morgan, 2004; Rachman *et al.*, 2000). However, engaging in PEP leads to the development of negative metacognitive beliefs about the disadvantages of PEP, such as those proposed in theoretical models and empirical studies. Indeed, it has also been proposed that both positive and negative metacognitive beliefs sustain engagement in PEP (Matthews & Wells, 2004; Wells & Matthews, 1996). However, as for positive metacognitive beliefs, it is still unknown whether individuals with SAD actually derive the benefit from PEP that they expect, and if this is not the case, how their positive beliefs are maintained. Also, as was reviewed earlier, SAD individuals may be aware of the counterproductive effects of PEP, but it is unknown why they continue PEP despite having such negative beliefs.

Thus, the current study employs a qualitative methodology aiming at exploring the phenomenology of the processes involved in PEP from the perspective of individuals diagnosed with SAD, in order to address the research questions above. The findings of this study will provide additional information about the perceived positive and negative consequences of PEP, and thus contribute to updating the proposed theoretical framework of PEP. It has been argued that repetitive negative thinking (RNT) about distressing events and metacognitive beliefs about RNT are a trans-diagnostic process across a range of anxiety and mood disorders (Matthews & Wells, 2004; Wells & Matthews, 1996). However, the specific distressing events, reasons for reviewing, and contents of reviews are expected to vary across disorders (Matthews and Wells,

2004, Wells and Matthews, 1996). Thus, in order to increase internal validity, the current interview study focuses on individuals with SAD who engage in PEP.

Method

Study design and interviews

This study was designed to be qualitative, using semi-structured, one-to-one interviews via telephone. The interview adopted a non-interventionist approach (i.e. the interviewer was not involved in direct care of the participants), and was conducted by the first author (NY). NY has seven years of clinical experience as a psychiatric nurse, five years of experience providing cognitive therapy to SADs, and has been conducting qualitative research for three years.

An interview guide was developed based on healthcare professionals' experiences treating SAD patients (author NY, KT, and OK), cognitive models of SAD, as well as metacognitive theories of PEP. The structure of the interview involved loosely defined sections. Firstly, what motivates them to review past social events ("What motivates you to review past social events?"). Secondly, what consequences (benefits and counterproductive effects) of PEP they perceive ("What happens to you during and after reviewing past events?"). Thirdly, how they generally view the process of PEP ("Do you think it is good (helpful) or bad (unhelpful) to review past social events? Why?"; "Do you try to stop your reviews?"; "(if so) Why do you still review past events?"). The interviewer also asked how they review past social events, with questions such as "What specific details do you review?" and "Do you seek advice or opinions from others?" Interviews were conversational, with the structure being loosely superimposed. In each instance, the interviewer was able to ask participants for further information and/or clarification (e.g. "could you tell me more about that?", "Could you give me a specific example of that?"). Throughout the interview, participants were also encouraged to seek clarification if they were unsure of what was being asked.

This study was undertaken, evaluated, and reported in accordance with Consolidated Criteria for Reporting Qualitative Research (COREQ) guidelines (Tong, Sainsbury, & Craig, 2007), and the study protocol was reviewed and approved by the Ethics Committee of the University of Miyazaki, Japan (No. 2015-057). All recruitment and interviews were carried out between September 2015 and February 2016.

Participants and procedure

The criteria for inclusion in this study were: 1) a primary diagnosis of SAD according to the Structured Clinical Interview for DSM-IV Axis-I Disorders (SCID-I) (First, Spitzer, Gibbon, &

Williams, 1997), 2) age of 20–65 years, and 3) individuals who reported repetitive reviewing of past social performance/interaction based on a simple yes/no question (“After interacting with someone or doing something in a social situation, do you find yourself thinking about it a lot?”).

Participants were recruited via Rakuten Research, a web-based survey company that holds approximately 2.3 million monitors. First, recruiting emails were sent to 13,350 potential monitors (whose Rakuten profile information indicated “social anxiety disorder”, “anxiety disorder”, or “neurosis”), and from these 300 individuals were potentially eligible to participate in the study (pooled sample). Before enrolling participants (from this pooled sample) into the interview stage, an online questionnaire screening (using the Mini-International Neuropsychiatric Interview-Screen) (Sheehan *et al.*, 1998) and a telephone diagnostic interview (using the SCID-I) were conducted by author NY. During the screening stage, participants also filled in the self-reporting version of the Liebowitz Social Anxiety Scale (LSAS) (Baker, Heinrichs, Kim, & Hofmann, 2002), but this was not used for the participants’ selection (i.e. we did not exclude participants based on the LSAS score). Regarding sampling strategy, we used purposeful/theoretical sampling to obtain cases deemed information-rich for this study. Sampling continued until data saturation was reached with the following steps (Patton, 2015). Firstly, the researcher interviewed 10 participants and analysed the data to generate initial codes and themes. A second interview guide expanding upon the initial guide was developed after this first stage interview according to the codes and themes introduced by participants. In the second interview guide, we added supplemental questions asking participants’ general views of the PEP process to find out whether their reviews occur intentionally, automatically/intrusively, or both (e.g. “Do you review past social events intentionally? Or, do your memories about events keep coming into your head automatically and/or intrusively? Or both?”). Secondly, the researcher interviewed some more participants and analysed the data to elaborate on initial codes and themes. From the 19th interview, we did not receive further information (i.e. data saturation was reached); despite this, we still interviewed three more participants to confirm the validity of the codes and themes (i.e. no new relevant knowledge, leads, or concepts emerged from new participants). In total, we conducted 21 interviews. In the interview stage, participants received 30-40 minute audio-recorded telephone interviews.

Participants were offered 5,000 JPY gift vouchers (equalled to 45.45 USD, exchange rate: 1 USD = 110 JPY) for their participation in the interview. Online agreed informed consent was obtained from all the participants.

All participants had a principal diagnosis of SAD, and none declined or were excluded from the study. Of the 21 participants (mean age = 39.2, SD = 9.2), 16 (76.0 %) were female, 12 (57.0 %) were married or living as married, 12 (57.0 %) had completed ≥ 3 years of college/university, and 4 (19.0 %) were unemployed because of SAD. Mean age at onset of

SAD was 17.2 years ($SD = 9.2$), and the duration was 22.0 years ($SD = 11.3$). The mean LSAS score was 83.2 ($SD = 19.9$), and the internal consistency coefficients (Cronbach's alpha) of LSAS was 0.92. Fifteen participants (71.4 %) had at least one comorbid axis-I disorder: major depressive disorder ($n = 7$, 33.3 %), obsessive-compulsive disorder ($n = 3$, 14.3 %), panic disorder with agoraphobia ($n = 2$, 9.5 %), agoraphobia without panic disorder ($n = 2$, 9.5 %), and others ($n = 4$, 19.0 %). No participants received a structured psychotherapy during the study (concurrent medication, $n = 9$ [42.9%]; supportive counselling, $n = 2$ [9.5%]).

Analysis

Audio-recordings of the interviews were transcribed and anonymised by two independent transcribers, and author NY checked all audio and script data. A thematic approach was used for analysis because it is a dynamic research method that can be usefully applied to improve understanding of phenomena of interest, inform theory development and strengthen clinical practice (Braun & Clarke, 2006; Silverstein, Auerbach, & Levant, 2006). Inductive analysis was chosen as the most appropriate method, as this allowed for unexpected themes to be identified (Braun & Clarke, 2006).

The analysis strategy followed a step-by-step guide (Braun & Clarke, 2006), which is described below in chronological order. First, each transcript was actively read and re-read several times by author NY, who took notes, searched for meanings and patterns, and identified initial ideas for coding. The transcripts were then read again, with full and equal attention given to each individual piece of data collected under the supervision of author KT and OK (both are clinical psychologists, and have over ten years of experience in treating SAD patients and carrying out qualitative research). Following this, all authors discussed their views, and codes were given to all features highlighted on initial readings by author NY. Generated codes identified a feature of the raw data (semantic content or latent), and were the most basic segment of raw data for subsequent analyses. A coding unit can range from only a few words to parts of sentences or whole paragraphs. Coding was executed manually for each participant (i.e. we did not generate codes separately in each question). The next stage involved searching for themes to explain larger sections of the data by combining similar or linked codes. Thematic maps were used to visualise data and show relationships between themes. The themes were then named and defined, and exemplary quotes were selected which best reflected the meaning of each theme. We repeated the interview-analysis cycle and continued until data saturation was reached. All transcripts were reread in order to test whether the thematic map worked against the transcription. If the thematic map did not work, the researchers returned to further reviewing and refining codes and themes until a satisfactory thematic map could be made. At the final

stage of analysis, two of the participants were asked to comment on how accurately the final theoretical formulation reflected their own experience.

Results

In the interview, participants were encouraged to talk about current/typical experience of repetitive reviewing of past social situation (social performance situation [n = 5, 23.8%] and social interaction situation [n=16, 76.2%]). Thematic analysis of the data revealed three main themes: “Only, safe and useful way to improve myself”, “It hurts more than helps me”, and “Better safe than sorry”. Figure S1 is a visual representation of the relationship between themes showing how individuals with SAD choose to perform PEP. They feel the need to improve their social performance, and they believe that reviewing past events is the only safe and private way to do so—“Only, safe and useful way to improve myself”, which is an underlying motive for them to do their reviews. However, as a consequence of engaging in prolonged negatively-biased review, they do not seem to obtain the benefit that they expect, or only find a variety of counterproductive outcomes—“It hurts more than helps me”. They weigh up the costs and benefits, but continue reviewing while feeling conflicted about it—“Better safe than sorry”. Each theme and illustrative quotations are described in detail as follows (see Table S1 for more examples of generated codes and illustrative data extracts associated with emerged themes).

Only, safe and useful way to improve myself

Individuals with SAD feel the need to improve their social performance. At the same time, they believe that reviewing past social events is the only safe way to do this and prevent potential mistakes in the future (without offending others, and/or being judged, negatively evaluated, or rejected by others as a result of asking for feedback/opinions). This positive belief is an underlying motive for them to review.

- *I repeatedly review past social events because I need to improve my social performance. [...] I think, reviewing is a good opportunity to look back on my choice of words, and whether they were appropriate or not. [Participant 8]*
- *That [reviewing] is the only way...I have no other way for improving myself. [Participant 21]*
- *I know that it's helpful to consult with others, but it's tough for me to do because I am afraid of showing my true self to others. After all, I can't do anything except look back on the event by myself. [Participant 20]*

It hurts more than helps me

Reviewing past social events is supposed to help SADs improve their social performance, but they rarely (or never) reach a clear conclusion or obtain a clear solution through reviewing due to the subjective nature of the available information they review. Reviewing a particular event also increases negative emotions, disrupts concentration, and triggers memories of similar past events. As a result, they confirm their negative beliefs, get more and more anxious every time they review, and are keen to avoid similar social situations in the future.

- *It's rare to reach a conclusion or find a solution through reviewing...maybe...never... [...] I only dwelled on my mistake and what I said during that event, so I missed what other people discussed or said. [Participant 11]*
 - *Even though I'll try to control my shaky hands next time, it's impossible. So I can't even think about countermeasures for similar situations in the future, I just dwell on my negative feelings and how much I was shaking at that time. It's really painful for me. [Participant 3]*
 - *When I review too much, I feel like I'm making up the worst story and I completely forget what actually happened at that event. [Participant 14]*
 - *Reviewing triggers more negative memories in the past. [Participant 3]*
- (As a result...)
- *I feel certain that I really am weird and stupid. [Participant 3]*
 - *I get more and more anxious every time I review. [Participant 5]*
 - *I really want to avoid similar situations through reviewing. [Participant 11]*

Better safe than sorry

SADs feel irrational, ambivalent, and conflicted about their reviews. As mentioned above, they are aware of the counterproductive effects of reviewing, and they doubt that reviewing actually contributes to improving their subsequent performances (i.e. it may not be useful). They usually want to stop reviewing, but it can start unintentionally and intrusively because anything in their mind can trigger such reviewing (i.e. reviewing can happen whenever and wherever). However, sometimes they successfully find or create new measures to cope with similar situations through reviewing (though it seems unhelpful in the long-term). So, even when there are no problems in their performance/interactions (or even when they perform successfully), they carefully analyse social events looking for something to improve. In this way, they weigh up the costs and benefits of reviewing, and they end up continuing their reviews while feeling conflicted about it.

As for conflicted beliefs about reviewing:

- *Reviewing past events is a way to remind me of my bad experience and to criticise myself.... it's really hard and tough for me, so I really want to stop it. From my experience, I realise that reviewing does not produce any positive results and it's kind of a waste of time. But I still believe it's necessary for preventing future mistakes or poor performance, so I eventually do it while feeling conflicted. [Participant 1]*
- *I know that reviewing can eventually be problematic, but I believe reviewing is not a bad thing at all. [Participant 15]*
- *There is nothing I can do aside from reviewing [to improve myself]. So, I review my past social events repeatedly, no matter how painful it is. [Participant 21]*

Examples of new measures to cope with similar situations in the future, that are found or created through reviewing:

- *While reviewing past social situations, I also start thinking of countermeasures for future events. [...] Previously, I asked many questions during the conversation. [...] When I ask too many questions, the other person looks tired and confused, and then seems to get bored. I dwelt on such negative responses and lost confidence more and more, so I needed to find another countermeasure. After that, I tried not to force questions and started to stay calm, but [...]. [Participant 21]*
- *I usually search the internet along with my review...When I find better words on a website, I then make a plan to use these words and avoid inappropriate words I used at a past event, and I try to carefully check what I'm going to say in advance of my next conversation. [Participant 8]*

Being asked if there were no problems in their past social performance/interactions (or if they perform successfully):

- *I frantically prepare my talk in advance, so I think I seldom make mistakes. However, I review such events every time. Reviewing is a way to amend something bad—I believe no review, no progress. Perhaps, I'm satisfied just reviewing, just doing something for improvement. I probably feel a sense of relief by doing it. [Participant 1]*
- *Whether or not the results are positive, I always look back at my conversation. Even if my client was completely convinced by my explanation, I still think I could have explained or presented better, so I end up trying and looking back on my conversation to achieve better outcomes. [Participant 6]*

Discussion

The aims of the study were to explore: 1) whether individuals with SAD actually derive the benefits from PEP that they expect; 2) if this is not the case, how their positive beliefs are maintained; and 3) if they are aware of the counterproductive effects of PEP, why they still perform PEP. The findings of this study, demonstrating how individuals with SAD engage in PEP from the perspective of individuals with SAD, support and expand on the theories of PEP in SAD.

Firstly, this qualitative study demonstrated that SAD individuals rarely obtain the benefits from PEP that they expect. Consistent with previous studies and theories of PEP (Fisak & Hammond, 2013; Gavric *et al.*, 2017; Matthews & Wells, 2004; Wells, 2005, 2007; Wells & Matthews, 1996; Wong & Moulds, 2010), the presence of positive metacognitive beliefs seems to play a central role in initial motivation to engage in PEP. However, contrary to the initial motivation, SADs recognise that PEP has few (or almost no) benefits and a range of harmful effects.

Secondary, results suggest that individuals with SAD may, on occasion, find solutions during PEP, which maintain their PEP as a form of intermittent reinforcement. In the interview, individuals with SAD know that they rarely find clear solutions to improving their social performance through PEP. For example, one of our participants reported that she used to ask many questions in order to avoid silence/pauses during conversations, as well as to keep the topic away from herself. During conversations, she was not able to listen carefully to what others were saying nor observe how they were responding because she was trying hard to think of her next question. Following the event, she only remembered what she was thinking (e.g. others had a negative impression of her, like “I look weird”), and also interpreted ambiguous responses from others in a negative way (e.g. they looked tired, confused, bored, etc.). Afterwards, she thought that her strategy was unhelpful in preventing the feared thing from happening. As a result, she took time and tried hard to find another strategy for future events in which she would try not to force questions and try to stay calm. However, this solution was also perceived as an unhelpful strategy because she was still in a self-focused processing mode; she expected failure, and missed what was really happening in the situation. This suggests that they may, on occasion, find solutions during PEP, which maintain their PEP as a form of intermittent reinforcement. However, these solutions may turn into safety behaviours, which can perpetuate dysfunctional beliefs. Thus, PEP can be one of the processes through which individuals with SAD can reflect on and develop new safety behaviours. Although preliminary, this finding has not been highlighted in the theoretical framework of PEP: future experimental research will need to examine how PEP contributes to developing new safety behaviours.

Lastly, we clarified that individuals with SAD weigh up the costs and benefits, but still continue PEP while feeling conflicted about it. The presence of such conflict between positive and negative metacognitive beliefs has also never been taken up as a phenomenon of PEP in SAD. Most previous studies in line with metacognitive theories of PEP have focused on positive metacognitive beliefs, so further questionnaire or experimental studies should assess both positive and negative metacognitive beliefs as well as discrepancies between them in an effort to better understand how these beliefs are linked to the maintenance of PEP. Individuals with SAD may hold on to PEP for two reasons. Firstly, PEP ironically maintains and exacerbates negative self-beliefs and images, which in turn motivate them to improve their social performance. Secondly, they believe that PEP is the only safe and useful way to improve their social performance. They may have tried other strategies (e.g. online social skills training) and sometimes may have actually improved their performance, but they cannot process positive feedback from other people due to their self-focused attention and biased ways of interpreting such feedback (e.g. “They said it was good so as not to upset me but they really think I am not good enough”). They may want to know what other people really think about their performance, but it can be too frightening to ask due to the fear of negative evaluation. They may also fear that asking for feedback might offend or irritate others. This is in contrast to individuals suffering from obsessive-compulsive disorder (OCD), who often seek reassurance from others in order to reduce anxiety or to feel safe (Halldorsson & Salkovskis, 2017; Kobori, Salkovskis, Read, Lounes, & Wong, 2012; Parrish & Radoemsky, 2006, 2010; Salkovskis & Kobori, 2015) even though they know that seeking reassurance bothers and annoys other people. On the other hand, PEP is a private activity, which SADs can do on their own, whenever and wherever. Thus, SADs may have positive beliefs about PEP (Brozovich & Heimberg, 2008; Clark & Wells, 1995; Hofmann, 2007; Rapee & Heimberg, 1997; Wells, 2007), while feeling irrational, ambivalent, and conflicted about it.

The current study also has potential implications for the treatment of SAD. As mentioned, individuals with SAD both believe that reviewing past events is useful for improving social performance and feel conflicted about it; thus, practitioners need to carefully examine both the “usefulness” and the counterproductive effects of PEP, so that individuals with SAD can understand how “a solution becomes a problem”. Clark and Wells (1995) predicted that successful treatment should produce improvements in self-appraisals of social performance or interactions, resulting in reduced PEP, because of improved realistic thinking (contents of cognitions processed during social events are less negative) as a result of treatment. Several studies have examined whether PEP declines over the course of behavioural and cognitive therapy (Abbott & Rapee, 2004; McEvoy, Mahoney, Perini, & Kingsep, 2009; Price, 2011). Although none of the treatments across these studies contained interventions that

specifically addressed PEP, results consistently demonstrated that PEP symptoms decreased throughout therapies. Clark and Wells (Clark, 2005; Wells, 1997, 2007) proposed an additional treatment technique that explicitly targets PEP and anticipation. More specifically, SADs are initially encouraged to identify the particular ways they think and behave before and after social events. The advantages and disadvantages of their PEP and anticipation are discussed in detail, with the aim of showing that the disadvantages predominate. They are then encouraged to experiment with banning such maladaptive processes before and after social events. The results obtained from this study could help therapists to clarify more detailed disadvantages by introducing real refined examples of the counterproductive effects of PEP, which would discourage SAD individuals from having positive beliefs about PEP. Further, since most individuals with SAD rarely seek third-person perspectives, seeking other people's opinions and perspectives (in addition to video feedback and an opinion survey) may be useful in order to gather all the overlooked information and to look at various interpretations of ambiguous social cues within situations that may help to prevent PEP. At the same time, therapists need to be careful about patients becoming excessively reassurance-seeking. Further experimental studies are needed to determine whether encouraging SAD individuals to seek other people's opinions/perspectives is helpful in preventing or terminating PEP.

Several limitations in the current study require attention when interpreting the findings of this study. First, this study focuses on individuals with SAD deemed information-rich for PEP, so the themes that were identified in this study may not be generalisable to the broader SAD population (i.e. threaten the external validity). Future study employing, for example, a larger sample including unselected SAD patients and a suitable control group (other disorders and healthy control), is clearly needed. Second, the thematic analysis used in this study recognises input from both the participants being interviewed and the researchers who conducted the interviews and analysis. Asking for the participants' perspectives in the interview study has been questioned as it relies on participants' ability to recognise and report internal processes and is clearly restricted to conscious processes. These perspectives are in turn interpreted in the thematic analysis introducing the possibility of investigator bias. Moreover, in this study, the researchers were specialists in behavioural and cognitive theory for SAD, possibly influencing the language available when coding and labelling themes in the analysis. Third, as most participants had at least one additional diagnosis, it is difficult to conclude on the specificity of findings for SAD. Fourth, the wording of the question "why do you still review past events?" may imply a discrepancy and be suggestive, but most participants mentioned they have conflicted beliefs about PEP in line with the earlier questions (e.g. "What motivates you to review past social events?", "Do you think it is good (helpful) or bad (unhelpful) to review past social events? Why?"). Thus, the finding that participants feel conflicted about PEP might not

be a result of the wording of the question. Fifth, we did not assess baseline levels of PEP using established measurements such as the PEPQ (Rachman *et al.*, 2000) and specify the type of social situation where the reviewing occurs, making it difficult to evaluate the internal validity of the results. Sixth, there was no specified timeframe within which participants were asked to recall their reviewing behaviours, which may have introduced recall bias. Seventh, although three researchers were involved in the analysis, the initial codes were generated by the first author due to time and manpower constraints. It is possible that other coders might view certain codes differently based on their own unique backgrounds. Lastly, although this study targeted PEP, it is difficult to distinguish clearly between PEP and anticipatory processing because both are self-focused thought processes that occur at various times before and after social events. When individuals with SAD anticipate their performance in an upcoming event, they may worry that the upcoming event represents a repetition of some previously perceived poor performance, and then they may start reviewing or analysing that performance. Also, several researchers have described/defined the phenomenology of PEP as a review and/or recall of past social events in anticipation of future events (Clark & Wells, 1995; Heimberg, Brozovich, & Rapee, 2010; Hofmann, 2007; Rapee & Heimberg, 1997). PEP itself is a backwards-directed review process, but it is motivated by forward-directed thinking (in order to prevent repeating past mistakes in future events); thus PEP and anticipation are quite likely to be intertwined. Intriguingly, however, one of our participants mentioned that “reviewing [past events] may stop when I face another unexpected fearful social event or when I start anticipating the next expected event.” Considering the perspective of individuals with SAD, PEP and anticipation may have slightly different constructs. Future interview studies focusing on anticipatory processing among SADs would be of great interest, in order to investigate how they actually anticipate future events (including the development of safety behaviours) and to clarify similarities or differences between PEP and anticipation.

To summarise, the findings of this study suggest that: (1) individuals with SAD rarely derive the benefit from PEP that they expect; (2) they may, on occasion, find solutions during PEP, which maintain their PEP as a form of intermittent reinforcement; however, these solutions may turn into safety behaviours, perpetuating dysfunctional beliefs; and (3) they choose to perform PEP while feeling conflicted because PEP ironically maintains and exacerbates negative self-beliefs and images, and for SADs, PEP is the only safe and useful way to improve their social performance for them. The findings of this study support and elaborate upon the phenomenology of PEP in SAD proposed in the Clark and Wells (1995) model, and have possible treatment implications.

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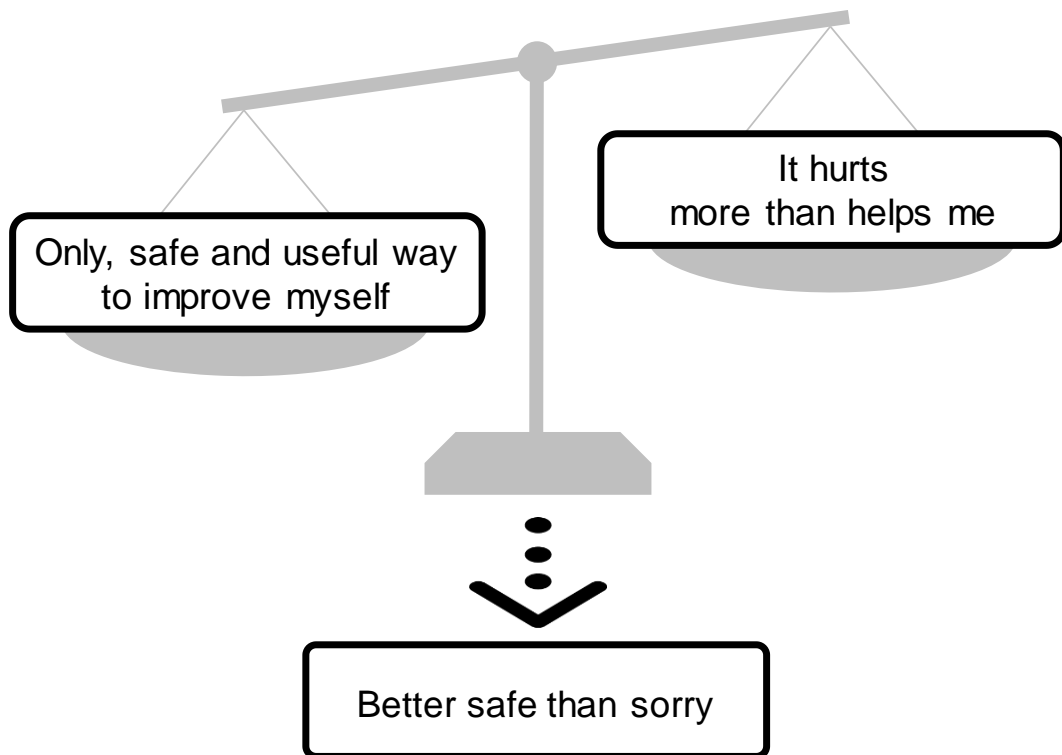


Figure S1. An illustration of how individuals with SAD choose to perform PEP.

QUALITATIVE INVESTIGATION OF PEP IN SAD [EXTENDED VERSION]

Table S1. Examples of generated codes and illustrative data extracts (direct quotes) associated with emerged themes.

Category	Theme	Example codes	Example extracts
Motivation	Only, safe and useful way to improve myself	<ul style="list-style-type: none"> • Helpful to understand the causes for my anxious feelings/symptoms • Useful for next time • Good opportunity to look back on my acts • It improves my social performance • Chance to gain more insight into myself • Useful to understand others' thoughts • It improves my social performance • Useful not to repeat same mistakes • Useful to do better next time • Only safe way to improve myself • Only way to improve myself 	<p><i>I think it [reviewing] helps me to understand why my hands were so shaky at the party. [...] It can be useful for next time. [Participant 7]</i></p> <p><i>I repeatedly review past social events because I need to improve my social performance. [...] I think, reviewing is a good opportunity to look back on my choice of words, and whether they were appropriate or not. [Participant 8]</i></p> <p><i>Through reviewing [past events], I hope I can perform well next time. I'm certain that it's a chance to gain more insight into myself. [...] It's also helpful to understand what they really think at that time. [Participant 9]</i></p> <p><i>I often make mistakes [in social situations]; so, I think I should not repeat the same mistakes and should be able to do better in future social situations by reviewing them. I think it's useful. [Participant 12]</i></p> <p><i>I know that it's helpful to consult with others, but it's tough for me to do because I am afraid of showing my true self to others. After all, I can't do anything except look back on the event by myself. [Participant 20]</i></p> <p><i>That [reviewing] is the only way...I have no other way for improving myself. [Participant 21]</i></p>
Perceived consequences	It hurts more than helps me	<ul style="list-style-type: none"> • It's impossible to find countermeasures • It's painful being focused on negative feelings • It triggers more negative memories • It confirms/reinforces negative self-beliefs • It increases negative emotions • It interferes with my concentration 	<p><i>Even though I'll try to control my shaky hands next time, it's impossible. So I can't even think about countermeasures for similar situations in the future, I just dwell on my negative feelings and how much I was shaking at that time. It's really painful for me. [Participant 3]</i></p> <p><i>Reviewing triggers more negative memories in the past. [...] I feel certain that I really am weird and stupid. [Participant 3]</i></p> <p><i>I get more and more anxious every time I review. [Participant 5]</i></p> <p><i>I usually do it [reviewing] mostly at work or at home. So, I can't concentrate on my assigned tasks at work, what</i></p>

- Rarely or never find a clear conclusion/solution
- It makes me dwell on negative aspects and being self-focused
- It makes me keen to avoid similar situations
- It increases negative emotions
- It causes physical problems
- It makes my memories more negative

other people are saying, and household chores such as cooking, washing dishes, and cleaning. [Participant 8]

It's rare to reach a conclusion or find a solution through reviewing...maybe...never... [...] I only dwelled on my mistake and what I said during that event, so I missed what other people discussed or said. [Participant 11]

I really want to avoid similar situations through reviewing. [Participant 11]

[By reviewing] I got depressed more. I also found it difficult to fall asleep. Actually, I think it [reviewing] hurts me. [Participant 13]

When I review too much, I feel like I'm making up the worst story and I completely forget what actually happened at that event. [Participant 14]

General views of the process Better safe than sorry

- Having conflicted beliefs about reviewing, but I need to do it

Reviewing past events is a way to remind me of my bad experience and to criticise myself.... it's really hard and tough for me, so I really want to stop it. From my experience, I realise that reviewing does not produce any positive results and it's kind of a waste of time. But I still believe it's necessary for preventing future mistakes or poor performance, so I eventually do it while feeling conflicted. [Participant 1]

- Trying to seek something for improvement even if there are no problems

I frantically prepare my talk in advance, so I think I seldom make mistakes. However, I review such events every time. Reviewing is a way to amend something bad—I believe no review, no progress. Perhaps, I'm satisfied just reviewing, just doing something for improvement. I probably feel a sense of relief by doing it. [Participant 1]

- Having conflicted beliefs about reviewing, but I need to do it
- Do it on purpose

I have two views about my review. I still believe it may be helpful not to make the same mistake again. However, as I said, I know there are many demerits for that [reviewing]. I guess I don't have confidence in myself, so I feel I need to do something. Reviewing does not bother anybody. [...] So, I always try to review past events on purpose. [Participant 6]

- | | |
|---|---|
| <ul style="list-style-type: none"> • Trying to seek something for improvement even if there are no problems | <p><i>Whether or not the results [of my conversation] are positive, I always look back at my conversation. Even if my client was completely convinced by my explanation, I still think I could have explained or presented better, so I end up trying and looking back on my conversation to achieve better outcomes. [Participant 6]</i></p> |
| <ul style="list-style-type: none"> • Sometimes successfully find potential solutions | <p><i>I usually search the internet along with my review...When I find better words on a website, I then make a plan to use these words and avoid inappropriate words I used at a past event, and I try to carefully check what I'm going to say in advance of my next conversation. I sometimes plan to make an apology next time. However, every time, they don't mind or even forget about it. Thinking back now, maybe, I don't need to try to think about such solutions [Participant 8]</i></p> |
| <ul style="list-style-type: none"> • Do it unintentionally | <p><i>I don't usually do this [reviewing] intentionally. It seems to me that the reviewing never stops. [Participant 10]</i></p> |
| <ul style="list-style-type: none"> • Having conflicted beliefs about reviewing, but I need to do it • Do it intentionally | <p><i>I know that reviewing can eventually be problematic, but I believe reviewing is not a bad thing at all. [...] So, when I have spare time, I start reviewing anything that pops into my head. [...] I've never thought about stopping my reviewing behaviour. [Participant 15]</i></p> |
| <ul style="list-style-type: none"> • Do it unconsciously and automatically • Sometimes do it intentionally | <p><i>It's like a habit. I think I used to do it [reviewing] intentionally. But recently, in most cases, I do it unconsciously. Memories come to my mind automatically. But sometimes, I guess I do it intentionally. [Participant 16]</i></p> |
| <ul style="list-style-type: none"> • Having conflicted beliefs about reviewing, but I need to do it | <p><i>There is nothing I can do aside from reviewing [to improve myself]. So, I review my past social events repeatedly, no matter how painful it is. [Participant 21]</i></p> |
| <ul style="list-style-type: none"> • Sometimes successfully find potential solutions | <p><i>While reviewing past social situations, I also start thinking of countermeasures for future events. [...] Previously, I asked many questions during the conversation. [...] When I ask too many questions, the other person looks tired and confused, and then seems to get bored. I dwelt on such negative responses and lost confidence more and more, so I needed to find another countermeasure. After</i></p> |

that, I tried not to force questions and started to stay calm, but [...]. [Participant 21]

Note: This is not a comprehensive summary of the data contributing to the theme, but shows some examples of data at each level of analysis.