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Social anxiety in pre-adolescent children: What do we know about maintenance?

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Brynjar Halldorsson[*], Cathy Creswell

School of Psychology and Clinical Language Sciences, University of Reading, UK

ABSTRACT

The cognitive theory of social anxiety disorder (SAD) is one of the most widely accepted accounts of the maintenance of the disorder in adults, yet it remains unknown if, or to what extent, the same cognitive and behavioral maintenance mechanisms that occur in adult SAD also apply to SAD among pre-adolescent children. In contrast to the adult literature, current models of SAD in children mostly account for etiology and maintenance processes are given limited attention. Consequently, their clinical utility for the treatment of SAD in children may be limited. This narrative review, first, critically examines the different theoretical conceptualizations of the maintenance of social anxiety in the child and adult literature and illustrates how these have resulted in different treatment approaches and clinical understanding. Second, it reviews the available evidence relating to hypotheses about the maintenance of SAD in children as derived from adult cognitive and etiological models. Third, it highlights the need to attend directly to child specific maintenance mechanisms in SAD, to draw on cognitive theory, and to account for the influence of childhood-specific contextual (e.g. family and school-based interactions) and developmental factors on children's social experiences.

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Social anxiety disorder (SAD) is one of the most common mental health disorders (Kessler, Chiu, Demler, Merikangas, & Walters, 2005), with approximately 13% of the population meeting diagnostic criteria for SAD during their life (Beesdo et al., 2007). If left untreated, SAD typically runs a chronic course and total remission is rare (Bittner et al., 2007). Although the age of onset is typically in early adolescence (median 13 years) (Kessler, Berglund, et al., 2005; Wittchen & Fehm, 2003), clinically anxious pre-adolescent children are commonly diagnosed with SAD (e.g. Hirshfeld-Becker et al., 2010; Ollendick & Hirshfeld-Becker, 2002; Spence, Donovan, & Brechman-Toussaint, 2000) and SAD is often present in pre-adolescent children referred for treatment for an anxiety disorder (e.g. 45%- Waite & Creswell, 2014, p. 82%- Kendall et al., 2010). Children with SAD are commonly treated with a generic form of Cognitive Behavioral Therapy (e.g. Kendall & Hedtke, 2006). However, children who have SAD benefit less from these treatments than children with non-SAD forms of anxiety disorders (e.g. 40.6% vs. 72.0% remission rate; Ginsburg et al., 2011). The reasons for why children with SAD benefit less from generic treatments than

children with other anxiety problems remain unclear.

Disorder-specific treatments, that is, treatments that were specifically developed to treat childhood SAD, are effective in comparison to waitlist control conditions or active, non-disorder specific interventions (e.g. Beidel, Turner, & Morris, 2000; Donovan, Cobham, Waters, & Occhipinti, 2015; Öst, Cederlund, & Reuterskiöld, 2015; Spence et al., 2000). However, these treatments typically require a relatively high number of sessions and resources — characteristics that create obstacles for dissemination in routine clinical practice — and 30—50% of children[1] retain their SAD diagnosis post-treatment. In contrast, highly effective treatments have been developed for adults with SAD (e.g. Clark et al., 2006; Mörtberg, Clark, Sundin, & Åberg Wistedt, 2007; Stangier, Heidenreich, Peitz, Lauterbach, & Clark, 2003) which can be delivered efficiently (Stott et al., 2013) due to the identification of clearly defined and carefully tested maintenance mechanisms that are specifically targeted in treatment (e.g. Clark & Wells, 1995; Clark, 2001; McManus et al., 2009; Rapee & Heimberg, 1997). Critically, these maintenance mechanisms explain why SAD persists in adults despite repeated exposure to social situations (Clark,

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* Corresponding author. School of Psychology and Clinical Language Sciences, University of Reading, RG6 6AL, UK.
  E-mail address: b.halldorsson@reading.ac.uk (B. Halldorsson).

[1] From now on, 'children' refers to pre-adolescent children.

2001; McManus, Sacadura, & Clark, 2008). In order to improve the effectiveness and efficiency of treatments of childhood SAD, an equally clear understanding of the psychological processes that maintain the disorder in children is required. However, in contrast to the adult literature, there are no maintenance models of childhood SAD. Instead current conceptualizations of SAD in children are typically models of etiology (Ollendick & Benoit, 2012; Ollendick & Hirshfeld-Becker, 2002; Rapee & Spence, 2004; Spence & Rapee, 2016) which do not specifically set out to inform treatment and its components and, as such, potential maintenance processes are given limited attention.

There are two main reasons why adult maintenance models of SAD may not apply directly to children. The first relates to cognitive maturation. Human brain development undergoes vast developmental changes between childhood and adulthood (Supekar, Musen, & Menon, 2009). However, it remains unclear at what age the processes outlined in adult models of social anxiety come 'online' in children. For example, children's cognitive capacity to see themselves as other's see them does not develop until late childhood (Cole, Jacquez, & Maschman, 2001) and children and adults use different neurocognitive strategies when making self-referential judgements (Pfeifer, Lieberman, & Dapretto, 2007). In addition, children may differ in the stage at which they develop the skills required for successful social interactions, potentially putting some children more at risk of negative social encounters (and subsequently social anxiety) than others (Rapee & Spence, 2004; Spence & Rapee, 2016). The second reason why adult models may need to be adapted for children relates to social context. Children rely extensively on parents and caregivers for guidance, instruction and to create social opportunities. There is increasing literature on the bidirectional effects of parenting and child outcomes (e.g. Paschall & Mastergeorge, 2016) in which child characteristics elicit particular parenting behaviours which may further promote particular child characteristics and which are entirely consistent with cognitive maintenance models. For example, in the case of child anxiety, parental overcontrol has been shown to be elicited by parental anxiety (Hudson, Doyle, & Gar, 2009), but also to have a heightened anxiogenic effect among high, versus low, anxious children (Thirlwall & Creswell, 2010). Children also typically spend up to a half of their waking time at school where the influence of teacher and peer relationships can be critical to their wellbeing (Silver, Measelle, Armstrong, & Essex, 2010). As well as living in quite different social-environments to adults, there is also evidence that the influence at particular people (e.g. peers, parents) on children's developing cognitions changes markedly throughout development (Cole, Maxwell, & Martin, 1997; Cole et al., 2001) highlighting the need to specifically consider children of particular developmental stages. Further clarification of the maintenance processes that are specific to childhood SAD is essential for improving treatments for social anxiety in children.

1. Adult maintenance models of SAD

The most widely cited and well-established disorder-specific cognitive behavioral models of adult SAD are those of Clark and Wells (1995) and Rapee and Heimberg (1997). Both models propose that dysfunctional beliefs and assumptions provoke a person with SAD to appraise social situations as dangerous and to interpret social events in an excessively negative fashion (Clark & McManus, 2002; Clark & Wells, 1995; Heimberg, Brozovich, & Rapee, 2010; Rapee & Heimberg, 1997). Two types of biases have been described. First, it is hypothesized that people with SAD interpret ambiguous social events in a negative fashion, and, second, that

they catastrophize in response to unambiguous, mildly negative social events (Clark & McManus, 2002; Clark, 2001; Stopa & Clark, 2000). Several maintenance processes are then hypothesized to 'keep the problem going': (i) Increased self-focused attention and self-monitoring linked with reduced observation of other people's behaviors and responses facilitates access to negative thoughts and feelings, interferes with performance and prevents belief disconfirmation; (ii) Use of misleading internal information (in particular anxious feelings, intrusive distorted and negative images/mental representations, and diffused body perception of 'felt sense') to make (erroneous) inferences about how one comes across to others produces self-generated evidence for fears and prevents access to disconfirmatory information (Clark, 2001); (iii) Safety-seeking behaviors (SSBs) that the person engages in to deal with the perception of threat and/or its consequences - including avoidance and escape from social situations and also overt and covert behaviors carried out whilst in social situations (e.g. mentally reviewing what to say) - lead the individual to ascribe the non-occurrence of a feared catastrophe to the SSB/s rather than adjusting their threat appraisal (Salkovskis, 1991). In addition, SSBs can create some of the symptoms that socially anxious people fear (e.g. trying to hide a shaking hand by tensing one's arms excessively produces more hand shaking), increase self-focused attention and self-monitoring that draws other people's attention to the socially anxious person, and/or influence other people in a way that re-inforces the socially anxious person's negative beliefs (Clark, 2001); (iv) The use of detailed and catastrophic anticipatory and post-event cognitive processing triggers feelings of anxiety, brings up memories of past social failures and negative self-images, and provides yet more apparent proof of social incompetence (Clark & Wells, 1995; Clark, 2001).

The Rapee and Heimberg (1997) model, and their updated model (Heimberg et al., 2010), can be distinguished from Clark and Wells (1995) in three ways. First whilst Clark and Wells (1995) consider SSBs to be a core feature, Rapee and Heimberg (1997) do not specifically illustrate SSBs in their model and focus mainly on the dysfunctional nature of avoidance. Second, Clark and Wells (1995) and Clark (2001) assert that some processing of external cues takes place, but propose that the core attentional bias is the person's shift to monitoring *internal* cues (e.g. arousal, thoughts, behaviors, images). In contrast, Rapee and Heimberg (1997) describe a more interactive process between internal and external information in which individuals allocate their attentional resources to monitoring and adjusting their distorted mental representation of the self while also directing attention externally in search of any threat cues or negative evaluation. Third, Heimberg et al. (2010) suggest that people with SAD fear and attend to *any* evaluation-related cues, whether they are negative or positive, rather than focusing specifically on fear of negative evaluation.

2. Etiological models of childhood SAD

Etiological models of SAD typically propose that a mixture of genetic, temperamental, environmental and cognitive factors increase the risk for the development of SAD (e.g. Kearney, 2005; Kimbrel, 2008; Ollendick & Benoit, 2012; Ollendick & Hirshfeld-Becker, 2002; Rapee & Spence, 2004; Spence & Rapee, 2016). Here we review the three factors that are described as potentially also playing a role in the *maintenance* of childhood SAD in these models, i.e. performance factors, peer interactions, and parental practices.

Rapee and Spence (2004) propose that two performance factors, in interaction with peer factors, may lead to repeated experiences

of social failure which then maintain social anxiety: (i) social skills deficits, "a fundamental lack in social ability" (Rapee & Spence, 2004, p. 758), and (ii) interrupted social performance, "the interference of appropriate social behavior due to heightened anxiety" (Rapee & Spence, 2004, p. 758). Both factors are hypothesized to prevent success in social situations leading to negative peer interactions, such as low peer acceptance and/or victimization, which negatively influence how the person views their own social competence and peer status, as well as causing feelings of anxiety and avoidance and limiting the individual's opportunities to develop and learn important behavioral and cognitive social skills and experience positive outcomes from social interactions — continuing the social anxiety cycle (Rapee & Spence, 2004).

Four parenting dimensions are implicated in the persistence of SAD in children (Ollendick & Benoit, 2012; Ollendick & Hirshfeld-Becker, 2002; Rapee & Spence, 2004): (i) Parental overcontrol, i.e. excessive regulation of children's activities and routines, over-protection, instruction on how to think and feel, and discouragement of independence (Barber, 1996; Steinberg, Elmen, & Mounts, 1989); (ii) Information transfer, i.e. transmission of information conveying threat, lack of control and lack of coping from the parent to the child (Rachman, 1977); (iii) Modelling, i.e. the child's observations of a parent's own behaviors signaling fears of social evaluation and use of maladaptive coping strategies (e.g. avoidance, social withdrawal) (Ollendick & Benoit, 2012; Ollendick & Hirshfeld-Becker, 2002; Rapee & Spence, 2004); (iv) Negativity, such as parental criticism, rejection, and lack of warmth (Wood, McLeod, Sigman, Hwang, & Chu, 2003). While the exact mechanisms by which the dimensions maintain SAD are not all articulated in SAD-specific models, broader models of child anxiety do describe potential mechanisms (e.g. Murray, Creswell, & Cooper, 2009; Rapee, 2001). For example, overcontrol is hypothesized to maintain a child's anxiety by limiting opportunities to evaluate the accuracy of fears and master challenging situations. Whereas, parental transfer of negative information regarding social stimuli or social evaluation and modelling of anxious and avoidant responses

may lead directly to fear of social situations (or their consequences) and avoidant behaviors in the child (Ollendick & Hirshfeld-Becker, 2002). Finally, parental negativity may sustain the child's negative beliefs regarding social interactions and reinforce associated behavioral (e.g. avoidance) and emotional (e.g. anxiety) reactions (Murray et al., 2009).

3. Aims of review

To date, it has been unclear if, or to what extent, the same cognitive and behavioral maintenance processes that occur in adult SAD also apply to childhood SAD and/or whether other potential maintenance mechanisms may be specific to SAD in childhood. As such, this paper critically evaluates what is currently known about maintenance processes in childhood SAD. Table 1 summarizes the main hypotheses that come from the adult cognitive models (Clark & Wells, 1995; Rapee & Heimberg, 1997) and the etiological models of SAD (Ollendick & Benoit, 2012; Ollendick & Hirshfeld-Becker, 2002; Rapee & Spence, 2004) and the various pathways between factors as hypothesized in these models (see Fig. 1).

4. Methodological approach

We have taken a narrative review approach as the relevant literature spans a range of potential maintenance mechanism and our initial scoping identified only a small number of papers relating to each mechanism. For the purposes of this review we focused on papers published in the last three decades where associations between the proposed maintenance factor and social anxiety (symptoms or disorder) were measured. A number of recent studies have highlighted critical differences between children and adolescents with anxiety disorders, in terms of clinical characteristics (Waite & Creswell, 2014), responsiveness to exposure interventions in CBT (Kendall & Peterman, 2015; Pattwell et al., 2012), and potential maintenance factors (Waite & Creswell, 2015; Waite, Codd, & Creswell, 2015). As such, our focus is specifically on pre-

Table 1
Hypotheses derived from the adult cognitive models and etiological models of social anxiety.

Dysfunctional beliefs and assumptions
  Socially anxious children are more likely than non-socially anxious children to hold dysfunctional beliefs and assumptions about themselves and their social world (Clark, 2001; Heimberg et al., 2010; Rapee & Heimberg, 1997).
Perceived social danger
  Socially anxious children are more likely than non-socially anxious children to (i) interpret ambiguous social events in a negative fashion and (ii) catastrophize in response to unambiguous, mildly negative social events (Clark & Wells, 1995; Clark, 2001).
Focus of attention
  Socially anxious children are more likely than non-socially anxious children to (i) show enhanced self-focused attention and self-monitoring linked with reduced processing of external social cues when anxious in social situations (Clark & Wells, 1995; Clark, 2001), and, (ii) direct their attention externally in search of threat cues (Rapee & Heimberg, 1997) or any evaluation-related cues (Heimberg et al., 2010) when anxious in social situations.
Use of misleading internal information
  Socially anxious children are more likely than non-socially anxious children to use internal information (in particular anxious feelings, intrusive distorted and negative images/mental representations, and diffused body perception of 'felt sense') to make (erroneous) inferences about how they appear to others (Clark & Wells, 1995; Clark, 2001).
Safety-Seeking Behaviors
  Socially anxious children are more likely than non-socially anxious children to engage in safety-seeking behaviors when socially anxious (Clark & Wells, 1995; Clark, 2001; Heimberg et al., 2010; Rapee & Heimberg, 1997).
Anticipatory and post-event processing
  Socially anxious children are more likely than non-socially anxious children to engage in negatively biased (i) anticipatory and (ii) post-event processing (Clark & Wells, 1995; Clark, 2001; Heimberg et al., 2010).
Performance factors
  Socially anxious children are more likely than non-socially anxious children to experience social failure due to (i) social skills deficits, and (ii) some aspect of anxiety that inhibits the expression of skilful behavior (Rapee & Spence, 2004).
Peer interactions
  Socially anxious children are more likely than non-socially anxious children to be (i) judged negatively and rejected, and/or (ii) victimized by their peers (Ollendick & Hirshfeld-Becker, 2002; Rapee & Spence, 2004).
Parenting styles and behaviors
  Parents of socially anxious children are more likely than parents of non-socially anxious children to (i) engage in parental overcontrol, (ii) negative information transfer, (iii) modelling and (iv) negative behaviors (Ollendick & Benoit, 2012; Ollendick & Hirshfeld-Becker, 2002; Rapee & Spence, 2004).
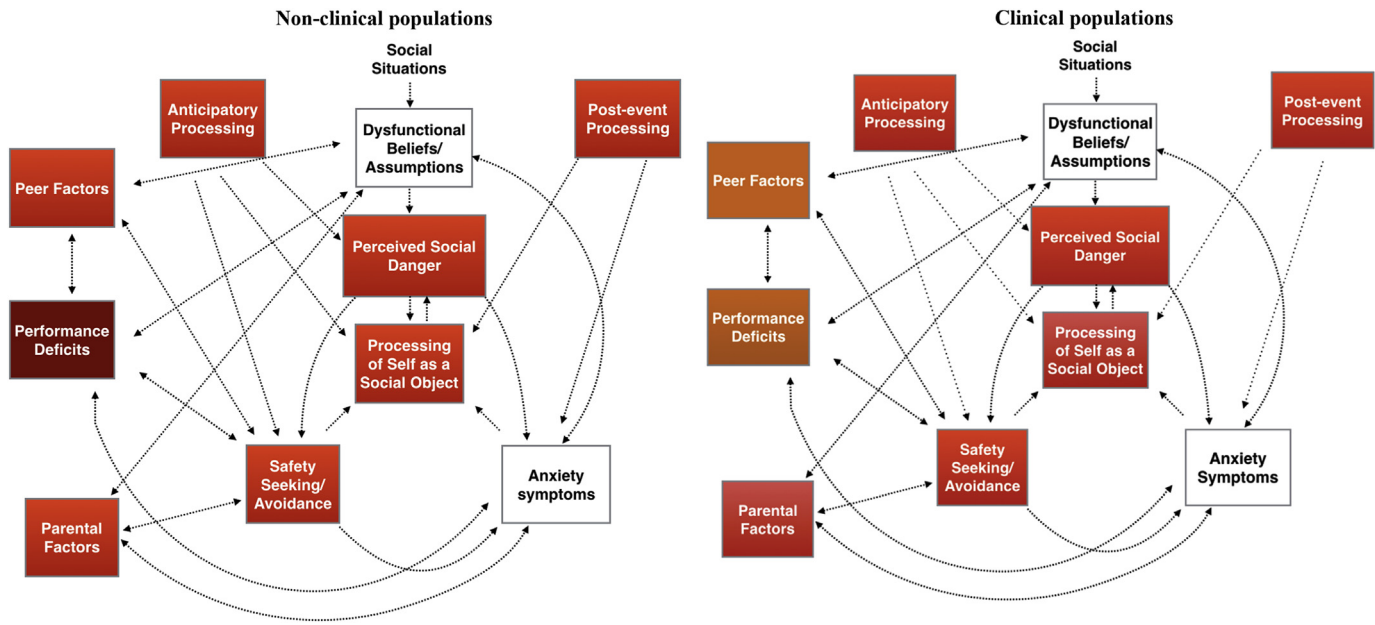
Fig. 1. Summary of findings from non-clinical and clinical populations. A 'Traffic light' analogy is used to visually capture the 'strength' of the current evidence. White = 'no studies exist'; dark red = 'studies typically failed to find evidence for a significant association'; light red = 'studies indicate a cross-sectional but non-specific symptom/disorder association'; amber = 'studies indicate a cross-sectional and symptom/disorder specific association'; green = 'studies indicate a causal and disorder specific association' (no such studies exist). Arrows = Pathways between maintenance mechanisms as hypothesized in the adults and etiological SAD models. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

adolescent children at an age where anxiety diagnoses can reliably be diagnosed, that is 7–12 years (Silverman & Albano, 1996). However, given the paucity of literature we also considered studies including participants with an upper age limit of 14 years as long as the average age of the sample was no more than 13 years (e.g. a study with an age range between 11 and 14 years with an average age of 12.2 would be included).

We have organized the literature according to the methodological approach taken and the extent to which it can provide information on the specific association between each potential maintenance factor and social anxiety symptoms/disorder in children. As such, we considered evidence for (i) associations between potential maintenance factors and social anxiety symptoms in community child populations; (ii) *specific* associations between potential maintenance factors and social anxiety symptoms in community child populations (e.g. compared to associations with other types of anxiety symptoms); (iii) the direction of effects between potential maintenance factors and social anxiety symptoms (based on experimental and prospective studies with non-clinical populations); (iv) differences between potential maintenance factors in children with SAD versus non-anxious children; (v) differences between potential maintenance factors in children with SAD versus children with other anxiety disorders (i.e. disorder specificity); and (vi) the direction of effects between potential maintenance factors and SAD (based on experimental and prospective studies recruiting children with SAD). Fig. 1 uses a 'traffic light' approach to illustrate the strength of evidence for each of the hypothesized maintenance factors as derived from the adult cognitive (i.e. self-focused attention, internal information, SSBs, and anticipatory/post-event processing) and etiological (i.e. performance factors, peer interactions and parental practices) models. The methods and measures used within each study are summarized in Supplementary Material. Effect sizes (Pearson's product moment correlation coefficient; r) are reported for all studies where these were provided. Where studies did not provide effect sizes in terms of r, they were calculated (if possible) or converted to

r using an online calculator (http://www.psychometrica.de/effect_size.html). Effect sizes were interpreted according to Cohen (1988) as follows: at least .10 'small effect', at least 0.24 'medium effect', and at least 0.37 'large effect'.

5. Methodological features of the studies reviewed

In the Supplementary material, we have summarized the methodological differences across studies. It is important to keep in mind, whilst considering the existing literature the extensive variation across studies examining the hypothesized maintenance mechanisms. Specifically, in terms of measurement methods, definitions of key concepts, sample characteristics and reliance on self-report measures and cross-sectional designs. Consequently, these differences undermine comparisons of findings across studies. We highlight these problems in the subsequent sections when appropriate, but a more thorough review of the limitations to the existing evidence base can be found in the discussion section of this paper.

6. Dysfunctional beliefs and assumptions

6.1. Are socially anxious children more likely than non-socially anxious children to hold dysfunctional beliefs and assumptions about themselves and their social world?

No studies were identified that met our inclusion criteria and *reported* the role of dysfunctional beliefs and assumptions in 7–12 year old children with either non-clinical or clinical levels of social anxiety.

6.2. Strength of the available evidence

'Dysfunctional Beliefs/Assumptions' has been coded as 'No studies exist' in Fig. 1.

7. Perceived social danger

7.1. Are socially anxious children more likely than non-socially anxious children to interpret ambiguous social events in a negative fashion?

7.1.1. Non-clinical populations

Vassilopoulos, Moberly, and Douratsou (2012) found that self-reported social anxiety was significantly associated with more threatening interpretations in response to ambiguous social situations in a community sample of 164 children (10–12 years) ($r = 0.36$). A similar finding was reported by Higa and Daleiden (2008) in another community-population based study ($n = 175$, 11–12 years; $r = 0.39$). Findings from both studies remained significant after controlling for symptoms of depression. To establish whether this interpretation bias was specific to *social* events, Vassilopoulos and Banerjee (2012) presented a community sample ($n = 210$; 11–12 years) with both social and non-social ambiguous scenarios. In addition, to examine whether interpretation bias is enhanced in 'self-referent events' (i.e. happen to oneself) (see e.g. Amir, Foa, & Coles, 1998) they asked children to interpret 'other-referent' versions of the same scenarios (i.e. how an imagined child would interpret the event). After controlling for symptoms of depression, higher levels of self-reported social anxiety were associated with significantly more threatening interpretations of both self- and other-referent social events ($r = 0.43$ and 0.23, respectively). No significant correlations emerged between social anxiety and interpretations of non-social events ($r = 0.11$ for self- and 0.19 for other-referent). Hence, socially anxious children appeared to only interpret ambiguous *social* information in a threatening manner, but this occurred when the information was processed in relation to both themselves and other people.

In the first study to directly examine the anxiety subtype-specificity of interpretation biases in children, Muris et al. (2000) administered ambiguous stories relating to three subtypes of anxiety (social, separation, and generalized) to a community population ($n = 105$, 8–13 years). Although higher social anxiety symptoms were significantly associated with greater threat interpretation generally ($r = 0.31$), social anxiety was not associated with a *specific* interpretation bias for social stories ($r = 0.19$). Building on these findings, Bögels, Snieder, and Kindt (2003) assigned 7–12 year old children to a 'high' social anxiety ($n = 20$), a 'high' generalized anxiety ($n = 20$) or a 'high' separation anxiety group ($n = 15$) on the basis of scoring in the top 10% of 537 community respondents on the relevant Screen for Child Anxiety Related Emotional Disorders questionnaire subscales (SCARED-R; Muris, Merckelbach, Van Brakel, & Mayer, 1999). Whilst the children who scored highly on self-reported social anxiety symptoms made significantly more threatening interpretations of social situations compared to children displaying high separation anxiety ($r = 0.37$), they did not differ significantly from those with high generalized anxiety ($r = 0.12$), therefore offering limited evidence of social anxiety-specific interpretation bias.

In addition to threat interpretation, perceived danger has been considered in terms of the *emotional cost* of ambiguous social situations. Findings to date have been fairly consistent in that a significant association has been found between self-reported social anxiety and greater emotional cost of self-referent ambiguous social events (Vassilopoulos, Moberly, et al., 2012; $r = 0.36$; Vassilopoulos & Banerjee, 2012; $r = 0.34$), but not for other-referent events (Vassilopoulos & Banerjee, 2012; social $r = 0.14$, non-social $r = 0.19$). However, Vassilopoulos and Banerjee (2012) also found that greater self-reported social anxiety was significantly associated with greater emotional cost for self-referent non-social ambiguous events ($r = 0.31$). These findings suggest that socially

anxious children may anticipate that they — but not other people — will have negative emotional responses to both social and non-social events.

In the first study to examine the direction of the association between interpretation biases and social anxiety in non-clinical populations, Vassilopoulos, Banerjee, and Prantzalou (2009) assigned a selected sample of children (10–11 years) scoring in the top 25% of the Social Anxiety Scale for Children-Revised (SASC-R; La Greca & Stone, 1993) to either a benign Cognitive Bias Modification of Interpretation (CBM-I) training condition ($n = 22$) or a no-training condition ($n = 21$). CBM-I training resulted in a significant reduction in negative ($r = 0.33$) — but not an increase in benign — interpretations and a significant reduction in self-reported social anxiety ($r = 0.62$). Neither negative/benign interpretations or self-reported social anxiety changed significantly in the no-training condition. Furthermore, there was a significant association between greater self-reported social anxiety and changes in negative — but not benign — interpretation ratings ($r = 0.34$). Building on these findings, Vassilopoulos, Blackwell, Moberly, and Karahaliou (2012) examined whether imagery ($n = 48$) and verbal ($n = 46$) processing instructions differentially affected the outcome of CBM-I in a community sample of children (10–12 years). Whilst neither training condition had any effect on benign interpretations, both groups interpreted ambiguous social events significantly less negatively and anticipated significantly lower emotional cost post-training although social anxiety was unaffected. However, reduction in social anxiety from pre-to post-training was significantly associated with change in both negative interpretation ratings and anticipated emotional cost ($r = 0.21$ and 0.24, respectively) across the whole sample.

Another adaptation of the standard CBM-I procedure has been evaluated on the basis that children's interpretations of social stimuli may be influenced by their peers (see e.g. Freeman, Hadwin, & Halligan, 2011). Vassilopoulos and Brouzos (2015) found that CBM-I training ($n = 20$; 10–11 years) which involved joint discussions of ambiguous scenarios with a same-gender peer, was associated with a significant reduction in negative interpretations ($r = 0.51$), emotional cost ($r = 0.63$) and social anxiety ($r = 0.51$). Furthermore, reduction in social anxiety from pre-to post-training was significantly associated with reduction in negative interpretation ($r = 0.60$) and emotional cost ($r = 0.47$). A no training condition ($n = 18$; 10–11 years) showed no significant changes in negative interpretations, emotional cost or social anxiety. In line with the previous two studies, training had no effect on benign interpretations.

7.1.2. Clinical populations

In the first study to investigate interpretation of ambiguity in a clinical child population, Barrett, Rapee, Dadds, and Ryan (1996) administered ambiguous scenarios involving either physical or social threat to children (7–12 years) meeting diagnostic criteria for SAD ($n = 31$), separation anxiety ($n = 37$), overanxious disorder ($n = 57$) or simple phobia ($n = 27$). There were no significant differences between the SAD group and the non-SAD groups on threat scores for social (r's ranging from 0.13 to 0.21) or physical situations (r's ranging from 0.18 to 0.35). Furthermore, when comparing threat scores for the social and physical situations within each subgroup, children with SAD did not interpret significantly more threat for social than physical situations (whilst this was evident for children with separation anxiety, $r = 0.33$) (Barrett et al., 1996).

Other studies have also failed to demonstrate that children with SAD show higher levels of threat interpretations than other-anxious (i.e. non-SAD) and non-anxious children in relation to ambiguous social situations, but findings have not been consistent for non-social situations. Creswell, Murray, and Cooper (2014)

administered ambiguous social and non-social scenarios to children (7—12 years) diagnosed with SAD ($n = 40$), other anxiety disorders ($n = 40$) and healthy controls ($n = 40$). Differences in threat interpretation were only found between the two anxious groups among the older children indicating that the nature of the association between cognitions and anxiety may change through development. That is, older (10—12 years) children with SAD produced significantly higher rates of threat interpretation compared to anxious controls ($r = 0.21$) but, contrary to expectations, this was only for non-social ambiguous situations. It is unclear if or to what extent the failure to find SAD-specificity in the Barrett et al. (1996) and Creswell et al. (2014) studies can be attributed to problems with measurement. Alkozei, Cooper, and Creswell (2014) suggested that the context (i.e. types of scenarios) in which social anxiety is associated with threat-related interpretation bias may be very specific and therefore group differences may get diluted when a broad range of scenarios are presented. For example, Alkozei et al. (2014) found that when only 3 ambiguous scenarios were presented (as opposed to 12, as in Barrett et al., 1996 and Creswell et al., 2014) children (7—12 years) with SAD ($n = 25$) reported significantly higher threat interpretation than other-anxious ($n = 25$) and non-anxious children ($n = 25$) ($r = 0.41$ and 0.54, respectively). However, this study did not distinguish between children's responses to social versus non-social situations - offering no clear evidence for social content-specific interpretation bias in response to ambiguous stimuli.

Two of the above studies also investigated how children with SAD rate the emotional cost of ambiguous events. Alkozei et al. (2014) showed that children with SAD rate the emotional cost of ambiguous events (including social, physical and separation) significantly higher than children with other anxiety disorders and non-anxious controls ($r = 0.38$ and 0.49, respectively). In order to address whether these findings relate specifically to social situations, Creswell et al. (2014) administered ambiguous social and non-social scenarios to children (7—12 years) with SAD ($n = 40$), anxious controls ($n = 40$) and non-anxious children ($n = 40$) and asked them to rate how they would feel if these events were to happen. There was no evidence of SAD-specificity, with the socially anxious children unexpectedly producing significantly *lower* ratings of expected negative emotions in response to ambiguous social events (and non-social events among 7—9 years old; $r = 0.28$) compared to non-anxious controls.

In order to investigate the direction of the association between interpretation bias for ambiguous social scenarios and social anxiety, Klein et al. (2015) compared positive CBM-I training ($n = 21$) to neutral ($n = 19$) in a mixed anxiety disordered sample of children showing an interpretation bias prior to training. Positive training — but not neutral — was significantly associated with a reduction in interpretation bias on social scenarios ($r = 0.43$ and 0.23, respectively). While, positive — but not neutral — training resulted in significantly lower mother and father reported social anxiety ($r = 0.26$ and 0.43, respectively) there was no significant effect on child self-reported social anxiety. Furthermore, neither training condition resulted in decreased interpretation bias for generalized or separation-related situations.

7.2. Are socially anxious children more likely than non-socially anxious children to catastrophize in response to unambiguous, mildly negative social events?

7.2.1. Non-clinical populations

Vassilopoulos and Banerjee (2008) found, in a community sample of children ($n = 109$; 11—13 years), that greater self-reported social anxiety was significantly associated with more catastrophic interpretations of mildly negative social events after controlling for depression ($r = 0.32$). Questionnaire studies investigating associations between social anxiety and the perceived probability and emotional cost of mildly negative social events have produced mixed findings. Weeks, Ooi, and Coplan (2015) reported that greater self-reported social anxiety was significantly associated with higher estimated probability and emotional cost for mildly negative social events ($r = 0.49$ and 0.32 for males; $r = 0.44$ and 0.40 for females, respectively). These findings were partially supported by Vassilopoulos and Banerjee (2008) who found a significant association between social anxiety and increased estimates of the emotional cost of mildly negative social events ($r = 0.49$). Notably, there were no significant associations between social anxiety symptoms and probability estimates for mildly negative social events ($r = 0.15$). Inconsistency in findings may relate to differences in wording of questions; items in Weeks et al. (2015) were less ambiguous (i.e. more clearly negative) than in Vassilopoulos and Banerjee (2008) — suggesting that socially anxious children may only overestimate the probability of clearly negative social events.

Vassilopoulos, Moberly, and Zisimatou (2013) administered a CBM-I training program to a community sample ($n = 77$; 10—13 years) and compared them to children who received no intervention ($n = 76$). Although the training program was associated with significant reductions in catastrophic interpretations of mildly negative social events ($r = 0.47$) and a significant increase in benign interpretations of negative social events ($r = 0.35$), there was not a significant change in trait social anxiety. However, the scope to alter social anxiety may have been limited by the inclusion of a non-selected sample that did not generally have elevated symptoms of social anxiety.

7.2.2. Clinical populations

Spence, Donovan, and Brechman-Toussaint (1999) found that children (7—12 years) with SAD ($n = 27$) were significantly less likely than non-anxious children ($n = 27$) to believe that positive social events would happen to them ($r = 0.42$). However, children with SAD were not significantly more likely than non-anxious children to believe that positive non-social or negative social/non-social events were likely to occur ($r = 0.28$, 0.32, and 0.13, respectively), indicating that the negative expectations of children with SAD may be specific to positive social events.

7.3. Strength of the available evidence

Among non-clinical and clinical populations, there is evidence that high social anxiety or the presence of SAD is significantly associated with a tendency to interpret ambiguous social situations as threatening and catastrophize in response to mildly negative social stimuli. However, existing studies have either failed to find or have not considered symptom specificity and experimental studies have been unable to show that modifying interpretation biases influences social anxiety specifically. As such 'Perceived Social Danger' has been coded as 'studies indicate a cross-sectional but non-specific symptom/disorder association' in Fig. 1.

8. Focus of attention and use of misleading internal information

8.1. Are socially anxious children more likely than non-socially anxious children to show enhanced self-focused attention and self-monitoring linked with reduced processing of external social cues when anxious in social situations?

8.1.1. Non-clinical populations

Hodson, McManus, Clark, and Doll (2008) compared Focus of

Attention Questionnaire (FAQ; Woody, 1996) scores of children (11–14 years) scoring in the highest ($n = 47$) and lowest ($n = 48$) quartiles and in the middle ($n = 76$) on the Social Phobia and Anxiety Inventory for Children (SPAI-C; Beidel, Turner, & Morris, 1995). High socially anxious children reported significantly higher levels of self-focused attention than middle and low socially anxious children ($r = 0.24$ and 0.48, respectively), and the middle socially anxious reported significantly higher levels than the low socially anxious children ($r = 0.25$). Furthermore, greater self-focused attention was significantly associated with social anxiety across the whole sample ($r = 0.42$). Higa and Daleiden (2008) also found a significant cross-sectional association between self-reported self-focused attention (on the FAQ) and greater self-reported social anxiety ($r = 0.39$). This study also used a mirror-based task in order to manipulate self-focused attention, however there was no evidence that the task successfully altered self-focused attention.

8.1.2. Clinical populations

In line with findings with community populations, Kley, Tuschen-Caffier, and Heinrichs (2012) found a significant correlation between greater self-reported social anxiety and self-reported self-focused attention (on the FAQ) ($n = 63$; 8–13 years; $r = 0.43$) among children with and without SAD. Furthermore, children with SAD ($n = 21$) reported significantly greater self-focused attention *during* a public speaking task compared to both non-clinical children who self-reported high social anxiety and partially met the diagnostic criteria for SAD ($n = 21$) and non-anxious children ($n = 21$) ($r = 0.48$ and 0.57, respectively). However, the two non-clinical groups did not differ ($r = 0.15$), suggesting a non-linear relationship between social anxiety and self-focused attention - in contrast to Hodson et al. (2008). In a related experimental study (using the same participant groups as Kley et al., 2012), Kley, Heinrichs, and Tuschen-Caffier (2011) investigated the direction of the association between social anxiety and self-focused attention by instructing children to either self-focus or focus externally during a public-speaking task. Although children reported changes in their self-focused attention (on the FAQ) consistent with the manipulation, there were no significant differences in how anxious the children felt whilst speaking between the two conditions. In other words, contrary to the expectations of the cognitive models of SAD, children with SAD did not report greater anxiety than non-anxious children whilst engaging in self-focused attention during a speaking task.

8.2. Are socially anxious children more likely than non-socially anxious children to direct their attention externally in search of threat cues or any evaluation-related cues when anxious in social situations?

As highlighted above the cognitive models of social anxiety differ in their hypotheses regarding the role of externally focused attention. Specifically, Clark and Wells (1995) and Clark (2001) assert that processing of external cues in conditions of social stress is reduced due to a shift in attention toward internal cues, whereas Rapee and Heimberg (1997) argue that there is an increase in both internal and external attention (see further Schultz & Heimberg, 2008; Wong, Gordon, & Heimberg, 2014). In contrast to the adult literature (e.g. Mansell, Clark, & Ehlers, 2003), no studies have investigated the balance between internal and external attention in socially anxious children. However, two studies (Kley et al., 2011, 2012) administered the 'other-focused attention' subscale from the FAQ questionnaire (Woody, 1996) with clinical populations to assess the extent to which children's attention is directed towards the external environment when public speaking. No studies have been conducted with community populations.

8.2.1. Clinical populations

Kley et al. (2012) found that children (8–13 years) with SAD ($n = 21$) reported significantly greater external focused attention when compared to non-anxious controls ($n = 21$; $r = 0.42$), but not when compared to 'high' socially anxious community children ($n = 21$; $r = 0.33$) (who did not differ from non-anxious controls, $r = 0.11$). Notably, however, when externally focused attention was increased following direct instructions (Kley et al., 2011), there was no evidence that this led to an increase in self-reported state anxiety.

8.3. Are socially anxious children more likely than non-socially anxious children to use internal information (in particular anxious feelings, intrusive distorted and negative images/mental representations, and diffused body perception of 'felt sense') to make (erroneous) inferences about how they appear to others?

To date no studies that fit our inclusions criteria have *reported* on negative distorted images (mental representations) or diffused body perception within the context of childhood social anxiety. However, constructs relating to children's beliefs about physical symptoms in the context of social anxiety have been examined, specifically, anxiety sensitivity (beliefs that bodily symptoms of anxiety are responsible for provoking embarrassment, additional anxiety and illness/loss of control), emotional reasoning (a tendency to draw conclusions on the basis of bodily experiences) and beliefs about others' appraisals when they notice bodily symptoms of anxiety.

8.3.1. Non-clinical populations

Eley, Stirling, Ehlers, Gregory, and Clark (2004) showed that scores on the Children's Anxiety Sensitivity Index (CASI; Silverman, Fleisig, Rabian, & Peterson, 1991) were significantly associated with self-reported symptoms of social anxiety ($r = 0.47$) in a community population of children ($n = 79$; 8–11 years). However, significant (and in some cases stronger) associations were found with other anxiety subtypes, specifically, panic ($r = 0.62$), separation anxiety ($r = 0.62$), general ($r = 0.56$), and school anxiety ($r = 0.40$). Eley, Gregory, Clark, and Ehlers (2007) found a similar significant moderate association between anxiety sensitivity and social anxiety ($r = 0.35$) among 300 twin pairs, but, again, similar or stronger associations with other anxiety subtypes (panic ($r = 0.53$), general ($r = 0.46$), separation ($r = 0.43$), and school anxiety ($r = 0.31$)). Together these studies suggest that, social anxiety symptoms are not specifically associated with negative beliefs about anxiety-related bodily symptoms.

In the only study to manipulate the visibility of bodily anxiety symptoms, Schmitz, Blechert, Krämer, Asbrand, and Tuschen-Caffier (2012) found that children (10–12 years) with 'high' social anxiety ($n = 20$) rated their heart rate as significantly stronger than those with 'low' social anxiety ($n = 20$) when they told a story in front of two adult observers ($r = 0.37$) despite their actual heart rates being comparable. Making children's heartbeats appear audible to others resulted in a significant increase in worry about heart rate visibility to others, amongst those with high – but not low – social anxiety ($r = 0.40$). However, contrary to expectations, self-reported state anxiety did not differ significantly between groups. Notably, those with high social anxiety also reported significantly stronger symptoms – and greater worry about visibility to others – of trembling, sweating and blushing under both the private ($r = 0.45$ and 0.39, respectively) and public conditions ($r = 0.37$ and 0.32, respectively).

8.3.2. Clinical populations

Alkozei et al. (2014) found that children (7–12 years) with SAD ($n = 25$) reported significantly higher anxiety sensitivity (on the CASI) than children with other anxiety disorders ($n = 25$; $r = 0.54$) and non-anxious controls ($n = 25$; $r = 0.70$) (who did not differ from each other, $r = 0.24$). These findings reflected significantly higher scores across all three subscales of the CASI (r's ranging from 0.42 to 0.73), i.e. negative consequences of physical symptoms in terms of (i) social embarrassment, (ii) additional anxiety and (iii) illness/loss of control, suggesting that children with SAD hold more general (as opposed to only socially-related) negative beliefs about anxiety-related bodily symptoms than other clinically anxious and non-anxious children. However, children with SAD were not more likely than anxious or non-anxious controls to rate ambiguous stories that included information about potentially frightening physical symptoms (e.g. "You can feel your heartbeat") as threatening ($r = 0.42$ and 0.51, respectively), providing no evidence for enhanced emotional reasoning. These findings indicate that children with SAD may associate negative consequences, such as embarrassment, with physical symptoms, but the experience of these symptoms does not necessarily lead them to change their interpretation of particular situations.

8.4. Strength of the available evidence

Overall, among non-clinical and clinical populations, social anxiety or the presence of SAD has been found to be significantly associated with higher levels of self-focused attention (and externally focused attention among clinical populations) and greater anxiety sensitivity. However, the validity of assessing focus of attention through self-report in children at this age remains unclear. In addition, the majority of the existing studies have not addressed or failed to find whether these findings are specific to social anxiety and/or SAD. Where some evidence for specificity has been found this is for constructs that are related but different from the core constructs as described in the adult cognitive models. As such, 'Processing of Self as a Social Object' has been coded as 'studies indicate a cross-sectional but non-specific symptom/disorder association' in Fig. 1.

9. Safety-seeking behaviors

9.1. Are socially anxious children more likely than non-socially anxious children to engage in safety-seeking behaviors when socially anxious?

9.1.1. Non-clinical populations

Hodson et al. (2008) demonstrated a significant association between greater self-reported social anxiety and a higher frequency of social anxiety related SSBs (on the Social Behavior Questionnaire; SBQ; Clark et al., 1995; $r = 0.42$). Furthermore, 'high' socially anxious children ($n = 47$) scored significantly higher on the SBQ than 'middle' ($n = 76$; $r = 0.31$) and 'low' socially anxious children ($n = 48$; $r = 0.45$) (who did not differ from each other, $r = 0.16$).

9.1.2. Clinical populations

Consistent with findings with non-clinical populations, Kley et al. (2012) found that children (8–13 years) with SAD ($n = 21$) reported significantly more frequent use of SSBs (as measured by the SBQ) than 'high' socially anxious ($n = 21$; $r = 0.47$) and non-anxious children ($n = 21$; $r = 0.57$) (who did not differ from each other, $r = 0.18$). In addition, children with SAD endorsed a significantly greater number of different SSBs than the other two groups.

9.2. Strength of the available evidence

Overall, studies recruiting non-clinical and clinical populations suggest that the presence of high social anxiety or SAD is significantly associated with the use of SSBs, but no studies have examined this association in relation to other anxiety symptoms/disorders. As such, Safety Seeking/Avoidance' has been coded as 'studies indicate a cross-sectional but non-specific symptom/disorder association' in Fig. 1.

10. Anticipatory processing

10.1. Are socially anxious children more likely than non-socially anxious children to engage in negatively biased anticipatory processing?

10.1.1. Non-clinical populations

Vassilopoulos (2012) found in a selected community sample of children (10–11 years) that those who scored in the highest ($n = 29$) quartile of the SASC-R (La Greca & Stone, 1993) recalled significantly fewer positive words (e.g. "popular") than those in the lowest quartile ($n = 29$) following a word-probe task ($r = 0.34$). The groups did not differ on recall of negative words (e.g. "foolish") ($r = 0.15$) and findings did not differ when the task was completed in the context of a social stress (anticipating reading aloud). These findings suggest that socially anxious children may have less positive beliefs about themselves in general (i.e. not specifically when they are anticipating a social event).

Questionnaire-based studies have suggested elevated levels of anticipatory processing in socially anxious children. Hodson et al. (2008) found that 'high' socially anxious children ($n = 47$; 11–14 years) reported significantly higher levels of anticipatory processing (on the Social Phobia Weekly Summary Scale; SPWSS; Clark et al., 2003) than children with 'middle' ($n = 76$; $r = 0.39$) and low ($n = 48$; $r = 0.35$) social anxiety (who did not differ from each other, $r = 0.02$). Furthermore, there was a significant association between social anxiety and higher levels of anticipatory processing ($r = 0.44$). Erath, Flanagan, and Bierman (2007; $n = 84$; 11–14 years) examined the related construct of performance expectancy, and found that higher social anxiety was associated with significantly lower performance expectancies prior to a social challenge task comprising a short speech ($r = -0.27$). Consistent with this finding, Morgan and Banerjee (2006) found that children (11–13 years) with 'high' social anxiety ($n = 28$) anticipated significantly worse performance than children with 'low' social anxiety ($n = 28$) on role-play tasks ($r = 0.25$).

10.1.2. Clinical populations

Spence et al. (1999) reported that children (7–12 years) with SAD's ($n = 27$) performance expectations were significantly lower than their non-anxious peers ($n = 27$) prior to a reading task and a series of role plays (both with an adult observer; $r = 0.56$ and 0.38, respectively). Similarly, Tuschen-Caffier, Kuhl, and Bender (2011) found that children with SAD ($n = 20$) anticipated significantly worse performance than non-anxious children ($n = 20$) on a reading and a story re-telling task (both involved an adult observer; $r = 0.63$ and 0.60, respectively). Furthermore, children with SAD expected significantly worse performance on the reading – but not the story re-telling – task when compared to non-clinical high socially anxious children ($n = 18$; $r = 0.50$ and 0.32, respectively) (who expected significantly worse performance than non-anxious children on the reading task; $r = 0.21$).

In the only study to assess performance ratings within peer-interactions, Alfano, Beidel, and Turner (2006) reported that children with SAD's ($n = 50$) performance expectations were

significantly lower than their non-anxious ($n = 30$) peers on a series of role-play tasks which involved socializing with a peer ($r = 0.45$) but — in contrast to Spence et al. (1999) and Tuschen-Caffier et al. (2011) — children with SAD did not expect to perform worse than the non-anxious children on a reading task ($r = 0.32$).

In order to address whether expectancy of poor performance is specific to SAD and whether it occurs specifically in relation to social situations, Creswell et al. (2014) compared performance expectancy amongst children (7–12 years) with SAD ($n = 40$), children with non-SAD forms of anxiety disorders ($n = 40$) and non-anxious children ($n = 40$) prior to delivering a speech in front of an adult and before exploring a black box containing 'scary' items. Unexpectedly, no SAD specificity was identified — in fact, the only significant group difference that emerged was in relation to the non-social task where older (10–12 years) children with non-SAD forms of anxiety disorders expected their performance to be significantly worse than both children with SAD and non-anxious children ($r = 0.44$) (who did not differ from each other).

10.2. Strength of the available evidence

Overall, among non-clinical and clinical populations, there is evidence that socially anxious children and children with SAD engage in negatively biased anticipatory processing. However, there is no evidence to suggest that this cross-sectional association is specific to social anxiety and/or SAD. As such, 'Anticipatory Processing' has been coded as 'studies indicate a cross-sectional but non-specific symptom/disorder association' in Fig. 1.

11. Post-event processing

11.1. Are socially anxious children more likely than non-socially anxious children to engage in negatively biased post-event processing?

Few studies (exceptions being Schmitz, Krämer, Blechert, & Tuschen-Caffier, 2010; Schmitz, Krämer, & Tuschen-Caffier, 2011) have explicitly set out to address post-event processing exactly as described in the cognitive models of social anxiety in adults, so we also consider studies of post-task evaluations as these provide a general sense of whether socially anxious children reflect negatively on their performance following social interactions.

11.1.1. Non-clinical populations

Hodson et al. (2008) found that 'high' socially anxious children ($n = 47$) reported significantly greater levels of negative post-event processing than both 'middle' ($n = 76$; $r = 0.30$) and 'low' ($n = 48$; $r = 0.43$) socially anxious children (who did not differ from each other; $r = 0.15$) on the Post Event Processing Questionnaire (PEP; Rachman, Grüter-Andrew, & Shafran, 2000). Furthermore, there was a significant association between greater social anxiety and higher score on the PEP across the whole sample ($r = 0.40$). Consistent with these findings, Schmitz et al. (2011) reported that children (10–12 years) with 'high' social anxiety ($n = 20$) reported significantly greater frequency of negative post-event cognitions on the Thoughts Questionnaire for Children (TQ-C; Schmitz et al., 2010) than 'low' socially anxious ($n = 20$) children 2.5 h ($r = 0.51$) and one week ($r = 0.50$) after giving a speech to two adults, but the groups did not differ in the frequency of positive post-event cognitions. Furthermore, there were significant associations between greater self-reported social anxiety and negative — but not positive — post event cognitions at both time points after controlling for depression ($r = 0.58$, $r = 0.51$). Similar results were found using a 4-item performance measure that was completed

immediately, 2.5 h and one week after the task ($r = 0.41$ for overall group difference) and there was an indication that performance ratings in high socially anxious children decreased over the course of one week whereas they remained stable in low socially anxious children.

Where studies have attempted to identify the exact concerns of socially anxious children following a social stressor they have suggested that the concerns might specifically relate to appearing nervous. Cartwright-Hatton, Hodges, and Porter (2003) found that trait social anxiety was significantly associated with poorer self-report on signs of nervousness ($r = -0.31$) but not any other performance ratings ($r = -0.04$ for micro-skills, e.g. clarity of voice; $r = -0.11$ for global impression) after a speech task ($n = 110$ community population; 8–11 years). In a follow-up study, involving a conversation with an adult, children with 'high' social anxiety ($n = 20$) reported that they looked significantly more nervous than those with 'low' social anxiety ($n = 20$; $r = 0.67$), but no group differences emerged for micro-skills ($r = 0.31$) or global impressions ($r = 0.15$) (Cartwright-Hatton, Tschernitz, & Gomersall, 2005). It is clearly likely that high socially anxious children *will* appear more nervous when under social stress (i.e. these post-event appraisals may be realistic) and this was corroborated by objective ratings in the former study (Cartwright-Hatton et al., 2003) although not in the latter (Cartwright-Hatton et al., 2005) (see social skills deficits section below).

11.1.2. Clinical populations

Schmitz et al. (2010) found that children (8–12 years) with SAD ($n = 24$) reported significantly more negative — and fewer positive — post-event cognitions on the TQ-C than non-anxious controls ($n = 22$) after reading aloud ($r = 0.50$) and solving an arithmetic task ($r = 0.44$) in front of adult observers. Furthermore, older children (10–12 years) with SAD reported significantly more negative post-event cognitions than younger children (8–10 years) with SAD ($r = 0.53$), indicating potential developmental influences. Finally, children with SAD rated their own performance as significantly worse than the non-anxious children both immediately and 2.5 h after the stress tasks.

The remaining three studies that have examined socially anxious children's post-performance ratings have provided mixed findings suggesting that the type of audience and task used to assess performance ratings may have an effect on findings. Spence et al. (1999) found no significant differences between children with SAD ($n = 27$) and non-anxious children ($n = 27$) on their post-performance ratings after reading aloud and role-playing (both involving an adult observer) ($r = 0.30$ and 0.29, respectively). Similarly, Alfano et al. (2006) found that children with SAD ($n = 50$) rated their performance similarly to non-anxious children ($n = 30$) after reading aloud in front of an adult and a same-aged peer ($r = 0.25$). However, when the children were asked to interact with a same-aged peer without the adult (e.g. carry on a conversation), children with SAD rated their own performance as significantly worse than non-anxious children ($r = 0.44$) — indicating that the type of audience may have an effect on findings. Tuschen-Caffier et al. (2011) asked children to imagine that they were standing in front of their class whilst reading aloud and re-telling a story and found that children with SAD ($n = 20$) rated their performance as significantly worse than non-anxious children ($n = 20$; $r = 0.36$) whereas children with non-clinical high social anxiety ($n = 18$) were no different from either group ($r = 0.08$ and 0.35, respectively). On the 're-telling the story' task, both children with SAD and non-clinical high socially anxious children rated their own performance as significantly worse than non-anxious children ($r = 0.55$ and 0.41, respectively) (but they did not differ from each other; $r = 0.15$).

11.2. Strength of the available evidence

There is evidence that social anxiety or the presence of SAD is significantly associated with higher levels of PEP and lower performance expectations. However, symptom/disorder specificity remains unclear as no studies have examined this association in relation to other non-social anxiety symptoms/disorders. As such, 'Post-event Processing' has been coded as 'studies indicate a cross-sectional but non-specific symptom/disorder association' in Fig. 1.

12. Performance factors

12.1. Are socially anxious children more likely than non-socially anxious children to experience social failure due to (i) social skills deficits, and (ii) some aspect of anxiety that inhibits the expression of skillful behavior?

12.1.1. Non-clinical populations

Cartwright-Hatton et al. (2003) found a significant negative association between children's ($n = 110$; 8—11 years) self-reported social anxiety and observer's ratings of signs of nervousness ($r = -0.28$) (but not micro-skills or global impressions; $r = -0.16$ and -0.17, respectively) during a speech task, indicating that, unsurprisingly, children with higher levels of social anxiety may appear more nervous while giving a speech than low socially anxious children but do not differ on other aspects of performance. Findings from a subsequent study (Cartwright-Hatton et al., 2005) suggest that the type of task used to assess performance deficits may have some effect on the findings. Specifically, when 'high' ($n = 20$) and 'low' ($n = 20$) socially anxious children (10—11 years) were asked to have a conversation with an adult, no group differences emerged in observers' ratings (using a slightly adapted version of the above scheme; r's ranging from 0.06 to 0.17). That is, in this more conversational context, high socially anxious children were indistinguishable from children with low social anxiety, even on 'signs of nervousness'.

In line with this finding, Erath et al. (2007) reported that observers could not identify any performance deficits among socially anxious children ($n = 84$; 11—14 years) when the children were having a conversation with an unfamiliar adult ($r = -0.17$). Similarly, Morgan and Banerjee (2006) reported that children (11—13 years) with 'high' social anxiety ($n = 28$) had similar speech latency and made significantly more eye contact than children with 'low' social anxiety ($n = 28$) whilst role-playing with an adult ($r = 0.32$). However, girls with low social anxiety provided significantly shorter responses than girls with high social anxiety ($r = 0.62$), suggesting possible gender differences in the association between social skills and social anxiety.

Questionnaire studies have also provided limited evidence for performance deficits among socially anxious children. Hannesdóttir and Ollendick (2007; $n = 92$; 10—14 years) reported no significant association between social anxiety and either child- or parent-report of social skills using the Social Skills Rating System (SSRS; Gresham & Elliott, 1990; $r = -0.18$ and -0.03, respectively). Similarly, Stednitz and Epkins (2006) found no group differences (after controlling for depression) between girls (9—11 years) with 'high' ($n = 25$) or 'low' ($n = 39$) social anxiety on either girl- or mother-reported girls' social skills using the SSRS. Furthermore, Banerjee and Henderson (2001; $n = 30$; 6—11 years) reported no significant association between self-reported social anxiety and teacher reported social behaviors that require and do not require insight into other's mental states (using an adapted version of the Vineland Adaptive Behavior Scale; Frith, Happe, & Siddons, 1994; $r = -0.32$ and -0.11, respectively). However, one study using teacher report did demonstrate a significant negative association between children's self-reported social anxiety and teacher reported social skills using the SSRS ($r = -0.14$) (Greco & Morris, 2005; $n = 383$; 8—12 years).

12.1.2. Clinical populations

Dodd et al. (2011) reported that there was not a significant correlation between children's self-reported social anxiety and poorer social skills on a speech task ($r = 0.07$) or an interaction task ($r = -0.12$) among a mixed anxiety-disordered sample ($n = 47$, 7—13 years). This was corroborated with objective ratings ($r = 0.02$ for the speech task and $r = 0.10$ for the interaction task). Similarly, Tuschen-Caffier et al. (2011) found that observers rated children with SAD ($n = 20$), non-clinical high social anxiety ($n = 18$) and non-anxious controls ($n = 20$) as having similar social skills on three tasks (speech, reading aloud, re-telling a story). In contrast, three studies using somewhat different tasks, audiences and behavioral measures have suggested that children with SAD do exhibit deficits in their social performance. Beidel, Turner, and Morris (1999) reported that observers rated children with SAD ($n = 50$; 7—13 years) as significantly less 'effective' (i.e. skilled) than non-anxious children ($n = 20$; 9—14 years) when they read aloud in front of a peer and two adults ($r = 0.65$) and role-played with a peer ($r = 0.76$) (where they also had significantly longer speech latencies; $r = 0.51$). Similarly, Alfano et al. (2006) found that observers rated children with SAD ($n = 50$) as significantly less skilled than non-anxious children ($n = 30$) on reading and role-play tasks ($r = 0.69$ and 0.45, respectively). However, children with SAD made similar eye-contact to the non-anxious children. There was some indication of potential developmental differences as younger (7—11 years) children with SAD had significantly longer speech latencies than older children (12—16 years) with SAD ($r = 0.43$) and non-anxious controls of any age ($r = 0.61$ for both) (no other significant group differences emerged). Spence et al. (1999) reported that observers rated children (7—12 years) with SAD ($n = 27$) as participating in and initiating significantly fewer social interactions than non-anxious children ($n = 27$) in school settings ($r = 0.49$ and 0.50, respectively). Children with SAD also perceived themselves and were perceived by their parents as being significantly less socially skilled and assertive on questionnaire measures (Social Skills Questionnaire; SSQ; Spence, 1995; $r = 0.33$ for child, $r = 0.67$ for parent; Children's Assertive Behavior Scale; CABS; Michelson & Wood, 1982; $r = 0.33$). Notably, however, when the same children were observed interacting with an adult in a laboratory setting, the evidence for 'social skills deficits' became less clear. Specifically, children with SAD responded with significantly fewer words than non-anxious children ($r = 0.35$) but had similar speech latency and eye-contact ($r = 0.24$ and 0.04, respectively). Finally, Scharfstein and Beidel (2015) found that children (6—13 years) with SAD ($n = 20$) took significantly longer to make their first utterance, spoke less and made fewer spontaneous comments than both children with GAD ($n = 18$) (r's ranging from 0.46 to 0.57) and non-anxious children ($n = 20$) (r's ranging from 0.42 to 0.70) whilst playing a video game with an unfamiliar peer. However, children with SAD and GAD did not differ on the amount of questions or exclamations made ($r = 0.35$ and 0.45) (although only children with SAD made significantly fewer exclamations than non-anxious children; $r = 0.39$).

Questionnaire-based studies have indicated that children with SAD may have poorer social skills than non-anxious children but may not differ from other-anxious children. Ginsburg, La Greca, and Silverman (1998; $n = 78$; 6—11 years) reported no significant association between children's self-reported social anxiety and parent reported social skills (on the SSRS) among a mixed anxiety-disordered sample ($r = -0.17$). Scharfstein and Beidel (2015) reported that parents of children (6—13 years) with SAD ($n = 20$)

rated them (on the SSRS) as having poorer social skills (i.e. less responsible and assertive) than non-anxious children ($n = 18$; $r = 0.55$ and 0.61, respectively), although they did not differ significantly from children with GAD ($n = 18$; $r = 0.17$).

The fact that social performance deficits are observed among children with SAD in some settings but not others may suggest that children with SAD do not have underlying 'social skills deficits' (as they can perform effectively in some situations) but that their performance may be inhibited in particular circumstances. However, there is some suggestion that a significant sub-group of children with SAD may experience underlying social communication deficits from one questionnaire-based study. Halls, Cooper, and Creswell (2015) found that children (6–13 years) with SAD ($n = 262$) scored significantly higher than children with non-SAD forms of anxiety disorders ($n = 142$) on the parent-report Social Communication Questionnaire (SCQ; Rutter, Bailey, & Lord, 2003) total score ($r = 0.27$) and on all three subscales (reciprocal interaction, communication, and restricted and repetitive behaviors; $r = 0.27$, 0.21, and 0.18, respectively), with 8.78% of children with SAD scoring above clinical cut-offs for social communication difficulties compared to 2.11% of non-SAD anxious children.

12.2. Strength of the available evidence

Among non-clinical populations more studies have failed to find a significant association between social anxiety and performance deficits than have found such an association. As such 'Performance Deficits' have been coded as 'studies typically failed to find evidence for a significant association' in Fig. 1. In contrast, studies recruiting clinical populations have established a cross sectional and disorder specific association between SAD and performance deficits so 'Performance Deficits' have been coded as 'studies indicate a cross-sectional and symptom/disorder specific association' in Fig. 1.

13. Peer interactions

13.1. Are socially anxious children more likely than non-socially anxious children to be judged negatively and rejected by their peers?

13.1.1. Non-clinical populations

Erath et al. (2007; $n = 84$; 11–13 years) demonstrated that self-reported social anxiety was significantly negatively associated with peer acceptance ($r = -0.37$). A similar picture was found in a follow-up study with a larger sample ($n = 383$; 11–13 years; $r = -0.25$; Flanagan, Erath, & Bierman, 2008). The pattern of results is also consistent across studies that have used sociometric classification among community populations. Here four studies reported that rejected children had significantly higher levels of social anxiety than average and/or popular children (Crick & Ladd, 1993; $n = 338$; 8–11 years; $r = 0.16$; Bell-Dolan, Foster, & Smith Christopher, 1995; $n = 232$; 8–11 years girls; $r = 0.29$; La Greca, Dandes, Wick, Shaw, & Stone, 1988; $n = 287$; 7–12 years; La Greca & Stone, 1993; $n = 587$; 9–12 years) and one study (Greco & Morris, 2005; $n = 333$; 8–12 years) found a significant negative association between self-reported social anxiety and being liked ($r = -0.15$). However, it is less clear if rejected children have higher levels of social anxiety than neglected children with three studies reporting no significant differences between them (Bell-Dolan et al., 1995; La Greca & Stone, 1993; La Greca et al., 1988) and one study finding significantly higher levels of social anxiety in rejected compared to neglected children ($r = 0.21$) (Crick & Ladd, 1993).

Questionnaire measures of perceived peer acceptance have generally provided a consistent picture of a significant negative association between social anxiety and peer acceptance (Festa &

Ginsburg, 2011; $n = 63$; 7–12 years; $r = -0.43$; Hutcherson & Epkins, 2009; $n = 100$; $n = 9$–12 year old girls; $r = -0.44$; La Greca & Stone, 1993; $n = 587$; 9–12 years) using the Self-Perception Profile for children (SPPC; Harter, 1985). In the case of Hutcherson and Epkins (2009) this association remained significant after controlling for depression. However, more extreme levels of depression may have influenced the picture, for example, Epkins (1996) demonstrated that socially anxious-dysphoric children ($n = 14$) had significantly lower perceived social acceptance (on the SPPC) than socially anxious children (8–12 years) ($n = 14$) but not dysphoric children ($n = 13$) (no other group differences emerged).

Questionnaire studies of friendship quality have provided inconsistent findings. A significant negative association has been found between self-reported social anxiety and both child- and mother-report of friendship quality (Flanagan et al., 2008; $n = 383$; 12–14 years; $r = -0.44$ using the Friendship Quality Questionnaire; FQQ; Parker & Asher, 1993; Hutcherson & Epkins, 2009; $n = 100$; 9–12 years; $r = -0.33$ using the SPPC). In contrast, Festa and Ginsburg (2011; $n = 63$; 7–12 years) found no significant associations between social anxiety and either friendship intimacy or validation (on the FQQ) ($r = -0.12$ and -0.21, respectively).

It is also unclear whether socially anxious children have fewer friends than non-socially anxious children. While Greco and Morris (2005; $n = 333$; 8–12 years) reported that self-reported social anxiety was unrelated to friendship quantity in both boys and girls ($r = -0.11$ and -0.02, respectively), Erath, Flanagan, Bierman, and Tu (2010; $n = 383$; 11–14 years) found a significant negative association between self-reported social anxiety and the number of mutual close ($r = -0.14$) and secondary ($r = -0.13$) friendships. Nonetheless, five studies have indicated significant associations between social anxiety and greater loneliness using the Loneliness Scale (LS; Asher, Hymel, & Renshaw, 1984) (Stednitz & Epkins, 2006; $n = 102$; 9–12 years; $r = 0.66$; Hutcherson & Epkins, 2009; $n = 100$; 9–12 years; $r = 0.49$; Erath et al., 2010; $n = 384$; 11–14 years; $r = 0.52$; Crick & Ladd, 1993; $n = 338$; 8–11 years; $r = 0.31$; Storch, Nock, Masia-Warner, & Barlas, 2003; $n = 186$; 10–13 years; r's ranging from 0.38 to 0.45).

13.1.2. Clinical populations

Ginsburg et al. (1998) reported a significant association between self-reported social anxiety and lower levels of perceived peer acceptance on the SPPC ($r = -0.46$) among a mixed anxiety-disordered sample ($n = 78$; 6–11 years) but social anxiety was unrelated to the frequency of positive peer interactions on the Friendship Questionnaire (FQ; Bierman & McCauley, 1987; $r = -0.04$). Spence et al. (1999) also showed that children with SAD ($n = 27$) perceived themselves and were perceived by their parents as being significantly less accepted than non-anxious children ($n = 27$) on questionnaire measures (Social Competence Questionnaire; SCPQ; Spence et al., 1999; $r = 0.40$ and 0.57, respectively). However, lower peer acceptance may not be specific to SAD as Scharfstein and Beidel (2015) found no significant differences between children (6–13 years) with SAD ($n = 20$) and children with GAD ($n = 18$) on parent reported peer acceptance (on the CBCL; $r = 0.03$), but both groups had significantly lower peer acceptance than non-anxious children ($n = 20$; $r = 0.68$ and 0.70, respectively). The study also reported no significant differences between the clinical groups on friendship intimacy or validation (on the FQQ; $r = 0.15$ and 0.31, respectively) but children with SAD felt significantly less validated than non-anxious children ($r = 0.40$). No other significant group differences emerged. In contrast, in the only study to include both anxious child (7–13 years) and a friend perspective, Baker and Hudson (2015) found that SAD dyads (n = 39) reported significantly lower friendship quality (based on combined child and friend FQQ scores) than other-anxious dyads (n = 28, $r = 0.27$), but

did not differ from non-anxious dyads (n = 29; r = 0.22). No other significant group differences emerged. Furthermore, the groups did not differ significantly on friendship quality when the children's friend ratings were excluded (r's ranging from 0.07 to 0.28).

Questionnaire-based studies have suggested that children with SAD have fewer friends than non-anxious children but not always when compared to other-anxious children. Bernstein, Bernat, Davis, and Layne (2008) found that children (7–10 years) with SAD (n = 45) had the same number of friends and were just as likely to have a best friend as children who either met criteria for anxiety disorders other than SAD or self-reported subclinical levels of non-social anxiety symptoms (n = 56). Furthermore, two studies (Scharfstein & Beidel, 2015; Scharfstein, Alfano, Beidel, & Wong, 2011) found that children with SAD (n = 18 and n = 20, respectively) did not differ from children with GAD (n = 18 and n = 18, respectively) on self- or parent-reported number of friendships (from reports on the ADIS-C/P; r's ranging from 0.02 to 0.06), but both groups (i.e. SAD and GAD) had significantly fewer friends than non-anxious children (n = 18 and n = 20, respectively; r's ranging from 0.50 to 0.62). Finally, Baker and Hudson (2015) reported no significant group differences between children (7–13 years) with SAD (n = 39), other-anxious (n = 28), or non-anxious children (n = 29) on the number of self-reported close friends (r's ranging from 0.07 to 0.13).

In an observational study, Spence et al. (1999, pp. 7–12 years) reported that children with SAD (n = 27) were significantly less likely to receive 'positive' − but not 'ignore' or 'negative' − responses in school settings from their peers when compared to non-anxious children (n = 27; r = 0.35, 0.28 and 0.11, respectively). Furthermore, children with SAD may be less liked by their peers than children with non-SAD forms of anxiety disorders. Scharfstein and Beidel (2015) demonstrated that non-anxious (n = 20) children (6–13 years) found unfamiliar peers with SAD (n = 20) significantly less likeable than unfamiliar peers with GAD (n = 18) whilst playing a video game with them (r = 0.46). Similarly, Verduin and Kendall (2008) reported that 'non-anxious peer raters' (n = 20; 9.5–13 years) rated unfamiliar children with SAD (n = 43) as significantly less likeable than children with other anxiety disorders (separation or generalized anxiety disorder; n = 19; 9.5–13 years; r = 0.55) when watching a video recorded speech. Furthermore, the extent that children liked anxiety-disordered children was significantly negatively associated with the anxiety-disordered children's self-reported social anxiety (r = −0.24) (Verduin & Kendall, 2008).

13.2. Are socially anxious children more likely than non-socially anxious children to be victimized by their peers?

13.2.1. Non-clinical populations
Erath, Tu, and El-Sheikh (2012) demonstrated that greater self-reported social anxiety was associated with both self-reported victimization and parent-reported victimization on a short version of the Social Experience Questionnaire (SEQ; Crick & Grotpeter, 1996; r = 0.36 and 0.58, respectively) among 10–12 year old children (n = 63). Three studies with community populations of similar ages (Erath et al., 2007; n = 84; 11–14 years; Erath et al., 2010; n = 383; 11–14 years; Flanagan et al., 2008; n = 383; 11–13 years) have reported a significant association between greater social anxiety and both self-reported victimization (r = 0.60, 0.44, 0.21, respectively), on an adapted version of the FQ, and peer nominated victimization (r = 0.24, 0.26, and 0.44, respectively).

Crick and Grotpeter (1996; n = 474; 8–11 years) and Storch et al. (2003; n = 186; 10–13 years) demonstrated that both overt (e.g. harming others through physical actions and verbal threats) and covert (e.g. harming others through exclusion, manipulation, and spreading rumors) victimization were significantly associated with higher levels of self-reported social anxiety using two subscales from the SEQ (r = 0.17 and 0.26; r's ranging from 0.28 to 0.51 on the SASC-R subscales La Greca & Stone, 1993, respectively) and Storch et al. (2003) also found a significant negative association between social anxiety and prosocial behavior using another subscale of the SEQ (r's ranging from −0.17 to −0.18 on the SASC-R subscales, La Greca & Stone, 1993).

13.2.2. Clinical populations
Ginsburg et al. (1998) found a significant association between self-reported social anxiety and overt/covert victimization as assessed by the FQ among a mixed anxiety-disordered sample (n = 78; 6–11 years; r = 0.45). Two studies (Scharfstein & Beidel, 2015; Scharfstein et al., 2011) reported no significant group differences between children (6–13 years) with SAD (n = 18 and n = 20, respectively) and GAD (n = 18 and n = 18, respectively) on parent reported victimization using the CBCL's social problems subscale (r = 0.03 and 0.27, respectively). However, Scharfstein and Beidel (2015) demonstrated that both clinical groups were significantly more victimized than non-anxious children (n = 20; r = 0.43 for SAD; r = 0.61 for GAD), whereas Scharfstein et al. (2011) did not find a significant differences between clinical (SAD, GAD) and non-clinical populations (n = 18; r = 0.19 and 0.21, respectively).

13.3. Strength of the available evidence

Non-clinical studies suggest that socially anxious children are at increased risk of being disliked and victimization compared to non-socially anxious children, but it is unclear if they have poorer friendships quality or fewer friends. However, no studies have examined this association in relation to other non-social anxiety symptoms meaning that symptom specificity is unclear. As such, 'Peer Factors' is coded as 'studies indicate a cross-sectional but non-specific symptom/disorder association' in Fig. 1. Among clinical populations, childhood SAD is significantly associated with poorer peer acceptance and victimization, with some studies reporting that children with SAD were significantly less liked by their peers than children with other forms of anxiety disorders. As such, for clinical populations, 'Peer Factors' was coded as 'studies indicate a cross-sectional and symptom/disorder specific association' in Fig. 1.

14. Parenting styles and behaviors

14.1. Are parents of socially anxious children more likely than parents of non-socially anxious children to engage in (i) parental overcontrol, (ii) negative information transfer, (iii) modelling and (iv) negative behaviors?

Existing studies of parent factors and childhood social anxiety are mostly based on non-clinical populations and have mainly examined parental overcontrol and negativity, with no studies examining parent-related information transfer or modelling specifically within the context of childhood social anxiety.

14.1.1. Parental overcontrol: non-clinical samples
Festa and Ginsburg (2011; n = 63; 7–12 years) demonstrated a significant positive association between self-reported social anxiety and children's perceived parental (92% referring to mothers) overcontrol on the Egna Minnen Betraffande Uppfostran questionnaire ("My memories of upbringing"; EMBU-C; Muris, Meesters, & van Brakel, 2003; r = 0.32). In contrast, in the only study to include mothers' self-reported parenting, neither mother-nor child-perceived maternal overcontrol (on the Parental Acceptance and Rejection/Control Questionnaire; Rohner & Khaleque,

2005) was significantly associated with children's self-reported social anxiety symptoms (Scanlon & Epkins, 2015; $n = 124$ mother-child dyads; 7–12 years; r's ranging from -0.01 to 0.14).

Where mothers and fathers have been studied separately, findings consistently indicate that children perceive their mothers to be overcontrolling but it remains unclear whether they have similar perceptions of their fathers. Grüner, Muris, and Merckelbach (1999) reported a significant association between children's self-reported social anxiety and perceived paternal *and* maternal overcontrol using the EMBU-C ($n = 117$; 9–12 years; $r = 0.27$ and 0.26, respectively) but, Rork and Morris (2009; $n = 32$; 10–13 years) found a significant association between social anxiety and maternal $-$ but not paternal $-$ overcontrol using the Parental Bonding Instrument (PBI; Parker, Tupling, & Brown, 1979; $r = 0.37$). Similarly, in a father-only sample, Greco and Morris (2002) did not find significant differences between 'high' ($n = 22$) and 'low' ($n = 26$) socially anxious children's (7–12 years) perceptions of paternal overcontrol using the PBI ($r = 0.15$).

Findings from the few observational studies that have examined parents' displays of overcontrolling behaviors have been consistent to date. Festa and Ginsburg (2011; $n = 63$; 7–12 years) found no significant associations between children's self-reported social anxiety and observers' ratings of parental overcontrol ($r = 0.07$) (in a sample of parents that were primarily female; 92%). Similarly, Hummel and Gross (2001) found no significant differences between mothers or fathers' display of verbal overcontrol for children (9–12 years) with 'high' ($n = 15$) or 'low' ($n = 15$) social anxiety. However, findings are less clear across studies examining parents separately. Rork and Morris (2009) did not find a significant association between children's self-reported social anxiety and observers' ratings of either maternal or paternal overcontrol. In contrast, Greco and Morris (2002) found that fathers of 'high' socially anxious children ($n = 22$; 7–12 years) displayed significantly more physical - but not verbal $-$ overcontrolling behaviors than fathers of 'low' socially anxious children ($n = 25$; $r = 0.53$ and 0.14, respectively).

14.1.2. Negativity: non-clinical samples

Several studies have found no significant associations between self-reported social anxiety and perceived parental rejection/criticism (Festa & Ginsburg, 2011; $n = 63$; 7–12 years; $r = 0.21$; EMBU-C; Hutcherson & Epkins, 2009; $n = 100$; 9–12 years; $r = 0.03$; Children's Report of Parental Behavior Inventory; CRPBI; Rork & Morris, 2009; $n = 32$; 10–13 years; PBI). Furthermore, Greco and Morris (2002) found no significant difference between 'high' ($n = 22$) and 'low' ($n = 22$) socially anxious children's (7–12 years) perceived paternal rejection on the PBI. In addition, whereas Scanlon and Epkins (2015; $n = 124$; 7–12 years) did find a significant association between children's perceived maternal rejection (on the PARQ measure) and their self-reported social anxiety symptoms ($r = 0.27$), this became non-significant after controlling for children's symptoms of depression ($r = -0.06$). In the same study mother-reported maternal rejection was not significantly related to children's social anxiety ($r = 0.10$). In contrast to the above studies, Grüner et al. (1999) reported a significant association between children's self-reported social anxiety and perceived maternal and paternal rejection using the EMBU-C ($n = 117$; 9–12 years; $r = 0.31$ and 0.32, respectively). Notably however this study did not control for comorbid depression symptoms.

Observational studies have indicated that mothers may be more likely than fathers of socially anxious children to display criticism/rejection. Rork and Morris (2009; $n = 32$, 10–13 years) reported a significant association between children's self-reported social anxiety and greater display of maternal (but not paternal) criticism ($r = 0.42$), and Greco and Morris (2002) found $-$ in a father-only

sample - no significant difference in paternal rejection for 'high' ($n = 22$) and 'low' socially anxious children ($n = 22$; 7–12 years).

14.1.3. Overcontrol and negativity $-$ clinical samples

Wei and Kendall (2014) demonstrated a significant association between children's self-reported symptoms of social anxiety and perceived maternal overcontrol ($r = 0.22$), but not rejection ($r = -0.14$), on the CRPBI in a treatment seeking sample of children (7–14 years) with mixed anxiety disorders ($n = 142$) or without anxiety disorders ($n = 33$). Notably, this association was no longer significant when depression symptoms were controlled for, however depression significantly moderated the effect of overcontrol ($r = -0.24$). Specifically, higher levels of overcontrol were associated with higher social anxiety in the context of low levels of depression, but, when depression was high, social anxiety was inflated regardless of the degree of maternal overcontrol. No significant association emerged between children's self-reported symptoms of social anxiety and perceived paternal overcontrol or rejection ($r = 0.11$ and -0.14, respectively).

14.2. Strength of the available evidence

Overall, the literature suggests a significant association between childhood social anxiety/disorder and parental overcontrol (and negativity in non-clinical populations). However, existing studies have failed to address social anxiety symptom/disorder specificity. As such 'Parental Factors' was coded as 'studies indicate a cross-sectional but non-specific symptom/disorder association' in Fig. 1.

15. Discussion

As Fig. 1 illustrates, no published studies examine associations between dysfunctional beliefs and social anxiety in children (colored 'white' in Fig. 1). For other hypothesized maintenance mechanisms, there is evidence that high social anxiety (and/or the presence of social anxiety disorder) is significantly associated with a tendency to interpret social situations as threating, use safety-seeking behaviors, high elevated levels of self-focused attention, negative anticipatory/post-event processing (with 'medium' to 'strong' effect sizes) and with the experience of more negative parental behaviors (with 'small' to 'medium' effect sizes). However, existing studies have either failed to find or have not considered whether this pattern is *specific* to childhood social anxiety or is equally associated with other anxiety symptoms and/or disorders (colored 'red' in Fig. 1). The only areas in which there is (albeit limited) evidence of social anxiety disorder specificity are social communication deficits and peer relationships. Specifically, Halls et al. (2015) found that children with SAD had more frequent parent-reported social communication deficits compared to children with other anxiety disorders (with a 'small-moderate' effect size), and Scharfstein and Beidel (2015) and Verduin and Kendall (2008) found that children with SAD were significantly less liked by non-anxious peers than children with other anxiety disorders (colored 'amber' in Fig. 1).

15.1. Limitations of the review

It is important to acknowledge that our findings should be understood in the context of some limitations. First, despite our best efforts, due to the disparate studies that are relevant to this review it is possible that we may have failed to identify all the relevant literature. Second, although we calculated effects sizes where this was possible, some papers lacked sufficient statistical information to inform these calculations. This prevents full evaluation of the strength of the existing evidence. The fact that we identified studies

which reported large effect sizes that were non-significant highlights problems with statistical power in some of the papers reviewed here and emphasizes the need for consistent reporting of effect sizes going forwards. Third, this review was limited to reviewing features of the most cited and well-established maintenance and etiological models of SAD. It is important to note that other models of SAD have been published over the past several decades (e.g. Hofmann, 2007; Kimbrel, 2008; Moscovitch, 2009; Wong & Rapee, 2016). However, although some components of these models are distinct (e.g. emphasizing the role of emotional control and goal delineation; Hofmann, 2007), they overlap to a significant degree with many aspects of the maintenance and etiological models reviewed here. Finally, the models we drew from do not consider the possible effects of teacher-child relationships. As such, we did not review any literature about teachers, but studies indicate that teachers are an important influence on developing cognitions in pre-adolescent children (e.g., Cole et al., 1997, 2001).

15.2. Limitations of the current literature

In addition to the general lack of studies that fully address hypothesized maintenance mechanisms in childhood SAD, clear interpretation of the existing evidence-base is hampered by several important limitations, specifically: (i) lack of concept clarity, (ii) variability in methods, (iii) sample selection, (iv) comorbidity, (v) reliance on cross sectional designs, and (vi) reliance on self- and/or parent report measures. These will be considered in turn.

15.2.1. Concept clarity

An important source of variation across studies is inconsistency in how key concepts have been defined. For example, there is no widely accepted agreement on a definition of 'social skills', making it unclear what researchers should be assessing exactly. Whilst, some observational studies (e.g. Alfano et al., 2006; Beidel et al., 1999) define social skills broadly (e.g. 'overall effectiveness of performance'), others use narrow definitions, focusing on very specific behaviors such as 'eye-contact', 'voice volume' and 'speech latency' (e.g. Cartwright-Hatton et al., 2003; Scharfstein & Beidel, 2015), without considering how these different social skills may come together to comprise effective social behavior. Similarly, questionnaire measures of social domains typically tap into a range of difference constructs, which one could argue may reflect both peer acceptance and social skills (e.g. "S/he finds it easy to make friends"; SCPQ; Spence et al., 1999). Similar problems exist with studies of parenting. For example, parental overcontrol is a very broad and generic construct which typically refers to a range of variables including parents' excessive regulation of children's activities and routines, overprotection, instruction on how to think and feel, and discouragement of independence. As a result, measures of parental overcontrol may reflect elements of more than one distinct dimension (Waite, Whittington, & Creswell, 2014).

A related issue is the inability of particular methods to distinguish between different maintenance mechanisms that may underlie similar child behaviors. For example, many studies of 'social skills' are unable to distinguish between social skills deficits and anxiety-induced performance deficits. In other words, even when social behavior seems to be impaired, it is not clear whether this results from an underlying social skills deficit, reflects inhibition of the expression of skillful behavior due to anxiety, or some combination of the two (Hopko, McNeil, Zvolensky, & Eifert, 2002). Findings from the adult literature suggest that observed performance deficits in social anxiety may be accounted for by the individual's use of safety-seeking behaviors and self-focused attention rather than reflecting a social skills deficit (e.g. McManus

et al., 2008). Researchers must consider carefully that any study which observes children's responses within a socially challenging situation will be prone to difficulty in interpretation, highlighting the need for studies using multi-method approaches to examine underlying social communication deficits which may be thought to underlie the observed social responses and potential 'social skills deficits' (Halls et al., 2015). In a related study, Kristensen and Torgersen (2008) assessed language and motor abilities difficulties in 11–12 year old children with SAD and/or Attention Deficit and Hyperactivity Disorder (ADHD), other disorders (mostly anxiety disorders) and no psychiatric disorder. Subtle differences in both language and motor abilities were found between children with SAD and other/no disorder on the basis of both observational measures and parent report. Furthermore, there was little evidence that task performance was associated with state anxiety while completing the tasks. The authors suggest that these subtle developmental delays may underlie social skill difficulties which put children at risk of social anxiety. Further studies are required to directly examine this hypothesis.

15.2.2. Variability in methods

A key limitation of the body of reviewed papers is the extensive variation in how the hypothesized maintenance mechanisms have been measured (see Supplementary Material) and in some cases the context in which this has taken place. The available literature contains almost no direct independent replication, creating problems in reconciling differences in findings across studies. For example, although the 'interpretation bias' studies typically look at how socially anxious children interpret ambiguous social stimuli, there is wide variation in how the paradigms are administered, in terms of whether they relate to social and/or physical threat, the number of scenarios used (ranging from 3 to 12), how questions are worded (e.g. "What do you think is happening in the situation?" vs. "What would you think if *you* were in this situation?"), and how children are required to respond (e.g. free and/or forced choice). It might be anticipated that these methodological factors may influence the extent to which group differences are apparent. For example, it is possible that childhood social anxiety may be associated with threat-related interpretation biases in fairly specific contexts and group differences become diluted when a broad range of scenarios are presented (Alkozei et al., 2014). There could also be a distinction between how self- and other-referent cognitions relate to social anxiety (Bögels et al., 2003; Vassilopoulos & Banerjee, 2012). Similarly, studies examining children's social performance tend to differ in the range of skills they measure, and what social tasks children participate in (e.g. role-play with a peer/ adult vs. giving a speech). These factors are likely to be of consequence given, for example, the fact that diagnostic criteria require children to have concerns around peer interactions, but not necessarily interactions with adults (American Psychiatric Association, 2013).

Finally, although most of the clinic population based studies relied on structured diagnostic assessments, there were variations across these studies in what instruments were used and few studies considered the different subtypes of SAD (generalized versus nongeneralized) meaning that it is not always clear what SAD refers to. There is some evidence to suggest that the generalized form of SAD in youth is associated with greater severity. For example, Knappe et al. (2011), in a study comparing different social fears and social anxiety subtypes among community youth, found that, compared to isolated fear of either interaction or performance situations, generalized social anxiety was associated with greater severity of social anxiety and higher rates of comorbidity.

15.2.3. Sample selection

Most of the studies included in this review employed samples that were predominantly Caucasian, and few studies examined the relationship between social anxiety and the variable/s under investigation among different ethnic and cultural groups, limiting the extent to which conclusions can be drawn across different populations. The most common approach to examining the hypothesized maintenance mechanisms has been to compare children with high versus low self-reported social anxiety. Typically, these studies do not assess other anxiety symptoms, meaning that the extent to which findings are accounted for by comorbid anxiety symptoms remains unclear. Relatively few studies have made comparisons between children with social anxiety disorder and those from other clinical groups — creating problems in relating findings, specifically, to social (versus other types of) anxiety disorder. For example, both non-clinical and clinical population-based questionnaire studies indicate that socially anxious children are more likely than non-anxious children to feel victimized, lonely and not accepted by their peers. However, no evidence exists to suggest that these peer related factors are specific to social anxiety rather than any other anxiety disorders/symptoms. In addition, as noted by Epkins and Heckler (2011), childhood depression, has been associated with some of the same maintenance mechanisms as social anxiety (e.g. peer rejection, loneliness). However, most studies reviewed here have not considered the substantial overlap in, or comorbidity of, social anxiety and depression — meaning that it is unclear to what extent findings may be accounted for by comorbidity with depression. While the first step may be to identify that a particular mechanism is associated with social anxiety disorder when compared to no disorder, authors and readers must be clear that disorder specificity cannot be concluded from these studies.

15.2.4. Comorbidity

A related issue concerns comorbidity of anxiety disorders/symptoms in socially anxious children. Children with SAD typically meet diagnostic criteria for at least one additional anxiety disorder (Kendall et al., 2010; Waite & Creswell, 2014) and there are typically moderate to high correlations between social and non-social anxiety symptoms among community populations (Epkins & Heckler, 2011). However, with few exceptions (e.g. Halls et al., 2015), the studies reviewed here typically failed to consider comorbidity, creating significant problems in drawing conclusions about the specificity of these various constructs to social anxiety.

15.2.5. Reliance on cross-sectional designs

Nearly all the studies reviewed here examined cross-sectional associations between social anxiety and the potential maintenance mechanisms. Although cross-sectional studies are helpful for establishing the presence of significant associations between childhood social anxiety and the potential maintenance mechanism under investigation, they tell us nothing about the direction of effects. For example, the correlation between victimization and the presence of social anxiety (e.g. Erath et al., 2007; Erath et al., 2010; Flanagan et al., 2008) may equally reflect the possibility that victimization is a risk for and/or a result of social anxiety. Prospective longitudinal studies and experimental methods with clear a priori hypotheses are required to address this limitation. However, with a few notable exceptions (e.g. Storch, Masia-Warner, Crisp, & Klein, 2005), prospective studies that examine the longitudinal association between hypothesized maintenance mechanisms and social anxiety are few and far between. Additionally, the few existing experimental studies that have been published have not always successfully manipulated the critical maintenance factor (e.g. Higa & Daleiden, 2008), highlighting the need for ongoing work to develop innovative experimental tasks that are appropriate for this age group.

15.2.6. Reliance on self- and/or parent report measures

The literature covered in this review has largely relied on self- and/or parent report measures of the hypothesized maintenance mechanisms. While these instruments have several practical advantages (e.g. in terms of time and cost), findings are prone to various biases - particularly where all responses come from a single reporter. It is also important to note that, some of the questionnaires that have been administered, such as the FAQ (Woody, 1996), SBQ (Clark et al., 1995) and PEP (Rachman et al., 2000), were developed for adult populations and have not been validated for children and it remains unclear whether they are measuring exactly what is intended, given potential limitations or differences in children's understanding of particular items. While parent-report may overcome potential developmental limitations associated with administration of the measures, parent report will only be more appropriate for observable, behavioral mechanisms (e.g. social skills) rather than for more internal processes (e.g. self-focused attention) as parents will be limited in their ability to report on their child's internal experiences. However parents may also be prone to biases due to, for example, their own symptoms of anxiety (Niditch & Varela, 2011), desire to access help for their child (Barrett et al., 1996; Shortt, Barrett, Dadds, & Fox, 2001) or willingness to respond in a socially desirable fashion (e.g. "fake good") (Wood et al., 2003). Future research is needed to establish psychometric data for the existing 'adult' measures or, preferably, to develop and validate measures that tap into the hypothesized maintenance mechanisms in a way that is effective and appropriate for younger populations.

16. Moving forward

In contrast to adult-focused cognitive maintenance models of social anxiety, models of childhood social anxiety focus on developmental and risk factors. While developmental models clearly have the potential to inform successful preventative interventions for at-risk individuals (see e.g. Rapee, Kennedy, Ingram, Edwards, & Sweeney, 2005; Rapee, Kennedy, Ingram, Edwards, & Sweeney, 2010; Rapee, Schniering, & Hudson, 2009) they are less helpful when it comes to identifying what keeps the problem going once it has developed, and, as such, may be limited in the extent to which they will generate advances in treatment. Instead a child-specific maintenance model for social anxiety is required. Following Clark (2004) we recommend that the first step involves developing a detailed understanding of the experience of children with social anxiety disorder in order to drive hypothesis development. Although we know quite a lot about the clinical characteristics of children with social anxiety disorder (Beidel et al., 1999; Spence et al., 1999), we know surprisingly little about the 'in the moment' experiences (and the pre- and post-event processes) of socially anxious children, and how contextual factors that are specific to childhood (e.g. family and school-based interactions) and children's developmental abilities influence these experiences. For example, adults with SAD frequently associate their recurrent, distorted negative images with unpleasant social experiences in childhood (Hackmann, Clark, & McManus, 2000), yet we do not know if socially anxious children experience similar images and how these relate to their developmental level and day to day experiences. Through understanding these experiences and the contextual factors that influence them, we can begin to hypothesize about what it is that *maintains* the problem and why social anxiety in children does not 'self-correct' given the fact that children typically have frequent exposure to social situations - ultimately

enabling us to develop more effective and efficient treatments.

Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.brat.2017.08.013.

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