

**Repetitive Negative Thinking in Social Anxiety Disorder 1:
Anticipatory Processing**

Author

Sluis, Rachel, Boschen, Mark, Neumann, David, Murphy, Karen

Published

2017

Journal Title

Psychopathology Review

Version

Version of Record (VoR)

DOI

[10.5127/pr.045516](https://doi.org/10.5127/pr.045516)

Rights statement

© 2017 Textrum. The attached file is reproduced here in accordance with the copyright policy of the publisher. Please refer to the journal's website for access to the definitive, published version.

Downloaded from

<http://hdl.handle.net/10072/377571>

Griffith Research Online

<https://research-repository.griffith.edu.au>



Repetitive Negative Thinking in Social Anxiety Disorder 1: Anticipatory Processing

Rachel A. Sluis, Mark J. Boschen, David L. Neumann, & Karen Murphy

Menzies Health Institute Queensland and School of Applied Psychology, Griffith University, Gold Coast Campus, QLD 4222, Australia

Abstract

Cognitive models of social anxiety disorder (SAD) emphasize anticipatory processing as a prominent maintaining factor that occurs before social-evaluative events. Anticipatory processing occurs when a socially anxious individual is expecting a social event and can be described as a mode of repetitive negative thinking dominated by past failures, negative images of oneself, predictions of poor performance and rejection. The present review examined the literature on anticipatory processing in social anxiety in an effort to highlight important findings pertaining to this construct. Correlational and experimental studies have investigated the relationship between anticipatory processing and the behavioural, physiological, cognitive and affective outcomes for socially anxious individuals. Studies investigating the characteristics, causes, and consequences of anticipatory processing according to models of social anxiety were included for review. The majority of study designs include those investigating anticipatory processing prior to social-evaluative threat. Directions for future research are discussed and an overview of a framework for explaining anticipatory processing biases in social anxiety is presented.

© Copyright 2017 Textrum Ltd. All rights reserved.

Keywords: Social Anxiety Disorder, Social Phobia, Repetitive Negative Thinking, Anticipatory Processing, Attentional Control.

Correspondence to: Dr Mark Boschen, School of Applied Psychology, Griffith University, Gold Coast Campus, QLD 4222, Australia. m.boschen@griffith.edu.au

Received 11-Jan-2016; received in revised form 29-Nov-2016; accepted 26-Apr-2017

Table of Contents

- Introduction
- Procedure for Systematic Review
- Repetitive Negative Thinking
- Social Anxiety Disorder
- Cognitive-Behavioural Models of Social Anxiety
 - Rapee and Heimberg's (1997) Cognitive-Behavioural Model
 - Clark and Wells (1995) Cognitive Model
 - Comparison of the Models
- Anticipatory Processing and Social Anxiety
 - Anticipatory Processing as Disorder-Specific or Transdiagnostic
- Consequences of Anticipatory Processing
 - Anticipatory Processing and Attentional Bias
 - Changes in Anticipatory Processing in Response to Treatment
 - Limitations of Existing Evidence in Anticipatory Processing
- Cognitive Control and Cognitive Performance
- Conclusions and Directions for Future Research
- References

Introduction

Cognitive models of social anxiety (Clark & Wells, 1995; Rapee & Heimberg, 1997) emphasize anticipatory processing as a central maintaining factor that contributes to enduring symptoms of social anxiety. Anticipatory processing has been identified as a mode of repetitive negative thinking (RNT) responsible for the maintenance of social anxiety. More recently, anticipatory processing has received increasing attention by researchers warranting a review in this field. This review concentrates on the current literature on anticipatory processing by evaluating the characteristics, causes, and consequences of this RNT process according to models of social anxiety. Extending the review, an explanation of the underlying functions of anticipatory processing is proposed regarding higher order cognitive functions of attentional control. Initially, the construct of RNT is outlined by comparing two similar modes of RNT (e.g., worry and anticipatory processing). An overview of two prominent cognitive models of social anxiety (Clark & Wells, 1995; Rapee & Heimberg, 1997) is presented, followed by a comprehensive review of the available and relevant literature on anticipatory processing in social anxiety. This review focuses specifically on the characteristics, causes and consequences, and changes following treatment of anticipatory processing, before providing a theoretical explanation of cognitive attentional control. Finally, critical appraisal of developments and limitations are documented within each section, concluding with ideas for future research within the field. The evidence from correlational and experimental studies reviewed here, supports the contention that anticipatory processing is a dysfunctional mode of thought implicated in the maintenance of social anxiety disorder (SAD).

Procedure for Systematic Review

One of the largest databases of English-language psychological/psychiatric literature, PsycINFO, was used for the search in June 2016. The number of articles published regarding social anxiety and anticipatory processing was estimated by using the search terms "SOCIAL ANXIETY" and "ANTICIPATORY PROCESSING". A total of 25 articles were retrieved that were then examined for relevance of which 18 articles were included. Inclusion criteria comprised: only articles specifically investigating anticipatory processing within the context of social anxiety; use of an adult population; and no comorbid effects of substance use on anticipatory processing. Any articles retrieved that investigated post-event processing in social anxiety were not included as these were comprehensively reviewed in the second paper of this two-part review (Sluis, Boschen, Neumann, & Murphy, in press). The references section of each article retrieved was also examined to locate other related articles that were not located in the original search. This yielded a total of 1 article which met the inclusion criteria.

Repetitive Negative Thinking

The ability to reflect on one's own thoughts, experiences and feelings is a common process unique to human beings. This type of self-focused thinking can have adaptive qualities when it comes to evaluating one's own goals, actions, and the consequences of their actions (Brozovich & Heimberg, 2008). However, maladaptive forms of self-focused thinking can be associated with negative affect as seen in psychological disorders, such as depression and anxiety (American Psychiatric Association, 2013). This type of maladaptive thinking is a repetitive and perseverative pattern of thinking, which is negatively valenced and perceived to be intrusive or unwanted (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008; Rachman, 1981), otherwise termed, RNT (McEvoy, Mahoney, & Moulds, 2010). Such thinking usually occurs in the presence of stress or a negative mood state, and is believed to consume cognitive resources that limit their availability for the effective operation of other cognitive functions.

Much of the research on RNT has focused primarily on worrisome and ruminative cognitive styles, the former a primary attribute of generalised anxiety disorder (GAD; Borkovec, Ray, & Stober, 1998), and the latter identified as a core feature of depression (Nolen-Hoeksema, Parker, & Larson, 1994). While some of the literature suggests RNT is a transdiagnostic process that is characteristic of a range of psychopathologies (Harvey, Watkins, Mansell, & Shafran, 2004; McEvoy et al., 2010), other research suggests that these processes may uniquely influence symptoms and discriminate between disorders (Fresco, Frankel, Mennin, Turk, & Heimberg, 2002; Goring & Papageorgiou, 2008). Theoretically, there appears to be a great deal of overlap between rumination and worry in terms of particular appraisals and strategies used (e.g., goal-discrepancy reduction and meta-cognitive accounts), however they appear to differ in specific content (Watkins, 2004). Thus, identifying the similarities and differences between modes of RNT is important in order to understand the underlying cognitive processes of these phenomena, and for designing appropriate, disorder specific, interventions. As previously mentioned, one of the most studied forms of RNT is: *worry*, defined as "a chain of thoughts and images, negatively affect-laden, and relatively uncontrollable" (Borkovec, Robinson, Pruzinsky, & DePree, 1983, p.10) and is considered a primary attribute of GAD (Borkovec, Ray, & Stober, 1998). More recently, accumulating evidence has identified *anticipatory processing* as an important example of RNT that plays a role in the maintenance of SAD (Clark & Wells, 1995). Anticipatory processing occurs when a socially anxious individual is anticipating a social/performance event and can be described as a mode of RNT that is difficult to disengage from and is dominated by past failures, negative images of oneself, predictions of poor performance and rejection (Clark & Wells, 1995). Worry and anticipatory processing are similar modes of RNT in that they are both future-focused and associated with less certainty and more perceived control, although slight differences tend to distinguish these two modes of RNT. For example, research has found that worry in GAD is primarily verbal in nature (Behar, Zellig, & Borkovec, 2005), whereas preliminary findings on anticipatory processing indicate that imagery may be more characteristic of this mode of thought for socially anxious individuals (Chiupka, Moscovitch, & Bielak, 2012). Furthermore, distinct factors within various RNT styles have different predictive properties. For example, rumination in depression can be distinguished into separate brooding and reflective factors (Treyner, Gonzalez, & Nolen-Hoeksema, 2003), while anticipatory processing can be conceptualised into avoidant and preparatory factors (Mills, Grant, Lechner, & Judah, 2013). These differences highlight that there may be specificity of different RNT processes across disorders which have diagnostic utility.

Social Anxiety Disorder

According to the *DSM-5* (APA, 2013), the core feature of SAD (also known as social phobia) is "a marked fear or anxiety about one or more social situations in which the individual is exposed to possible scrutiny by others" (p. 202). SAD can be subtyped further to a "performance only" specifier, which denotes those who fear a single performance situation, such as public speaking (APA, 2013). Typically, the onset of SAD begins in childhood or adolescence, with lifetime prevalence rates of 12.1%, making it one of the most common mental disorders (Kessler et al., 2005). Consequently, SAD tends to precede most other comorbid disorders, such as depression, substance abuse, or other anxiety disorders, making these individuals less likely to seek help for their problem (Ohayon & Schatzberg, 2010).

When exposed to social or performance situations, individuals with SAD fear that they will act in a certain way, or show anxiety symptoms (i.e., blushing, sweating, trembling) that will be considered embarrassing or humiliating, ultimately leading to negative evaluation by others. As a result, individuals either avoid feared social situations, or

endure them with intense anxiety and distress. The fear or anxiety is recognised as disproportionate to the actual threat posed by the social situation, and symptoms must persist for six months or more and cause significant impairment (APA, 2013). Despite the dichotomous nature of diagnosis in the DSM system, social anxiety is typically regarded as a dimensional construct, existing on a continuum of severity, based on the degree of functional impairment and extent of behavioural avoidance (Heimberg, Liebowitz, Hope, & Schneier, 1995). Consequently, empirical studies commonly employ social anxiety analogue samples and clinical samples to study cognitive processes involved in the maintenance of SAD (Stopa & Clark, 2001).

Cognitive-Behavioural Models of Social Anxiety

Many researchers have proposed models to explain social anxiety over the past three decades (e.g., Clark & Wells, 1995; Hirsch & Clark, 2004; Hofmann, 2007; Rapee & Heimberg, 1997; Schlenker & Leary, 1982). Two of the most widely cited and applied models explain the processes that shape and maintain social anxiety with emphasis on the relevance of cognitive constructs such as, interpretation, attention, and memory. Clark and Wells (1995) cognitive model of social phobia, and Rapee and Heimberg's (1997) cognitive-behavioural model of social anxiety provide useful frameworks for understanding the role of anticipatory processing in social anxiety. Both models are similar in that they propose that individuals with social anxiety engage in anticipatory processing before they enter a social-evaluative situation, consequently maintaining anxiety symptoms.

Rapee and Heimberg's (1997) Cognitive-Behavioural Model

According to Rapee and Heimberg (1997) individuals with social anxiety attach fundamental importance to being appraised positively by others, while also assuming that others are inherently critical evaluators. In this mode when socially anxious individuals encounter a social situation, a distorted mental representation of their external appearance and behaviour, emphasizing negative qualities, is formed as seen by the audience. The individual simultaneously focuses attention to this internal representation and external perceived threat in the environment. This internal mental representation is then compared with what they believe is expected by the audience. This creates a discrepancy between perceptions of the audience's appraisal, and perceptions of the audience's expected standard for evaluation. Consequently, the perceived likelihood of being negatively evaluated is predicted by the individual, which in turn elicits physiological (e.g., blushing, sweating), cognitive (e.g., negative thoughts) and behavioural (e.g., avoiding eye contact) symptoms of anxiety. These anxiety symptoms subsequently negatively influence the individual's mental representation of themselves, continuing the cycle.

Clark and Wells (1995) Cognitive Model

Similarly, Clark and Wells (1995) propose that individuals with social phobia experience significant anxiety when anticipating a social-evaluative situation, where they engage in a detailed prediction of what they believe might happen. As a result, their thoughts are governed by negative images of themselves in the situation, memories of past failures, and predictions of poor performance and rejection. Occasionally, this process leads the individual to avoid the social-evaluative situation. However, if the individual enters the situation, they are already likely to be in a self-focussed processing mode and less likely to focus attention externally on their environment. Given that feared outcomes are deemed probable, heightened awareness of physiological arousal becomes the focus of attention. This interoceptive information is then used to construct a negative impression of the self which is assumed to be an accurate representation of how they appear to the audience. In an attempt to minimize the likelihood of being negatively evaluated, the socially anxious individual may engage in a variety of in-situation safety behaviours (e.g., avoiding eye contact), which may ultimately lead to social performance deficits. After leaving the social-evaluative situation, it is not uncommon for the individual to conduct a *post-mortem* of the event (i.e., post-event processing). The situation is reviewed in detail, prominently featuring negative self-perceptions and appraisal of the situation as being much more negative than it actually was. Other instances of perceived social failures are also retrieved, and the recent social-evaluative event is added to the list of past failures thus strengthening dysfunctional beliefs of social incompetence.

Table 1: Characteristics of Anticipatory Processing in Social Anxiety

Study	Sample	Social- evaluative threat induction	AP measure (additional measures)	Summary of findings
Correlational studies				
Vassilopoulos (2004)	147 undergraduates (high and low SA)	No	APQ (scale development; FNE, BDI-II, STAI-T, SPAI)	AP before social situations is specific to high levels of SA. High SA individuals engage in more prolonged AP.
Vassilopoulos, Brouzos, and Moberly (2015)	301 undergraduates	No	PB-APQ, APQ, PBRS (SIAS, BDI-II, MCQ-30)	PB-APQ was found to be a valid and reliable measure. Anticipatory processing partially mediated the relationship between positive beliefs about anticipatory processing and social interaction anxiety.
Hinrichsen and Clark (2003)	40 undergraduates (high and low SA)	Study 1 – No	ASBQ (FNE, STAI-T)	Study 1 – High SA recalled more past perceived failures, more negative bodily sensations, more escape and catastrophic thoughts, reported images from observer perspective.
Mills et al. (2013)	861 undergraduates 485 undergraduates 59 undergraduates (high SA)	Study 1 – No Study 2 – No Study 3 – No	ASBQ (SIAS, SPS, SMIB, FAQ, PSWQ, CES-D)	ASBQ best conceptualised as a two-factor model (Avoidance and Preparation).
Vassilopoulos (2008)	46 undergraduates (high and low SA)	No	MMAP (FNE, STAI, BDI-II)	High SA more likely to engage in AP, reported more negative thoughts, more thoughts related to hiding anxiety and avoidance of situation, fewer thoughts of improving in-situation performance behaviours, and recalled less positive events from their past.
Scott et al. (2014)	245 community sample	No	MMAP (LSAS, DASS, FMPS)	Maladaptive perfectionism and maladaptive anticipatory processing were positively associated with social anxiety and maladaptive anticipatory processing uniquely predicted social anxiety, even after controlling for depression and maladaptive perfectionism. Maladaptive anticipatory processing mediated the relationship between maladaptive perfectionism and social anxiety

Campbell, Bierman, and Molenaar (2016)	10 undergraduate females	No	ASBQ (SADS, BFNE, PEPQ)	Same-day fear of negative evaluation was associated with maladaptive anticipatory processing which influenced social withdrawal behaviours.
Mills, Grant, Lechner, and Judah (2014)	326 undergraduates 353 undergraduates	Study 1 – No Study 2 - No	ASBQ, RRS (PSWQ, SIAS, CES-D, GAD-Q)	Anticipatory processing, worry and rumination predicted social anxiety, however only worry predicted trait anxiety, and only rumination predicted depressive symptoms. Only worry predicted future social anxiety, however social anxiety predicted later anticipatory processing and rumination.
Experimental studies				
Hinrichsen and Clark (2003)	40 undergraduates (high and low SA)	Study 2 – Speech	Two questions related to AP rated on 0-100 scale (FNE, STAI-T)	Study 2 – AP maintained self-reported anxiety, distraction decreased anxiety.
Mellings and Alden (2000)	116 undergraduates (high and low SA)	Social Interaction	RQ (SADS, FAQ, STAI, BSQ, BDI)	
Vassilopoulos (2005)	80 undergraduates (high and low SA)	Speech	One question related to AP anxiety on 0-10 scale (FNE, STAI, BDI-II, SPAI)	Compared to distraction, high SA individuals reported stronger feelings of anxiety when engaged in AP, predicted a more negative overall appearance in upcoming speech. High SA in distraction recalled more negative and less positive information about public selves.
Wong and Moulds (2011)	80 undergraduates (high and low SA)	Speech	VAS (FNE, DASS, SBSA, SPORS)	Compared to distraction, AP increased self-reported anxiety in all participants. High SA showed increased skin conductance, stronger conditional and high standard beliefs, and poorer speech performance.
Wong and Moulds (2012)	94 undergraduates (high and low SA)	Study 1 – Speech	VAS (FNE, DASS, SBSA, SPORS)	High SA participants adopting an experiential processing mode had stronger high standard and conditional beliefs during AP.
Chiupka et al. (2012)	85 undergraduates (high and low SA)	Speech	PANAS (SPIN, DASS, NSPS)	High SA individuals in AP condition endorsed more negative images and memories, and reported more negative emotional consequences associated with bringing images and memories to mind.

Brown and Stopa (2006)	40 undergraduates (high and low SA)	2-Speeches	One question related to anticipatory anxiety rated on 0-100 scale (BFNE, SPS, SIAS, BAI)	Compared to distraction, high SA in AP condition were more anxious, experienced more negative and unhelpful self-images, and used more of an observer perspective. Both high and low SA reported better speech performance after AP.
Mills, Grant, Judah, and Lechner (2014)	108 undergraduates (high and low SA)	Social interaction with confederate	ASBQ, FAQ, and one question relating to anxiety level rated from 0-100 (SPS, SIAS, CES-D, PSWQ, FAQ)	High SA who anticipated had higher SFA than NC who anticipated and high SA in distraction. Those who anticipated endorsed more negative interpretations than those who engaged in distraction, regardless of SA status.
Mills, Grant, Judah, & White (2014)	59 undergraduates (high and low SA)	Social interaction with confederate	SIAS	High socially anxious individuals who anticipated experienced an increase in information from Time 1 to Time 2 compared to high socially anxious individuals in the distraction condition and low socially anxious individuals in either condition who experienced no changes.
McEvoy and Perini (2009)	81 SAD	No (CBGT and ATT)	Single-item measure of PEP and AP (SPS; SIAS; BDI-II; MCQ; ACS)	Anticipatory processing was more consistently associated with attentional control at pre-treatment, and increased attentional control during treatment was associated with reductions in anticipatory processing
Hedman et al. (2013)	94 SAD	No (ICT and CBGT)	SPWSS	Improvement in ICT was mainly mediated by reductions in avoidance and self-focused attention, whereas improvement in CBGT was mediated by changes in self-focused attention, and anticipatory and post-event processing.
Gkika and Wells (2015)	12 undergraduates	Three-Speeches	ASBQ (FNE, SADS, DASS, SSPS)	Both techniques improved overall anxiety scores, however detached mindfulness also led to reductions in the observer-perspective, negative beliefs, and anticipatory processing.

Note: AP = anticipatory processing; SA = social anxiety; SAD = Social Anxiety Disorder; SFA = self-focused attention; NC = normal controls; APQ = Anticipatory Processing Questionnaire; ASBQ = Anticipatory Social Behaviours Questionnaire; MMAP = Measure of Mental Anticipatory Processes; VAS = Visual Analogue Scale; PANAS – Positive and Negative Affect Scale; FAQ = Focus of Attention Questionnaire; FNE = Fear of Negative Evaluation Scale; STAI = State Trait Anxiety Inventory; BDI-II = Beck Depression Inventory; SPAI = Social Phobia and Anxiety Scale; SPIN = Social Phobia Inventory; DASS = Depression, Anxiety and Stress Scale; NSPS = Negative Self-Portrayal Scale; SBSA = Self-Beliefs Related to Social Anxiety Scale; SPORS = Speech Performance Observer Rating Scale; BFNE = Brief Fear of Negative Evaluation Scale; SPS = Social Phobia Scale; SIAS = Social Interaction and Anxiety Scale; BAI = Beck Anxiety Inventory; PSWQ = Penn State Worry Questionnaire; CES-D = Center for Epidemiological Studies-Depression Scale; FAQ = Focus of Attention Questionnaire; CBGT = Cognitive Behavioural Group Therapy; ATT = Attention Training; ICT = Individual Cognitive Therapy; ACS = Attentional Control Scale; MCQ = Meta-Cognitions Questionnaire; SPWSS = Social Phobia Weekly Summary Scale; SADS = Social Avoidance and Distress Scale; SSPS = Self-Statements during Public Speaking Scale; PB-APQ = Positive Beliefs about Anticipatory Processing Questionnaire; PBRS = Positive Beliefs about Rumination Questionnaire; MCQ-30 = Metacognitions Questionnaire-30; SMIB = Self-Report Measure of Interpretation Bias; RQ = Rumination Questionnaire; BSQ = Body Sensations Questionnaire; RRS = Ruminative Response Questionnaire; GAD-Q = Generalised Anxiety Disorder Questionnaire; MMAP = Measure of Mental Anticipatory Processes; FMPS = Frost Multidimensional Perfectionism Scale

Comparison of the Models

While both Rapee and Heimberg (1997) and Clark and Wells' (1995) models highlight similar processes that occur to socially anxious individuals before, during and after a social-evaluative event, there are also notable differences. For example, Rapee and Heimberg (1997) suggest that the processes they propose to maintain social anxiety are the same regardless of whether a social-evaluative situation is encountered, anticipated, or retrospectively brooded over. Despite this suggestion, Rapee and Heimberg (1997) do not explicitly emphasise anticipatory processing as a distinct and important maintaining factor of social anxiety. On the other hand, Clark and Wells (1995) specifically highlight the significance of anticipatory processing as a unique maintaining factor for socially anxious individuals. On the basis of Clark and Wells (1995) explicit account of anticipatory processing, much of the literature on anticipatory processing in social anxiety has predominantly employed the Clark and Wells (1995) framework thus allowing for ease of comparison between studies. The following sections provide a comprehensive review of the anticipatory processing literature and how cognitive models can be useful in understanding the characteristics and impact of this RNT style in the context of social anxiety.

Anticipatory Processing and Social Anxiety

Table 1 provides a detailed description of the study details, measures used and a summary of findings for each study included in this review. Based on Clark and Wells (1995) idea that anticipatory anxiety is a common feature of social anxiety; several studies have shown robust positive relationships between self-reported engagement in anticipatory processing and social anxiety. Vassilopoulos (2004) developed the first measure of anticipatory processing (APQ; Anticipatory Processing Questionnaire), in order to measure its relationship with social anxiety. Using a sample of 147 undergraduates, Vassilopoulos (2004) showed that high socially anxious individuals, compared to their low socially anxious counterparts, reported thinking a great deal about the event. Moreover, these thoughts were intrusive and interfered with their ability to concentrate, and anticipatory processing increased their anxiety. It was also found that anticipatory processing before social situations was specific to social anxiety, even after controlling for trait anxiety and depression. Further to the development of the APQ and given the commonalities observed between worry and anticipatory processing, Vassilopoulos, Brouzos, and Moberly (2015) developed the Positive Beliefs about Anticipatory Processing Questionnaire (PB-APQ) in order to gain a greater understanding of how metacognitive theory applies to anticipatory processing. Employing a sample of 301 undergraduates they demonstrated the PB-APQ to be a valid and reliable measure. Furthermore, they found that anticipatory processing partially mediated the relationship between positive beliefs about anticipatory processing and social interaction anxiety. These findings provide preliminary evidence indicating that positive metacognitive beliefs facilitate anticipatory processing, similar to that of worry observed in GAD (Wells, 2006). However it is important to note that only one measure of social anxiety was used (Social Interaction and Anxiety Scale [SIAS]; Matticke & Clarke, 1998) which may not capture the entire range of social anxiety symptoms, and they also neglected to examine negative metacognitive beliefs about anticipatory processing which would be useful for future studies to examine.

Other researchers have investigated the nature of cognitive processes that underlie anticipatory processing. Hinrichsen and Clark (2003) conducted two studies to investigate these processes. In the first study, they employed a sample of 40 undergraduates who were split in to high and low social anxiety groups and used a semi-structured interview to examine reported mental processes during anticipatory processing and develop the Anticipatory Social Behaviours Questionnaire (ASBQ). They found that high socially anxious individuals recalled more past perceived failures, experienced more negative bodily sensations, had more catastrophic and escape related thoughts, and reported images from more of an observer perspective than low socially anxious individuals. While these findings are broadly consistent with the Clark and Wells' (1995) model of social anxiety, the research findings were based on an analogue population making it unclear as to what degree the findings would be generalizable to a clinical population. Extending the work of Hinrichsen and Clark (2003) on the development of the ASBQ, Mills, Grant, Lechner, and Judah (2013) examined the factor structure of the ASBQ and found that anticipatory processing was best conceptualised as a two-factor model (Avoidance and Preparation) in two separate samples of undergraduates ($N = 861$ and $N = 485$, respectively). Furthermore, using a third sample of high socially anxious undergraduates ($N = 59$),

they found that the Avoidance factor was more maladaptive than the Preparation factor. By conducting three separate studies, the authors were able to demonstrate the robustness of the factor structure of the ASBQ across different samples and identify that some components of anticipatory processing (i.e., escape and avoidance), may be more maladaptive than others (i.e., planning or preparation) for socially anxious individuals.

Vassilopoulos (2008) compared 24 high and 24 low socially anxious individuals that were presented with vignettes which involved anticipating an anxiety-provoking social situation, subsequently recording their thoughts and recalled memories. They found that when anticipating a feared social event those high in social anxiety reported more negative thoughts, more thoughts related to hiding their anxiety, and avoidance of the stressful situation. They also had fewer thoughts concerning improvement of in-situation performance behaviours, and they recalled less positive events from their past than low socially anxious individuals. Similarly, Scott, Yap, Francis, and Schuster (2014) examined the moderating and mediating role of anticipatory processing on the relationship between perfectionism and social anxiety. They had 245 individuals from the community complete a number of online questionnaires, and then rated their levels of anticipatory processing in response to vignettes describing future anxiety-provoking social interaction or performance situations. They found that maladaptive perfectionism and maladaptive anticipatory processing were positively associated with social anxiety and that maladaptive anticipatory processing uniquely predicted social anxiety, even after controlling for depression and maladaptive perfectionism. Furthermore, maladaptive anticipatory processing mediated the relationship between maladaptive perfectionism and social anxiety. While these findings extend that of previous research (Vassilopoulos, 2008; Wong & Moulds, 2011) and highlight the importance of targeting anticipatory processing during treatment, it is important to note that the vignettes may not have elicited experiential anticipatory processing and recollection of previous anticipatory processing experiences may have been prone to recall bias.

Using a more ecologically valid methodology, Campbell, Bierman, and Molenaar (2016) employed a sample of 10 new undergraduate students starting their first semester at university to investigate how day-to-day processes of social anxiety influenced future social anxiety and social withdrawal. Throughout the 13 weeks of their first semester, participants were required to complete brief online daily diaries outlining salient anxiety-provoking social interactions. For most individuals, they found that same-day fear of negative evaluation was associated with maladaptive anticipatory processing which influenced social withdrawal behaviours. While their methodology was more ecologically valid, the study was limited by a small sample size and they neglected to control for depression.

The maladaptive characteristics of anticipatory processing identified in these studies illustrates why this processing mode maintains high anxiety levels. As high socially anxious individuals regard being positively appraised as important, it is reasonable to assume that anticipating how the social-evaluative event will unfold may be a helpful strategy. As these individuals begin to think about what could go wrong, confidence in their ability to convey a favourable impression is misjudged, negative information about past failures is retrieved, and enhanced perception of bodily sensations all contribute to further confirming their fears and increasing their anxiety.

Anticipatory Processing as Disorder-Specific or Transdiagnostic

While there is a growing body of research examining the role of cognitive processes in a range of psychopathology independently, other researchers suggest that anticipatory processing may be described as a RNT style similar to that of worry and rumination observed in GAD and depression, respectively (McEvoy et al., 2010). Mills, Grant, Lechner and Judah (2014) conducted two studies to examine whether individual differences in anticipatory processing were associated with social anxiety symptoms above and beyond worry and rumination. Employing a sample of 326 undergraduates for their first study, they found that anticipatory processing, worry and rumination predicted social anxiety, however only worry predicted trait anxiety, and only rumination predicted depressive symptoms. The second study used a prospective design with a sample of 353 undergraduates and found that only worry predicted future social anxiety, however social anxiety predicted later anticipatory processing and rumination. These findings highlight the value of examining the unique relationships among these RNT styles and symptom profiles. Taken together, the findings lend some support for RNT as a unitary construct; however also suggest that worry and rumination may be more transdiagnostic than anticipatory processing.

Consequences of Anticipatory Processing

Researchers have also begun to experimentally investigate the relationship between anticipatory processing and the behavioural, physiological, cognitive, and affective consequences in socially anxious individuals. Experimental studies (see Table 1) typically induce both high and low socially anxious participants to engage in either anticipatory processing or distraction prior to social-evaluative threat (e.g., a speech task; Hinrichsen & Clark, 2003; Vassilopoulos, 2005; Wong & Moulds, 2011). Research shows that high socially anxious individuals who engage in induced anticipatory processing prior to the threat of a speech task, report stronger feelings of anxiety (Hinrichsen & Clark, 2003; Vassilopoulos, 2005; Wong & Moulds, 2011), predict a more negative overall appearance of themselves in the upcoming speech (Vassilopoulos, 2005), and show increased relative skin conductance (Wong & Moulds, 2011). Distraction tends to significantly decrease self-reported anxiety (Hinrichsen & Clark, 2003; Vassilopoulos, 2005).

In one of the first studies to examine anticipatory processing and how it contributes to biases in judgments and memory for social events, Mellings and Alden (2000) had 58 socially anxious undergraduates and 58 non-anxious controls participate in a social interaction and then complete measures of self-focused attention and anxiety-related physiological and behavioural symptoms. Interestingly, they found no support for the notion that anticipatory processing activated selective retrieval of negative information about previous social events and no group differences emerged between socially anxious individuals who anticipated a second social interaction and those who did not. These findings highlight that selective attention may play a greater role than selective retrieval in anxiety-provoking situations and suggest that anticipatory processing may indeed be a separate construct from post-event processing (which is a mode of RNT that occurs following a social-evaluative event).

Vassilopoulos (2005) employed a sample of 80 high and low socially anxious undergraduates who were randomly assigned to either an anticipation or distraction condition prior to giving a speech. Unexpectedly, they found that high socially anxious individuals in the distraction condition, as opposed to facilitated anticipatory processing, recalled more negative and less positive information about their public selves using a self-referent words recall task. However, it should be noted that while those in the distraction condition were not instructed to engage in facilitated anticipation, manipulation checks revealed that these participants still engaged in anticipatory processing, but to a lesser extent than those in the anticipatory processing condition. It appears that when anticipatory processing is limited, occasional and incomplete (i.e., through the use of distraction) rather than prolonged and facilitated, memory biases for negative salient words may be found in social anxiety. In contrast, Chiupka et al. (2012) utilised a sample of 85 undergraduates high and low in social anxiety that were advised to focus on images/memories in anticipation of giving a speech. They found that negative images and memories were endorsed more frequently by high socially anxious individuals induced in anticipation of a speech task, compared to their low socially anxious counterparts. One possible reason for these different findings may be that memory biases occur in response to the salience of autobiographical images in anticipation of a social-evaluative situation (Chiupka et al., 2012), as opposed to negative words (Vassilopoulos, 2005), which may have relatively mild threat value during facilitated anticipation.

Another possible explanation for the conflicting findings may be differences in the duration of anticipation. Chiupka et al. (2012) restricted induced duration of facilitated anticipation to 60 seconds of reflection, while Vassilopoulos (2005) facilitated 8-9 minutes of anticipatory processing. It may be that thought suppression, or limiting the time the participant has to engage in anticipatory processing (e.g., distraction), enhances negative memory biases which are more readily available for socially anxious individuals than positive information (Vassilopoulos, 2005). This explanation would be consistent with the suggestion that these individuals tend to exhibit a weakened attentional control system (Linville, 1996), indicating impairment in attentional control relative to their own negative thoughts. However these interpretations are only conjecture and firm conclusions will need to come from future empirical studies.

Brown and Stopa (2006) instructed 20 high and 20 low socially anxious undergraduates to give two speeches in a fixed order. The first was preceded by distraction and the second was preceded by ten minutes of anticipatory processing. In the anticipation condition, they found that high socially anxious individuals were more anxious ($\eta^2 = .08$), experienced more negative self-images ($\eta^2 = .10$), and took more of an observer perspective ($\eta^2 = .12$) than low socially anxious individuals. However, both high and low socially anxious participants reported less frequency and

belief in negative thoughts after anticipatory processing compared to the unanticipated speech, and rated their second speech performance more positively than the first. Brown and Stopa (2006) concluded that anticipatory processing may have adaptive qualities and potential benefits for speech performance prior to giving a speech. Despite this conclusion, it is notable to mention that the order of distraction and anticipatory processing was not counterbalanced (i.e., all participants completed the distraction speech first). Accordingly, practice effects may have been carried over from the first speech to the second speech. For example, prior practice giving the first speech exposed participants to the anxiety-provoking event therefore habituating them to the situation. This habituation resulted in better predicted and actual performance on the second speech.

Although most studies have examined anticipatory processing prior to giving a social-evaluative speech task, Mills, Grant, Judah, and Lechner (2014) investigated the relationship between anticipatory processing, self-focused attention, and interpretation prior to a threatening social interaction with a confederate. They employed 108 undergraduates high and low in social anxiety who were randomly assigned to either an anticipation or distraction condition prior to a social interaction. They found that high socially anxious individuals exhibited higher self-focused attention than both normal controls in the anticipation condition, and high socially anxious participants in the distraction condition. Moreover, the anticipation condition produced greater endorsement of negative interpretations than those who engaged in distraction, regardless of social anxiety status. This finding suggests that any individual who enters a social situation with negative expectations is susceptible to the negative effects of anticipatory processing. In particular, when one expects the worst, information is interpreted in such a way that confirms those expectations.

In summary, the research to date largely supports cognitive-behavioural models emphasizing anticipatory processing as a maintaining factor of social anxiety (Clark & Wells, 1995; Rapee & Heimberg, 1997). Despite the fact that anticipatory processing has been shown to exhibit some adaptive qualities, findings primarily support the notion that this style of RNT has damaging consequences for those with social anxiety. It appears reasonable to assume that anticipatory processing is a maintaining mechanism that negatively influences attentional processes and consumes cognitive resources. However future empirical studies are needed to specifically examine whether the cognitive demands of anticipatory processing limits available resources required for processing of information that may disconfirm one's negative beliefs and cognitions.

Anticipatory Processing and Attentional Bias

On the basis of strong empirical support and theoretical predictions that socially anxious individuals exhibit attentional biases, Mills, Grant, Judah, and White (2014) examined the effect of anticipatory processing on attentional bias for both internal (e.g., heart rate feedback) and external (e.g., emotional faces) threat information using a sample of 59 undergraduates high and low in social anxiety symptoms. Participants were required to complete a modified version of the dot probe paradigm, which is a valid and reliable attention task, prior to (Time 1) and after (Time 2) an anticipatory processing (i.e., social interaction with a confederate) or distraction task. They found that high socially anxious individuals who anticipated experienced an increase in attentional bias for internal information from Time 1 to Time 2 compared to high socially anxious individuals in the distraction condition and low socially anxious individuals in either condition, who experienced no changes. Consistent with Clark and Wells' (1995) model, these findings suggest that anticipatory processing results in an increased shift of attention toward internal physiological information. While these findings contribute important information to the body of literature, they only used one measure of social anxiety (SIAS; Mattick & Clarke, 1998) which may not capture the entire range of social anxiety symptoms and they neglected to control for depression. Given that social anxiety and depression are highly comorbid, controlling for this covariate is important to determine specificity of the findings.

Changes in Anticipatory Processing in Response to Treatment

The authors are aware of only three studies to date that have examined changes in anticipatory processing following psychotherapeutic interventions. McEvoy and Perini (2009) studied a clinical sample of 81 participants with a primary diagnosis of social phobia. They aimed to determine whether or not supplementing cognitive-behavioural group therapy (CBGT) with attention training (ATT; Wells, 1990) could produce greater changes in social anxiety, depression, attentional control, metacognitive beliefs, and anticipatory processing. Utilising self-report measures,

McEvoy and Perini (2009) found that ATT did not potentiate greater change on any outcome variable (both the CBGT group and the ATT group significantly improved on every outcome and to the same degree). Furthermore, anticipatory processing was more consistently associated with attentional control at pre-treatment, and increased attentional control during treatment was associated with reductions in anticipatory processing. These findings provide support for the importance of increased attentional control in relieving symptoms of social anxiety, along with reduced engagement in maladaptive RNT.

Hedman et al. (2013) studied a clinical sample of 94 individuals with social anxiety disorder to examine whether changes in several maintenance processes of social anxiety mediate clinical improvement in either individual cognitive therapy (ICT) or CBGT. They found significant between-treatment differences whereby improvement in ICT was mainly mediated by reductions in avoidance and self-focused attention, whereas improvement in CBGT was mediated by changes in self-focused attention, and anticipatory and post-event processing. While these results suggest that CBGT is more effective in reducing anticipatory processing than ICT, the participants were collected from two separate studies so the results are not based on random allocation of a single cohort to ICT or CBGT.

Gkika and Wells (2015) compared two techniques including, detached mindfulness and thought evaluation, for dealing with negative thoughts. Employing a sample of 12 female students high in social anxiety, participants were assigned to practice either detached mindfulness or thought evaluation following the delivery of three speeches. They found that both techniques improved overall anxiety scores, however detached mindfulness also led to reductions in the observer-perspective ($r = -.45$), negative beliefs ($r = -.41$), and anticipatory processing ($r = -.57$). While these findings provide preliminary evidence that metacognitive techniques, such as detached mindfulness, are beneficial in reducing maintaining processes of social anxiety, the study is limited by a small female analogue sample and so replication of the findings with a larger clinical sample is needed.

Limitations of Existing Evidence in Anticipatory Processing

While research on anticipatory processing in social anxiety is still in its infancy, several limitations are worth mentioning. Firstly, the majority of studies reviewed have had high socially anxious individuals as analogues to those diagnosed with SAD. It is generally accepted that social anxiety is continuously distributed in the general population (Stopa & Clark, 2001). On this basis, using an analogue sample for identifying processes that may be important in SAD has been justified by existing research that supports the validity of this sampling strategy (i.e., results obtained using an analogue sample are largely similar to results found using a clinical sample; Stopa & Clark, 2001). However, the key novel findings should always be contrasted between a clinical sample of SAD individuals and normal controls to really enhance understanding in this area.

Secondly, many of the SAD studies examining anticipatory processing are correlational in nature thus precluding the ability to identify causal relationships between components proposed by models of social anxiety (Clark & Wells, 1995; Rapee & Heimberg, 1997). It has been suggested that maintaining factors of social anxiety do not operate in isolation, but rather interact with one another (cf. combined cognitive bias hypothesis; Hirsch & Clark, 2004; Hirsch, Clark, & Mathews, 2006). Experimental studies examining the interaction of these maintaining constructs are starting to emerge (Wong & Moulds, 2011; Wong & Moulds, 2012). However, the precise cognitive control functions (e.g., executive control functions; Eysenck, Derakshan, Santos, & Calvo, 2007) that may underlie RNT in social anxiety remain unknown. Establishing causal relationships between executive functions thought to be responsible for the maladaptive attentional control strategies of RNT in social anxiety would allow greater understanding of this maintaining process (currently under investigation by the authors).

Thirdly, the majority of studies have relied solely on self-report methods to investigate anticipatory processing. While self-report measures are convenient and may provide useful insight from participants, the ability for humans to introspect is limited. Therefore, self-report data may be susceptible to response biases, and common method variance may inflate results. Only one study to date has utilised psychophysiological measures to assess anticipatory processing outcomes (Wong & Moulds, 2011). This is surprising given that models of social anxiety emphasize the cognitive, affective, somatic and behavioural changes associated with this disorder (Clark & Wells, 1995; Rapee & Heimberg, 1997). Thus, future studies incorporating multi-method paradigms are needed.

Given that anticipatory processing involves persistent and recurrent thoughts that revolve around a reduced ability to shift attention away from one's current stream of thought, researchers have begun to explore the attentional mechanisms underlying these phenomena (Linville, 1996). In particular, cognitive deficits (e.g., RNT) resulting from stress and depression are thought to be the consequence of a weakened attentional control system (Linville, 1996), yet no research exists examining the cognitive functions thought to be responsible for anticipatory processing in social anxiety. The following section proposes one potential theoretical explanation as to the underlying mechanisms of anticipatory processing focusing specifically on attentional control theory (Derakshan & Eysenck, 2009; Eysenck & Derakshan, 2011; Eysenck et al., 2007).

Cognitive Control and Cognitive Performance

The preceding review on anticipatory processing in social anxiety indicates that researchers have neglected to answer the question of how and why anticipatory processing exerts its effects on those with social anxiety. Cognitive interference theories, such as attentional control theory (Derakshan & Eysenck, 2009; Eysenck & Derakshan, 2011; Eysenck et al., 2007) propose that performance on cognitive tasks, especially those that require a high load of cognitive resources, are negatively impacted by high levels of anxiety. The underlying link between reduced cognitive performance and anxiety has been explained via the operation of two attentional systems. The goal-directed attentional system (i.e., "top-down" control of attention) is influenced by knowledge, expectations and goals, and the stimulus-driven attentional system (i.e., "bottom-up" control of attention) is affected by stimuli that are salient and conspicuous (Corbetta & Shulman, 2002; Posner & Petersen, 1990). According to attentional control theory, the balance of these two attentional systems is disrupted by anxiety which is associated with an increased stimulus-driven attentional system, and a decreased goal-directed attentional system (Derakshan & Eysenck, 2009; Eysenck & Derakshan, 2011; Eysenck et al., 2007). Miyake et al., (2000) identified three main executive functions, which are associated with the control and regulation of cognitive processes. These three processes are: (1) Inhibition (i.e., the ability to deliberately inhibit automatic, prepotent responses); (2) Shifting (i.e., shifting between multiple tasks, or mental sets); and (3) Updating (i.e., updating and monitoring of information in working memory; Miyake et al., 2000).

According to attentional control theory (Derakshan & Eysenck, 2009; Eysenck & Derakshan, 2011; Eysenck et al., 2007), the presence of threat-related stimuli, external (e.g. angry faces) or internal (e.g., RNT), triggers anxiety and impairs processing efficiency thereby reducing attentional control. Each of the three executive functions (outlined previously) has unique relevance to attentional control theory. The inhibition function restricts the allocation of attentional resources to task-irrelevant stimuli. The shifting function allocates attention to focus on or move to task-relevant stimuli. The updating function is less related to attentional control, as it is associated with monitoring and updating the temporary storage of information (Eysenck et al., 2007; Miyake et al., 2000). Thus, the effects of anxiety are assumed to be weaker on the updating function than on the inhibition and shifting functions because of their roles in attentional control. While the inhibition, shifting and updating functions are partly symbiotic and partly separable (Miyake et al., 2000), they are all part of the "top-down" attentional control system. Consequently, if demands on one function are high (e.g., due to anticipatory processing) then the processing resources available for other executive functions will be reduced (Eysenck et al., 2007).

Recent research developments examining the effect of attentional control as a predictor of outcomes for 'best practice' interventions, such as cognitive behavioural therapy (CBT), have started to emerge. Preliminary research in this area by Klumpp, Fitzgerald, Angstadt, Post, and Phan (2014) studied a sample of 21 participants with a diagnosis of social anxiety disorder to examine pre-treatment brain activity in brain regions implicated in attentional control. They found that the direction of brain activity at pre-treatment in individuals with intact attentional control were more likely to benefit from CBT. In other words, these individuals exhibited more regulatory capacity (i.e., enhanced dorsal prefrontal activity) during attentional control in the presence of emotional distractors (e.g., facial expressions), and were less reactive (i.e., reduced amygdala activity) to such faces during emotion processing. However these findings only provide preliminary support for the relative importance of attentional control in predicting treatment outcomes and fail to provide specific information regarding the mechanism by which attentional control hinders or facilitates specific maintaining factors of social anxiety. Similarly, other researchers have examined the utility of attentional bias retraining in conjunction with standard CBT. For example, Rapee et al., (2013) integrated attentional bias towards threat re-training (i.e., attentional bias modification) into a standard 12-week CBT package

for 134 individuals with social phobia. Attentional bias modification was conducted using the dot probe task which is a widely used and commonly accepted measure of attentional bias assessment. In contrast to Klumpp et al., (2014), they found no significant differences between groups in attentional bias towards threat or in treatment response. While the authors suggest that the results do not indicate that integration of attentional bias modification procedures with CBT augments attentional change or enhances treatment efficacy, they do acknowledge that the attentional probe task used may not have been sufficiently sensitive to detect attenuation of attentional control. As such, future research would benefit from further examination into the role of attentional control in reducing symptoms of social anxiety using other paradigms. For example, an eye-tracking paradigm, such as the antisaccade task, may be more sensitive in attenuating attentional control given that it is a covert measure of attentional control that is not reliant on manual reaction times and less susceptible to demand characteristics or compensatory strategies (Ainsworth & Garner, 2013).

While the aforementioned studies provide conflicting evidence on the role of attentional control as an underlying mechanism of maintaining features of social anxiety, attentional control is only one potential explanation that warrants further investigation. It is important to note that multiple factors may contribute to the explanation of, and differentially impact, why socially anxious individuals find it difficult to disengage from anticipatory processing. Some of these factors may include the role of motivation (Kouneiher, Charron, & Koechlin, 2009), the cognitive load of task demands (Gazzaley, 2011), the threat load of the task (Van Dillen & Koole, 2009), and differences in ability to regulate emotion (McRae et al., 2010; Kanske, Heissler, Schönfelder, Bongers, & Wessa, 2011).

Although this theory has not been used to investigate the underlying mechanisms of anticipatory processing specifically, this approach appears to provide utility to understand why socially anxious individuals find it particularly difficult to disengage from RNT. Identification of the underlying mechanisms responsible for anticipatory processing may encourage researchers and practitioners to incorporate attentional control strategies into standard interventions, using sufficiently sensitive measures, which are targeted specifically towards specific maintaining mechanisms to reduce some of the dysfunctional outcomes associated with RNT in social anxiety.

Conclusions and Directions for Future Research

Given the limitations of research on anticipatory processing in social anxiety, it is evident that much work is needed to increase our understanding of this construct. As it stands, the existing literature demonstrates that anticipatory processing increases anxiety for socially anxious individuals and appears to be unique to social anxiety (Vassilopoulos, 2004). Given this preliminary evidence, future research is needed to further elucidate whether anticipatory processing is a unique maintaining factor for social anxiety and is therefore different to other forms of RNT (e.g., worry). Verifying the specificity of this construct is important for understanding the characteristics and detrimental effects of anticipatory processing and for highlighting whether interventions aimed at decreasing RNT need to be disorder specific or transdiagnostic. For example, research on worry in GAD has found these thoughts to be primarily verbal in nature (Behar et al., 2005). In contrast, preliminary findings on anticipatory processing indicate that imagery may be more characteristic of this mode of thought for socially anxious individuals (Chiupka et al., 2012). Distinguishing differences in reactivity to various constructs, such as mental imagery, may prove useful when trying to achieve differential diagnoses among comorbid anxiety disorders and also for designing appropriate interventions.

The lack of experimental studies on anticipatory processing also limits the ability to identify causal relationships between maintaining factors of social anxiety. It has been proposed that biased cognitive processes often operate simultaneously rather than in isolation to maintain social anxiety (cf. combined cognitive bias hypothesis; Hirsch & Clark, 2004; Hirsch et al., 2006). Research has begun to investigate the interaction of such biases (Chiupka et al., 2012; Mills et al., 2014; Wong & Moulds, 2011), showing that anticipatory processing tends to increase negative imagery and interpretations, biased recall of memories, and maladaptive self-beliefs. In extending these studies, it would be useful to compare the interaction of such biases relative to other disorders that feature similar RNT processes, such as GAD, in order to more thoroughly understand these processes across disorders.

Duration of anticipatory processing also appears to be an important determinant of dysfunctional outcomes. Future research may benefit from systematically manipulating the durations of facilitated anticipation in an attempt to determine at which point anticipatory processing becomes most detrimental. Given the findings of previous research

(Chiupka et al., 2012; Vassilopoulos, 2005), the preliminary evidence suggests that when anticipatory processing is limited or incomplete, negative images and memories may be endorsed more frequently by socially anxious individuals. It would also be worth investigating if limited duration of anticipatory processing fosters an increase in other outcomes, such as physiological arousal, in conjunction with biased negative images and memories. Using multi-method paradigms to investigate these ideas would provide insight into the interaction of these biases proposed by cognitive-behavioural models in a more holistic manner (Clark & Wells, 1995; Rapee & Heimberg, 1997).

Furthermore, given that a small number of studies have identified some adaptive effects of anticipatory processing (Brown & Stopa, 2006), it would be beneficial for research to establish the specific aspects of anticipatory processing which have adaptive qualities. Preliminary research in this area has found that anticipatory processing can be conceptualised as a two-factor model (e.g., Avoidance and Preparation), indicating that the preparation factor is more adaptive than the avoidance factor (Mills et al., 2013). Further research examining the adaptive and maladaptive features of anticipatory processing would aid in confirming existing findings and enhancing our knowledge toward understanding to what extent, under which circumstances, and for whom this processing mode may be advantageous. Another potential avenue for examining the adaptive and maladaptive features of anticipatory processing includes the role of cognitive interference theories (Derakshan & Eysenck, 2009; Eysenck & Calvo, 1992; Eysenck & Derakshan, 2011; Eysenck et al., 2007). For example, ineffective control of attention may underlie the perpetual nature of RNT. Thus, it seems plausible that exploration of individual differences may indicate that high socially anxious individuals with higher levels of cognitive attentional control may exhibit decreased dysfunctional outcomes compared to high socially anxious individuals with lower levels of cognitive attentional control.

Finally, a small amount of empirical evidence has explored the effects of treatment protocols, such as CBGT, in reducing the effects of anticipatory processing (McEvoy & Perini, 2009). This is surprising given that anticipatory processing has been identified as an important contributing factor in the maintenance of SAD (Clark & Wells, 1995). While the existing literature indicates that attention training and CBGT assist in reducing anticipatory processing, it is still unclear as to which components of a treatment would result in the most change. Future research is warranted to determine which treatment techniques are most effective for reducing the dysfunctional effects of anticipatory processing in social anxiety. For example, research has identified predominant characteristics of anticipatory processing involving memory perspective, memory retrieval, imagery, and self-focused attention. Future research may benefit from assessing which elements of cognitive restructuring lead to better outcomes. It may be that reducing self-focused attention and altering biased retrieval of past social failures may potentiate greater changes than treatment strategies counteracting memory perspective and imagery (or vice versa). Moreover, preliminary findings from McEvoy and Perini (2009) identified attentional control during treatment to be associated with reductions in anticipatory processing. The authors compared CBGT with ATT revealing no differences between treatments regarding improvement on anticipatory processing (both groups significantly improved on anticipatory processing). This is an interesting line of research that prompts a number of additional research questions worthy of investigation. For example, would a combination of strategies from both treatment packages incur greater changes than either treatment package alone? If so, whom does this type of treatment package benefit the most (e.g., only socially phobic individuals who exhibit attentional control deficits, or only those exhibiting increased levels of trait RNT)? And, do the combined effects of attention training and CBGT contain a carry-over effect on the interaction of other cognitive biases implicated in the maintenance of social anxiety? Furthermore, examining the impact of attentional control more specifically on maintaining mechanisms of social anxiety may be a first step in achieving a deeper understanding of these processes. While there is preliminary research that refutes the utility of attentional control training in improving outcomes for socially anxious individuals (Rapee et al., 2013), other research has shown that increasing our understanding of the role of attentional control provides valuable information that is worthy of further investigation (Klumpp et al., 2014). This line of research emphasizes the relative importance of individual differences toward treatment approaches, highlighting that idiosyncratically designed assessments and interventions may be more beneficial for certain individuals.

There is still much work to be done on anticipatory processing in social anxiety. Future research that addresses some of the main methodological limitations of previous research should facilitate clarification of past research findings and assist in simplifying the comparison of analogous studies. There are still a number of interactive effects between anticipatory processing and other components proposed by cognitive models of social anxiety (Clark & Wells, 1995;

Rapee & Heimberg, 1997) that have yet to be elucidated. Addressing these limitations and gaps in the existing literature will not only provide added insight into the underlying aetiology and maintenance of SAD by informing theoretical models, but it will also facilitate expansion of the assessment and disorder specific treatment packages for those with SAD.

References

- Ainsworth, B., & Garner, M. (2013). Attentional control in mood and anxiety disorders: evidence from the antisaccade task. *Human Psychopharmacology: Clinical and Experimental*, *28*, 274-280. <https://doi.org/10.1002/hup.2320>
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders (5th ed.)*. Washington DC: Author
- Behar, E., Zullig, A. R., & Borkovec, T. D. (2005). Thought and imaginal activity during worry and trauma recall. *Behaviour Therapy*, *36*, 157-168. [https://doi.org/10.1016/S0005-7894\(05\)80064-4](https://doi.org/10.1016/S0005-7894(05)80064-4)
- Borkovec, T. D., Robinson, E., Pruzinsky, T., & DePree, J. A. (1983). Preliminary exploration of worry: Some characteristics and processes. *Behaviour Research and Therapy*, *21*, 9-16. [https://doi.org/10.1016/0005-7967\(83\)90121-3](https://doi.org/10.1016/0005-7967(83)90121-3)
- Borkovec, T. D., Ray, W. J., & Stober, J. (1998). Worry: a cognitive phenomenon intimately linked to affective, physiological and interpersonal behavioural processes. *Cognitive Therapy and Research*, *8*, 561-576. <https://doi.org/10.1023/A:1018790003416>
- Brown, M., & Stopa, L. (2006). Does anticipation help or hinder performance in a subsequent speech. *Behavioural and Cognitive Psychotherapy*, *35*, 133-147. <https://doi.org/10.1017/S1352465806003481>
- Brozovich, F., & Heimberg, R. G. (2008). An analysis of post-event processing in social anxiety disorder. *Clinical Psychology Review*, *28*, 891-903. <https://doi.org/10.1016/j.cpr.2008.01.002>
- Campbell, C. G., Bierman, K. L., & Molenaar, P. C. M. (2016). Individual day-to-day process of social anxiety in vulnerable college students. *Applied Developmental Science*, *20*, 1-15. <https://doi.org/10.1080/10888691.2015.1026594>
- Chiupka, C. A., Moscovitch, D. A., & Bielak, T. (2012). In vivo activation of anticipatory vs. post-event autobiographical images and memories in social anxiety. *Journal of Social and Clinical Psychology*, *31*, 783-809. <https://doi.org/10.1521/jscp.2012.31.8.783>
- Clark, D. M., & Wells, A. (1995). A cognitive model of social phobia. In R. Heimberg, M. Liebowitz, D. A., Hope, & F.R. Schneier (Eds.), *Social Phobia: Diagnosis, Assessment and Treatment*. (pp. 69-93). New York: Guilford Press.
- Corbetta, M., & Shulman, G. L. (2002). Control of goal-directed and stimulus-driven attention in the brain. *Nature Reviews Neuroscience*, *3*, 201-215. doi: 10.1038/nrn755
- Derakshan, N., & Eysenck, M. W. (2009). Anxiety, processing efficiency, and cognitive performance. *European Psychologist*, *14*, 168-176. <https://doi.org/10.1027/1016-9040.14.2.168>
- Eysenck, M. W., & Calvo, M. G. (1992). Anxiety and performance: The processing efficiency theory. *Cognition and Emotion*, *6*, 409-434. <https://doi.org/10.1080/02699939208409696>
- Eysenck, M. W., & Derakshan, N. (2011). New perspectives in attentional control theory. *Personality and Individual Differences*, *50*, 955-960. <https://doi.org/10.1016/j.paid.2010.08.019>
- Eysenck, M. W., Derakshan, N., Santos, R., & Calvo, M. G. (2007). Anxiety and cognitive performance: Attentional control theory. *Emotion*, *7*, 336-353. <https://doi.org/10.1037/1528-3542.7.2.336>
- Fresco, D. M., Frankel, A. N., Mennin, D. S., Turk, C. L., & Heimberg, R. G. (2002). Distinct and overlapping features of rumination and worry: The relationship of cognitive production to negative affective states. *Cognitive Therapy and Research*, *26*, 179-188. doi: 10.1023/A:10145177118949
- Gazzaley, A. (2011). Influence of early attentional modulation on working memory. *Neuropsychologia*, *49*, 1410-1424. <https://doi.org/10.1016/j.neuropsychologia.2010.12.022>
- Gkika, S., & Wells, A. (2015). How to deal with negative thoughts? A preliminary comparison of detached mindfulness and thought evaluation in socially anxious individuals. *Cognitive Therapy and Research*, *39*, 23-30. <https://doi.org/10.1007/s10608-014-9637-5>

- Goring, H. J., & Papageorgiou, C. (2008). Rumination and worry: Factor analysis and self-report measures in depressed participants. *Cognitive Therapy and Research*, 32, 554-566. <https://doi.org/10.1007/s10608-007-9146-x>
- Harvey, A., Watkins, E., Mansell, W., & Shafran, R. (2004). *Cognitive behavioural processes across psychological disorders: A transdiagnostic approach to research and treatment*. Oxford: Oxford University Press. <https://doi.org/10.1093/med:psych/9780198528883.001.0001>
- Hedman, E., Mörtberg, E., Hesser, H., Clark, D. M., Lekander, M., Andersson, E., & Ljótsson, B. (2013). Mediators in psychological treatment of social anxiety disorder: Individual cognitive therapy compared to cognitive behavioural group therapy. *Behaviour Research and Therapy*, 51, 696-705. <https://doi.org/10.1016/j.brat.2013.07.006>
- Heimberg, R. G., Liebowitz, M. R., Hope, D. A., & Schneier, F. R. (1995). *Social Phobia: Diagnosis, Assessment, and Treatment*. New York: The Guilford Press.
- Hinrichsen, H., & Clark, D. M. (2003). Anticipatory processing in social anxiety: two pilot studies. *Journal of Behaviour Therapy and Experimental Psychiatry*, 34, 205-218. [https://doi.org/10.1016/S0005-7916\(03\)00050-8](https://doi.org/10.1016/S0005-7916(03)00050-8)
- Hirsch, C. R., & Clark, D. M. (2004). Information-processing bias in social phobia. *Clinical Psychology Review*, 24, 799-825. <https://doi.org/10.1016/j.cpr.2004.07.005>
- Hirsch, C. R., Clark, D. M., & Mathews, A. (2006). Imagery and interpretations in social phobia: Support for the combined cognitive biases hypothesis. *Behaviour Therapy*, 37, 223-236. <https://doi.org/10.1016/j.beth.2006.02.001>
- Hofmann, S. G. (2007). Cognitive factors that maintain social anxiety disorder: A comprehensive model and its treatment implications. *Cognitive Behaviour Therapy*, 36, 193-209. <https://doi.org/10.1080/16506070701421313>
- Kanske, P., Heissler, J., Schönfeld, S., Bongers, A., & Wessa, M. (2011). How to regulate emotion? Neural networks for reappraisal and distraction. *Cerebral Cortex*, 21, 1379-1388. <https://doi.org/10.1093/cercor/bhq216>
- Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005). Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the national comorbidity survey replication. *Archives of General Psychiatry*, 62, 593-602. <https://doi.org/10.1001/archpsyc.62.6.593>
- Klump, H., Fitzgerald, D. A., Angstadt, M., Post, D., & Phan, K. L. (2014). Neural responses during attentional control and emotion processing predicts improvement after cognitive behavioural therapy in generalised social anxiety disorder. *Psychological Medicine*, 44, 3109-3121. doi: 10.1017/S00332917174000567
- Kouneiher, F., Charron, S., & Koechlin, E. (2009). Motivation and cognitive control in the human prefrontal cortex. *Nature Neuroscience*, 12, 939-945. <https://doi.org/10.1038/nn.2321>
- Linville, P. (1996). Attention inhibition: Does it underlie ruminative thought? In R. S. Wyer, *Ruminative thoughts: Advances in social cognition, Volume IX* (pp. 121-133). New Jersey: Lawrence Erlbaum Associates, Inc.
- Mattick, R. P., & Clarke, J. C. (1998). Development and validation of measures of social phobia scrutiny and social interaction anxiety. *Behaviour Research and Therapy*, 36, 455-470. [https://doi.org/10.1016/S0005-7967\(97\)10031-6](https://doi.org/10.1016/S0005-7967(97)10031-6)
- McEvoy, P. M., Mahoney, A., & Moulds, M. L. (2010). Are worry, rumination, and post-event processing one and the same? Development of the repetitive thinking questionnaire. *Journal of Anxiety Disorders*, 24, 509-519. <https://doi.org/10.1016/j.janxdis.2010.03.008>
- McEvoy, P. M., & Perini, S. J. (2009). Cognitive behavioural group therapy for social phobia with or without attention training: A controlled trial. *Journal of Anxiety Disorders*, 23, 519-528. <https://doi.org/10.1016/j.janxdis.2008.10.008>
- McRae, K., Hughes, B., Chopra, S., Gabrieli, J. D., Gross, J. J., & Ochsner, K. N. (2010). The neural bases of distraction and reappraisal. *Journal of Cognitive Neuroscience*, 22, 248-262. <https://doi.org/10.1162/jocn.2009.21243>
- Mellings, T. M. B., & Alden, L. E. (2000). Cognitive processes in social anxiety: The effects of self-focus, rumination and anticipatory processing. *Behaviour Research and Therapy*, 38, 243-257. [https://doi.org/10.1016/S0005-7967\(99\)00040-6](https://doi.org/10.1016/S0005-7967(99)00040-6)
- Mills, A. C., Grant, D. M., Judah, M. R., & Lechner, W. V. (2014). Consequences of anticipatory processing on cognitive symptoms of social anxiety. *Anxiety, Stress, & Coping*, 27, 1-16. <https://doi.org/10.1080/10615806.2013.866229>

- Mills, A. C., Grant, D. M., Judah, M. R., & White, E. J. (2014). The influence of anticipatory processing on attentional biases in social anxiety. *Behaviour Therapy*, 45, 720-729. <https://doi.org/10.1016/j.beth.2014.04.004>
- Mills, A. C., Grant, D. M., Lechner, W. V., & Judah, M. R. (2013). Psychometric properties of the anticipatory social behaviours questionnaire. *Journal of Psychopathology and Behavioural Assessment*, 35, 346-355. <https://doi.org/10.1007/s10862-013-9339-4>
- Mills, A. C., Grant, D. M., Lechner, W. V., & Judah, M. R. (2014). Relationship between trait repetitive negative thinking styles and symptoms of psychopathology. *Personality and Individual Differences*, 71, 19-24. <https://doi.org/10.1016/j.paid.2014.07.022>
- Miyake, A., Friedman, N. P., Emerson, M. J., Witzki, A. H., Howerter, A., & Wager, T. D. (2000). The unity and diversity of executive functions and their contributions to complex "frontal lobe" tasks: A latent variable analysis. *Cognitive Psychology*, 41, 49-100. <https://doi.org/10.1006/cogp.1999.0734>
- Nolen-Hoeksema, S., Parker, L. E., & Larson, J. (1994). Ruminative coping with depressed mood following loss. *Journal of Personality and Social Psychology*, 67, 92-104. <https://doi.org/10.1037/0022-3514.67.1.92>
- Nolen-Hoeksema, S., Wisco, B. E., & Lyubomirsky, S. (2008). Rethinking rumination. *Perspectives on Psychological Science*, 3, 400-424. <https://doi.org/10.1111/j.1745-6924.2008.00088.x>
- Ohayon, M. M., & Schatzberg, A. F. (2010). Social phobia and depression: Prevalence and comorbidity. *Journal of Psychosomatic Research*, 68, 235-243. <https://doi.org/10.1016/j.jpsychores.2009.07.018>
- Posner, M. I., & Petersen, S. E. (1990). The attention system of the human brain. *Annual Review of Neuroscience*, 13, 25-42. <https://doi.org/10.1146/annurev.ne.13.030190.000325>
- Rachman, S. (1981). Part 1. Unwanted intrusive cognitions. *Advances in Behaviour Research and Therapy*, 3, 89-99. [https://doi.org/10.1016/0146-6402\(81\)90007-2](https://doi.org/10.1016/0146-6402(81)90007-2)
- Rapee, R. M., & Heimberg, R. G. (1997). A cognitive-behavioural model of anxiety in social phobia. *Behaviour Research and Therapy*, 35, 741-756. [https://doi.org/10.1016/S0005-7967\(97\)00022-3](https://doi.org/10.1016/S0005-7967(97)00022-3)
- Rapee, R. M., Macleod, C., Carpenter, L., Gaston, J. E., Frei, J., Peters, L., & Baillie, A. J. (2013). Integrating cognitive bias modification into a standard cognitive behavioural treatment package for social phobia: A randomized controlled trial. *Behaviour Research and Therapy*, 51, 207-215. <https://doi.org/10.1016/j.brat.2013.01.005>
- Schlenker, B. R., & Leary, M. R. (1982). Social anxiety and self-presentation: A conceptualization and model. *Psychological Bulletin*, 92, 641-669. <https://doi.org/10.1037/0033-2909.92.3.641>
- Scott, J. H., Yap, K., Francis, A. J. P., & Schuster, S. (2014). Perfectionism and its relationship with anticipatory processing in social anxiety. *Australian Journal of Psychology*, 66, 187-196. <https://doi.org/10.1111/ajpy.12045>
- Sluis, R. A., Boschen, M. J., Neumann, D. L., & Murphy, K. (in press). Repetitive negative thinking in social anxiety disorder 2: Post-event processing. *Psychopathology Review*.
- Stopa, L., & Clark, D. M. (2001). Social phobia: Comments on the viability and validity of an analogue research strategy and British norms for the fear of negative evaluation questionnaire. *Behavioural and Cognitive Psychotherapy*, 29, 423-430. <https://doi.org/10.1017/S1352465801004039>
- Treynor, W., Gonzalez, R., & Nolen-Hoeksema, S. (2003). Rumination reconsidered: A psychometric analysis. *Cognitive Therapy and Research*, 27, 247-259. <https://doi.org/10.1023/A:1023910315561>
- Van Dillen, L. F., & Koole, S. L. (2009). How automatic is "automatic vigilance"? The role of working memory in attentional interference of negative information. *Cognition and Emotion*, 23, 1106-1117. <https://doi.org/10.1080/02699930802338178>
- Vassilopoulos, S. P. (2004). Anticipatory processing in social anxiety. *Behavioural and Cognitive Psychotherapy*, 32, 303-311. <https://doi.org/10.1017/S1352465804001377>
- Vassilopoulos, S. P. (2005). Anticipatory processing plays a role in maintaining social anxiety. *Anxiety, Stress, & Coping*, 18, 321-332. <https://doi.org/10.1080/10615800500258149>
- Vassilopoulos, S. P. (2008). Coping strategies and anticipatory processing in high and low socially anxious individuals. *Journal of Anxiety Disorders*, 22, 98-107. <https://doi.org/10.1016/j.janxdis.2007.01.010>
- Vassilopoulos, S. P., Brouzos, A., & Moberly, N. J. (2015). The relationships between metacognition, anticipatory processing, and social anxiety. *Behaviour Change*, 32, 114-126. <https://doi.org/10.1017/bec.2015.4>
- Watkins, E. (2004). Appraisals and strategies associated with rumination and worry. *Personality and Individual Differences*, 37, 679-694. <https://doi.org/10.1016/j.paid.2003.10.002>

- Wells, A. (1990). Panic disorder in association with relaxation induced anxiety: An attentional training approach to treatment. *Behaviour Therapy*, *21*, 273-280. [https://doi.org/10.1016/S0005-7894\(05\)80330-2](https://doi.org/10.1016/S0005-7894(05)80330-2)
- Wells, A. (2006). The metacognitive model of worry and generalised anxiety disorder. In G. L. Davey & A. Wells (Eds.), *Worry and its psychological disorders: Theory, assessment and treatment* (pp. 179-199). Hoboken, NJ: Wiley Publishing. <https://doi.org/10.1002/9780470713143.ch11>
- Wong, Q. J. J., & Moulds, M. L. (2011). Impact of anticipatory processing versus distraction on multiple indices of anxiety in socially anxious individuals. *Behaviour Research and Therapy*, *49*, 700-706. <https://doi.org/10.1016/j.brat.2011.07.007>
- Wong, Q. J. J., & Moulds, M. L. (2012). Processing mode during repetitive thinking in socially anxious individuals: Evidence for a maladaptive experiential mode. *Journal of Behaviour Therapy and Experimental Psychiatry*, *43*, 1064-1073. <https://doi.org/10.1016/j.jbtep.2012.05.002>