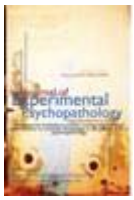
Journal of
Experimental Psychopathology
JEP Volume 7 (2016), Issue 3, 277-295
ISSN 2043-8087



Introduction to the Special Issue: Understanding the Role of Attentional Control in the Development of Anxiety in Childhood, Adolescence and Across the Lifespan

Hadwin, J.A.[a], Visu-Petra, L.[b], Muris, P.[c], Derakshan, N.[d] & Macleod, C.[e]

[a]*Department of Psychology, University of Southampton*

[b]*Department of Psychology, Babeș-Bolyai University*

[c]*Department of Clinical Psychological Science, Maastricht University*

[d]*Department of Psychological Sciences, Birkbeck, University of London*

[e]*School of Psychology, The University of Western Australia*

Table of Contents

Anxiety and Development

Anxiety is characterised by a distinctive emotional, cognitive and behavioural symptomatology. The central emotional symptoms are fear and apprehension, often evoked by the occurrence or anticipation of specific types of situations; the primary cognitive symptoms are negative thoughts and worries concerning the uncertainties and potential threats associated with such situations; and the main behavioural symptom is avoidance or attempted avoidance of these situations (Grills, Seligman & Ollendick, 2014).

People differ in terms of the degree to which they are inclined to experience anxiety, which reflects a temperamental dimension known as trait anxiety. Trait anxiety is defined as a general and stable predisposition to experience worries and concerns across different contexts, and its presence increases current and transient feelings of state anxiety in the context of or expectation of threat (Gidron, 2013). Higher levels of trait anxiety are associated with intolerance of uncertainty, which reflects a preference for certainty and increased engagement in behaviours linked to the management and avoidance of situations that are unpredictable or ambiguous (Birrell, Meares, Wilkinson & Freeston, 2011; Chen & Lovibond, 2016). Individual differences in the disposition to experience anxiety are evident from early childhood, when elevated anxiety vulnerability typically manifests as behavioural inhibition (BI). Children with high levels of BI display negative reactions to novelty, heightened sensitivity to stimulus variations and withdrawal from social situations, which can result in peer rejection and reduced assertiveness (Fox & Pine, 2012). Early manifestations of heightened dispositional anxiety predict an increased tendency to experience problematic levels of anxiety in adolescence (Fox, Henderson, Marshall, Nichols & Ghera, 2005). In addition, longitudinal evidence supports multifactorial models in which anxious rearing and parental trait anxiety play a major role in the development

of elevated anxiety, and behavioural inhibition and attachment exert interactive effects on the emergence of anxious symptomatology (Muris, van Brakel, Arntz, & Schouten, 2011). Hence, it is important to understand the multiple factors that contribute to heighted anxiety across childhood and adolescence.

Although increased levels of dispositional anxiety can be distinguished from clinical anxiety disorders, the risk of developing an anxiety disorder is elevated in people who display this vulnerability, such as children who exhibit heightened BI (Perez-Edgar & Fox, 2005). Some of the anxiety disorders identified in the Diagnostic and Statistical Manual (American Psychiatric Association, 2014) involve fears associated with specific objects or situations (e.g., separation anxiety disorder, specific phobia, social anxiety disorder (SAD), selective mutism). In other cases, clinical anxiety is characterised by global and intrusive worrisome thoughts linked to actual or anticipated negative events (i.e., generalised anxiety disorder; GAD). The worry component of GAD has been related to heightened trait anxiety and intolerance of uncertainty. Understanding the factors that give rise to the occurrence of distinct anxiety disorders represents a major challenge for clinical investigators.

Around 4% of children and adolescents meet the diagnostic criteria for an anxiety disorder and lifetime prevalence is around 28% (reviews by Beesdo, Knappe & Pine, 2009; Kessler et al., 2005). For some anxiety disorders, onset is usually during childhood (i.e., selective mutism, separation anxiety disorder; reviews by Muris & Ollendick, 2015; Waite & Creswell, 2014), while others are more likely to be diagnosed early in adolescence (e.g., SAD) or emerging adulthood (e.g., GAD; Merikangas et al., 2010). Epidemiological studies have found that, early in development, there is significant co-morbidity across the anxiety disorders, as well as between anxiety disorders and externalising difficulties (Franz et al., 2013). Gender differences in the risk of developing an anxiety disorder are evident early in childhood and persist across the lifespan, with females being at most risk of meeting diagnostic criteria (Beesdo et al., 2009; Leach, Christensen, Mackinnon, Windsor & Butterworth, 2008) and of experiencing the greatest functional impact on quality of life (McLean, Asnaani, Litz & Hofmann, 2011).

Regardless of whether it represents the symptoms of an anxiety disorder, or whether it reflects heightened dispositional anxiety, excessive anxiety during childhood can have severely detrimental consequences. For example, anxiety symptoms can drive patterns of avoidance behaviours that may attenuate anxiety in the short term, but that reduce opportunities for young people to engage in typical daily activities. Thus, heightened anxiety is associated with lowered school attendance (Waite & Creswell, 2014; Richards & Hadwin, 2011), predicts increased school absenteeism over time (Wood et al., 2012), and leaving school early (Van Amerigan Mancini & Farvolden, 2003). Several studies have also revealed positive associations between heightened anxiety and educational underachievement (e.g., Lee & Bull, 2016; Owens, Stevenson, Norgate & Hadwin, 2008; Wang et al., 2014). In addition, elevated anxiety is associated with poor social functioning (e.g., Beesdo Pine, Lieb, & Wittchen 2010; Copeland, Angold, Shanahan & Costello, 2014), heightened sensitivity to peer rejection (Kujawa, Arfer, Klein & Proudfit, 2014), increased social reticence (i.e., low levels of assertion and reduced emotional expression), and disengagement from peer groups, thereby reducing opportunities to strengthen social skills, peer relationships and friendships (Erath, Flanagan, & Bierman, 2007; Grant, Beck, Farrow & Davilo, 2007).

While the tendency to experience anxiety can change to a limited degree across the developmental period, perhaps reflecting environmental influences, the symptoms typically follow a relatively steady pathway, implicating stable dispositions factors plausibly with a genetic basis (Trzaskowski, Zavos, Haworth, Plomin & Eley 2012). Consequently, the heightened experience of anxiety in childhood predicts later problems associated with the transition to adulthood, including delays in securing employment and the development of romantic relationships (Asendorpf, Dennison, & van Aiken, 2008) and difficulties leaving the family home in adulthood (Flakierska-Praquin, Lindström & Gillberg, 1997). Furthermore, the onset of an anxiety disorder in childhood increases the risk of further mental health difficulties, inflating the probability of developing other comorbid anxiety disorders or clinical depression (Roza, Hofstra, van der Ende &Verhulst, 2003). Thus high levels of dispositional anxiety and the presence of anxiety disorders in children and adolescents can severely comprise adaptive development, and can give rise to longer term problems that have significant personal, as well as broader societal and economic costs (review by Collins, Westra, Dozois & Burns, 2004). To minimise the risk of childhood anxiety problems, and to most effectively attenuate them should they arise, it is imperative that we identify their psychological basis.

Attention and Anxiety

Given its detrimental impact on development, a major challenge for researchers is to understand the mechanisms that operate to put children and young people at risk of experiencing problematic anxiety, and that can be targeted to enhance prevention and intervention. Multiple mechanisms of quite different types are likely to be implicated. Some will involve biological factors, possibly with a genetic basis. For example, certain conceptualisations of anxiety highlight the distinctive neural circuitry underpinning negative affect associated with anticipatory anxiety and depression (so called “misery states”; Etkin 2012, p. 355; see also Moser, Moran, Schroder, Donnellan & Yeung, 2013; Somerville, Whalen & Kelly, 2010) versus reactive fearful states, which may be associated with differing facets of genetic risk (Kendler, Prescott, Myers, & Neale 2003). Parenting factors may also play a role. For example, there is evidence that parenting styles that involve high levels of control, coupled with rejection, may increase the risk of childhood anxiety (Bögels & Brechman-Toussaint, 2006; Rapee, Schneiring & Hudson, 2009). In addition, there is growing evidence that cognitive factors make a major contribution to the etiology and maintenance of anxiety in development (e.g., O’Toole, DeCicco, Berthod & Dennis, 2013).

Many theorists contend that certain styles of information processing are strongly implicated in a core vulnerability to anxiety, reflecting temperamental factors associated with an elevated predisposition to experience heightened levels of negative affect and arousal linked to increased perception of threat, coupled low levels of effortful control, and behavioural avoidance in the context of novel and unfamiliar situations (e.g., Rapee et al., 2009; Spence & Rapee, 2016; Rueda, Checa, & Rothbart, 2010; review by Pérez-Edgar, Taber-Thomas, Auday & Morales, 2014). These cognitive factors do not exert their developmental impact in isolation, but interact in a complex manner with other factors underpinning the emergence of anxious disposition, as is characteristic of emotional development more broadly (e.g., Denham, 1998; Izard, 2007; Lewis, 2014). Cognitive vulnerability is suggested to interact with familial risk (e.g., negative and aversive family or peer experiences, insecure attachment with caregivers; Affrunti & Woodruff-Borden, 2015; review by Waite, Whittington & Creswell, 2014), and exposure to specific threat experiences and challenging life events (e.g., Muris & Merkelbach, 2001; Oar, Farrell, & Ollendick, 2015; Rachman, 1998; Rapee, 2001). For example, while children inherit genes that increase vulnerability for anxiety (Hancock, Mitrou, Shipley, Lawrence & Zubrick, 2013; Micco et al., 2009), they are also more likely to experience an anxiogenic parenting style that can include parent over-control, parent modeling of anxiety and distress, and the sharing of negative information and avoidance of feared objects or events (Eley, 2015; review by Creswell Murray, Stacey & Cooper, 2011).

One particular facet of information processing that appears to be strongly implicated in anxious disposition and dysfunction is attention. It is possible to distinguish two quite separate lines of research that have examined the association between anxiety and attention, each of which has focused on a different dimension of variability in attentional processing. One line of investigation has formulated and tested hypotheses concerning how biased patterns of attentional selectivity, that operate to favour the processing of internal threats (e.g., worrisome thoughts) and environmental threat (e.g., signals of potential danger), may increase anxiety vulnerability (cf., Bar-Haim, Lamy, Pergamin, Bekermans-Kranenburg, & van IJzendoorn 2007; Richards, Benson, Donnelly & Hadwin, 2014). A second line of investigation has instead illuminated deficits in attentional control that are associated with elevated anxiety vulnerability, and that potentially may contribute to the types cognitive impairments commonly observed in highly anxious individuals (cf., Eysenck, Derakshan, Santos & Calvo, 2007; Eysenck & Derakshan, 2011). We will here briefly review work motivated by each research tradition, before considering how these traditions converge within an integrative framework. As we will illustrate, some of the most interesting recent research has bridged these two lines of investigation, to consider the possible inter-relationship between anxiety-linked attentional biases to threat and anxiety-linked deficits in attentional control in the determination of anxiety vulnerability and dysfunction.

Across the past three decades, many theoretical models and empirical research studies have been guided by the idea that anxiety vulnerability and dysfunction may partly reflect an automatic attentional bias towards threatening information (e.g., Williams, Watts, Macleod & Matthews, 1988; Waters, Mogg, Bradley & Pine, 2008). Some of this work has distinguished early patterns of automatic attentional selectivity from the patterns of selectivity that operate subsequently, perhaps influenced by strategic processes. This has led several investigators to propose that elevated anxiety vulnerability is characterised by rapid attentional vigilance towards threat information, followed by strategic attentional avoidance of such threat to facilitate regulation of anxious affect (Mogg & Bradley, 1988; see Brown et al., 2013; Stirling, Eley & Clark, 2006). The majority of studies have used a dot probe methodology to assess selective

attention in anxious populations (MacLeod, Mathews, & Tata, 1986), and variants of this task have been developed to generate cognitive indices of attentional capture and avoidance of threat stimuli (e.g., Salum et al., 2013). Eysenck (1992) has further suggested that heightened anxiety is associated with a broadening of attention that allows individuals to more readily detect potential environmental threat (e.g., Richards, Benson & Hadwin, 2012) or by "hyperscanning", where breadth of attention is narrow but attention is deployed to rapidly scan the environment for threat (e.g., Horley, Williams, Gonsalvez, & Gordon, 2004). There has been recent interest in determining whether anxiety-linked attentional bias to threat reflects increased attentional capture by threatening information, or difficulty disengaging attention from threatening information (e.g., Fox, Russo, Bowles, & Dutton, 2010). In addition to displaying an attentional bias to threatening information, anxiety vulnerability and dysfunction also is characterised by an interpretive bias that favours the threatening resolutions of ambiguity (Beck, Emery & Greenberg, 1985; Crick & Didge, 1994; e.g., Richards, French, Nash, Hadwin & Donnelly, 2007). These patterns of selective information processing, including attentional bias to threat, have been observed in anxious children and adolescents (cf., Dudeney & Sharpe, 2015). While such processing biases are characteristic of elevated trait anxiety and diagnosed anxiety disorders, they are most evident in the context of heightened state anxiety or negative arousal (review by Bar-Haim et al., 2007).

Setting aside, for the moment, research motivated by the hypothesis that anxiety vulnerability and dysfunction is characterised by an attentional bias to threat, we turn now to consider the association between anxiety and the more general impairment of attention. It has long been recognised that anxiety can impair many facets of cognitive performance including, for example, visuo-spatial processing (Shackman, Maxwell, McMenamin, Greischar, & Davidson, 2011), working memory (Darke, 1988; Shackman et al., 2006) and reasoning (Jung, Wranke, Hamburger, & Knauff, 2013). Increasingly, evidence has accrued that elevated anxiety vulnerability is specifically characterized by a reduced ability to control attention, and the most comprehensive theoretical expression of this position has been provided by attentional control theory (ACT; Eysenck et al., 2007; Eysenck, 2010). ACT proposes that anxiety compromises the top down attentional processes, supported by the prefrontal cortex (PFC) and associated neural networks, which allow individuals to meet their task goals. The nature of the attentional mechanisms that are compromised by this anxiety-linked impairment includes those that deal with challenges to attentional focus (enabling sustained attention and ability to ignore salient distractors), those that enable the shifting of attention between stimuli and across contexts, and those that operate to permit retention and updating of information in working memory (WM).

Building on earlier theoretical frameworks (e.g., Mathews & Mackintosh, 1998), ACT further implicates a motivational component, by proposing that elevated anxiety vulnerability is associated with increased motivation to perform well. This increased motivation can enable highly anxious individuals to continue performing tasks effectively under certain circumstances, despite their impaired attentional control, although their performance efficiency will be reduced, in the sense that maintaining effective performance will require the investment of greater cognitive resources (Eysenck & Derakshan, 2011). This proposal has been influential in the development of a research agenda that aims to capture the cognitive and neuropsychological profile of the complex interplay between anxiety-related performance in attentional tasks, alongside individual efforts to utilise compensatory strategies to meet task goals via increased effort (e.g., Hadwin, Brogan, & Stevenson, 2005; Visu-Petra, Miclea, Cheie, & Benga, 2009). Related research has found that tasks that impose a greater cognitive load elicit more effortful processing in anxious individuals (review by Berggren & Derakshan, 2013).

Consistent with ACT, studies have shown that increased anxiety in childhood is negatively linked to self-reported levels of attentional control (Muris, de Jong & Engelen, 2004). In addition, difficulties with attentional control early in development (established experimentally or through observation) have been found to predict stable elevated and low-increasing levels of anxiety across childhood (Duschenne, Vitaro & Tremblay, 2010; Pérez et al., 2010). While ACT was developed to account for the pattern of task performance exhibited by individuals with elevated levels of trait anxiety, extensions of this theoretical framework have implicated impaired attentional control in the genesis of symptoms associated with clinical anxiety disorders, including worry in GAD (Hirsh & Mathews, 2012) and the emergence of specific phobia (Oar et al., 2015).

This body of research links to the temperamental dimension closely related to attentional control (sometimes the two being equated, see Meesters, Muris, & van Rooijen, 2006), namely effortful control; characterized as the ability to suppress a dominant response in order to perform a subdominant response, and that is involved in the regulation of

cognitive and emotional processes (Rothbart & Bates, 2006). Empirical studies have found lower levels of effortful control in groups with internalizing problems (e.g., Eisenberg et al., 2001; Muris, 2006; Verstraeten, Vasey, Raes, & Bijttebier, 2009), but the complex relationship between effortful control, attentional control, predisposition to developing internalizing problems and the presence of stressors remains under-investigated (Gulley, Hankin & Young, 2016).

Although, in principle, the anxiety-linked impairment of attentional control and the anxiety-linked attentional bias towards threat may be quite unrelated attentional phenomena there are both theoretical and empirical reasons for believing that these two attentional characteristics of elevated anxiety vulnerability could be functionally related to one another. One theoretical reason for anticipating such a relationship concerns the likely shared involvement of the prefrontal cortex (PFC) in both attentional phenomena. The PFC is intimately involved in attentional control, and is directly implicated by ACT as being the locus of anxiety-linked impairment of such control. The role of the PFC in the regulation of emotional experience is increasingly supported in neuropsychological research. The amygdala and its connections with the brainstem and regions of the PFC are considered to be important in the learning and experience of fear, and emotional processing more generally (LeDoux, 2003). Moreover, functional connectivity between the amygdala with regions of the PFC has been found to be important in the regulation of negative affect (e.g., Banks, Eddy, Angstadt, Nathan & Phan, 2007; reviews by Bishop, 2007; Graham & Milad, 2013). Developmental research has found enhanced sensitivity in the amygdala in children who experience elevated anxiety and in the context of threat or uncertainty (e.g., Williams et al., 2015). Other studies have found reduced functional connectivity between the amygdala with the PFC associated with elevated trait anxiety in adolescents (Hare et al., 2008; Monk et al., 2008; review by Lau & Pine, 2008) and in young children who meet the diagnostic criteria for an anxiety disorder (Carpenter et al., 2015).

Given that the PFC is implicated in regulation of negative affect, and that one of the ways in which such emotion regulation can be achieved is through the inhibition of attention to threatening information, it is possible to speculate that the anxiety-linked impairment of PFC functioning that gives rise to reduced attentional control may also underpin the reduced ability to inhibit attention to threat, that also characterises anxiety vulnerability and dysfunction. The idea that good attentional control may be required to inhibit attention to threat is consistent with the proposal put forward by Hirsh and colleagues (2012), who suggest that individuals who experience chronic worry may lack the attentional control necessary to inhibit their automatic tendency to focus attention on internal representations of their concerns. There is also empirical evidence that good attentional control can moderate the expression of anxiety-linked attentional bias to threat in adults (Derryberry & Reed, 2002). Likewise, in younger cohorts, it has been found higher levels of attentional control can not only mitigate the negative impact of anxiety on achievement in school (Owens et al., 2008; Owens, Stevenson, Norgate, & Hadwin, 2012), but also can reduce emotional reactivity (Gramzsio & Woodruff-Boden, 2015) and, most importantly, can attenuate the attentional bias to threat that characterizes children and adolescents with a heightened disposition to experience anxiety (Lonigan & Vasey, 2009; Susa, Pitica, Benga, and Miclea, 2012).

Translational Implications

Cognitive behaviour therapy (CBT) aims to encourage individuals who experience anxiety dysfunction to change their negative patterns of thinking and related avoidant behaviour, and it is the treatment of choice for anxiety disorders in children and adolescents (Creswell, Waite & Cooper, 2014). A review of over 40 randomised control trials concluded that CBT was effective in reducing symptoms for around 60% of children and adolescents who experienced mild to moderate levels of anxiety (compared to 16% in wait-list control groups) and that combined treatment approaches (e.g., CBT with medication) may be more effective in reducing anxiety post intervention and over time (see Walkup et al., 2008; review by James, James, Cowdrey, Soler & Chole, 2015). James et al. also highlighted that additional research is needed to understand the relative impact of CBT across different anxiety disorders indicating that this approach may be less effective for children who experience social anxiety (Hudson et al., 2015). In addition, they suggest that future studies should aim to understand the longevity of positive outcomes in CBT, the relative impact of this intervention compared with other therapeutic approaches and the specific mechanisms that underpin positive change in CBT.

Research evaluating mechanisms of change has shown that cognitive re-appraisal, whether associated with CBT or elicited as an experimental manipulation, can positively impact attentional control and emotional regulation. Experimental studies have found that positive re-appraisal of negative stimuli fosters emotional regulation via increasing PFC and reducing amygdala activation (Oschner, Bunge, Gross & Gabrieli, 2002). Preliminary results indicate that adolescents diagnosed with GAD showed increased PFC activation and emotional regulation associated with lower amygdala activation following CBT (Maslowsky et al., 2010). In addition, attention biases for threat stimuli has been shown to be attenuated following a CBT intervention in children (Reinholdt-Dunne, Mogg, Vangkilde, Bradley & Esbjørn, 2015) and adolescents (Hadwin & Richards, 2016).

Thus there is growing evidence to support the proposition that CBT leads to improved attentional control and reduced attention biases for threat. When coupled with the evidence that implicates attentional bias to threat and impaired control in the development of problematic anxiety, these findings suggest that induced attentional change may represent a core therapeutic mechanism through which CBT serves to reduce anxiety. This proposition encourages the development and evaluation of complementary intervention approaches that directly target these attentional mechanisms, in prevention and intervention research. There is a growing evidence base supporting the potential therapeutic value of novel interventions designed to directly alter attentional functioning, for those at risk of anxiety and for children and adolescents diagnosed with an anxiety disorder. Some of these interventions have been configured to modify processing biases that favour negative emotional information (cf., MacLeod & Clarke, 2015; Lowther & Newman, 2014), for example by training children and young people to shift attention away from environmental threat (e.g. Bar-Haim, Morag, & Glickman, 2011), or to move attention towards positive stimuli (e.g., Eldar et al., 2012). Other interventions instead have been configured to enhance attentional control (e.g., Roughan & Hadwin, 2011; Hadwin & Richards, 2016; see also Owens, Koster & Derakshan, 2013; Sari, Koster, Pourtois & Derakshan, 2015 for similar work with adult populations). Researchers have demonstrated that interventions designed to directly alter attentional functioning can serve as a positive adjunct to more traditional CBT interventions for anxiety reduction in individuals who experience elevated anxious affect and who demonstrate associated attentional difficulties (Schechner et al., 2014), and may be useful for children and young people who do not show positive outcomes following conventional CBT (e.g., Bechor et al., 2014).

Introduction to Special Issue Papers

Recent theoretical progress and empirical research has lent general support to the premise that an attentional bias to threat may represent a core mechanism in the elevation of anxious disposition and dysfunction in children and adolescents, and has also indicated that impaired attentional control is associated with increased anxiety vulnerability across development. Moreover, there is evidence that these two facets of attention may be intimately related, such that anxiety-linked attentional bias to threat is more evident when attentional control is compromised, and can be significantly attenuated when attentional control operates more effectively. An emerging evidence base testified to the potential translational impact of this research, by showing that procedures designed to directly reduce selective processing biases that favor threat, and to increase attentional control, can be successful deployed either independently, or alongside more traditional CBT interventions, to reduce anxiety in developing populations.

Our goal in putting together this special issue was to build on this exciting foundation, by showcasing the work of leaders in the field that can extend empirical knowledge and theoretical understanding concerning the involvement of attentional bias and attentional control in anxiety experienced during the developmental period. It includes a series of innovative papers that broaden our understanding of the form and function of attentional control and biases for threat in childhood and adolescent anxiety and across the life-span. Collectively, the papers highlight some of the challenges associated with understanding cognitive processes in the context of risk and resilience in developing populations. In addition, they demonstrate the utility of using different methodologies (e.g., reaction time data, eye movement methodology) and adopting levels of analysis (e.g., neuropsychological, behavioural) in this area of research. Some papers draw attention to the development of research agendas that aim to capture cognitive features across different anxiety disorders and in the context of comorbidity with externalizing disorders or increased physiological arousal. Additional papers fit with an emerging body of translational research, and specifically with the design and measurement of effective interventions that can be readily accessed by children and young people. Importantly, the papers set out agenda for future research in this area of cognition and emotion that can serve to

advance our understanding of the role of attentional processes in the genesis and maintenance of anxiety vulnerability and dysfunction, and that can inform the development of prevention and intervention methods that deliver the benefit this enhanced understanding to children and young people diagnosed with an anxiety disorder, or who are dispositionally inclined to experience problematic levels of anxious affect.

The special issue includes two key papers that utilise a risk resilience framework to summarise and extend theoretical thinking on anxiety to further our understanding of cognitive processes (Parsons, Kruijt & Fox) and associated neuropsychological underpinnings (Shackman et al.) in development. Parsons et al., outline a novel theoretical framework that considers those aspects of cognition (i.e., selective attention to threat, negative interpretation bias) that place children and young people at risk for anxiety, as well elements that might serve as protective factors. It proposes that core cognitive processes (active cognitions and information processing biases; indicated to operate outside of conscious control and in response to specific situations) are moderated via executive control and an overarching mapping system. The mapping system is suggested to operate at a metacognitive level, using current goals and representations from previous experience to guide the processing of information in specific situations and to monitor the effectiveness of responses via feedback loops. The authors argue that these systems should work flexibly to inhibit attentional and metacognitive processes in the context of a positive outcome and to activate these processes otherwise. The paper further considers whether individuals who display known resilient traits (e.g., high levels of self efficacy) are those who are most likely to be able to use attention flexibly to impact cognitive biases and emotional regulation difficulties in anxiety to meet current challenges and goals. The paper makes an important link to highlight the translational implications of this framework, drawing out its relevance to the modification of information processing via ABM, the promotion of positive cognitive processes through more traditional cognitive re-framing approaches that underpin CBT, as well emotional regulation via the modification of executive functions.

Shackman et al. provide a timely and comprehensive overview of the neuropsychological research associated with temperamental risk (“dispositional negativity”) and associated cognitive processing for anxiety and mood disorders. Similar to Parsons et al. and several of the empirical papers in this special issue, it aims to understand the impact of temperamental and cognitive vulnerability as risk factors for psychopathology in the context of negative and stressful life events. The paper highlights imaging research which shows that amygdala responses are associated with the prioritization of threat processing in anxious individuals. Its neuropsychological focus captures the role of the amygdala in understanding risk for the development of anxiety and mood disorders. For example, drawing on animal and adult research the paper describes the heightened and extended amygdala response and delayed habituation to situations characterized by threat as a trait-like characteristic that is most evident in individuals with dispositional negativity and in the context of challenging life events. The paper highlights that both negative traits and increased amygdala activation are associated with anxious affect, and that their roles in the etiology of anxiety is supported by reduced amygdala activation and lowered threat biases in response to psychological and pharmacological interventions. Considering avenues for further research, the paper argues for the utility of mapping neuropsychological indices to anxiety and mood disorders. It highlights the lack of research in children and adolescents required to understand the extent to which these indices linked to anxiety and attention play a causal role in the onset of disorder or respond to treatment. Furthermore, the paper highlights the need for future research to move away from behavioural measures of attention to capture risk at a neuropsychological level through consideration of functional brain networks in populations who are at most risk for the development of negative affect. The paper further recommends a shift in research agendas to establish links between cognitive and neuropsychological measures of attention with e.g., experience sampling or mobile technology to explore the relevance of this research to attention and emotion in daily life.

Several of the empirical papers focus on the attentional concomitants of elevated anxious disposition in non-clinical cohorts. Some of these report studies that have primarily examined the relationship between biased attentional processing of threat-related information, and individual differences associated directly or indirectly with anxiety vulnerability. For example, Vandeviere, van de Brande, Bosmans, Mueller and Braet used eye gaze measures to explore whether self-reported perception of attachment relationships in 9-15-year-olds was linked to caregivers’ attention to emotional (fear, happy, sad) and non-emotional facial expressions in offspring and unfamiliar young people. This study examined associations between individual differences in anxious, avoidant and secure attachment styles with mothers’ total viewing time of faces and viewing time as a function of attentional shifts (called “maintained

attention"). The authors hypothesised that mothers whose children reported increased secure attachment would show adaptive (i.e., increased) monitoring of negative emotional (i.e., sad versus neutral or positive) expressions displayed by faces of their offspring (compared to faces of unfamiliar children). In contrast, the researchers anticipated that mothers of children who reported anxious attachment representations would instead display increased (i.e., "hyperfocused") attention, and expected that reported avoidant attachment would be characterised in decreased maternal attention to faces of their offspring versus unfamiliar faces irrespective of expression. The results revealed a general tendency for mothers to show more attention to faces of their offspring compared to those of unfamiliar children, and this effect was partly moderated by emotion and attachment relationships. Relationships characterised by anxious attachment were associated with increased maintenance of attention to both emotional and non-emotional faces. In addition, reports of secure attachment relationships were linked to mothers' increased and lowered maintained attention to offspring positive faces and neutral faces respectively (relative to unfamiliar children). These novel results indicate that experience of maternal control via increased monitoring of emotional faces in offspring may place children at risk for the development of insecure anxious attachment relationships in childhood.

Though Kelly et al. also examined selective attentional processing of emotional information, these investigators adopted a quite different approach to attentional assessment, employing a variant of the attentional blink (AB) task to examine temporal (rather than spatial) aspects of attentional selectivity. While their primary interest concerned how such patterns of selectivity would differ in high and low trait anxious children, they also examined whether patterns of attentional selectivity different as a function of state anxiety. Kelly and colleagues asked children aged 8 to 11 years to complete questionnaires for symptoms of depression, as well as trait and state anxiety. Children were removed from the study if they reported elevated depression symptoms, before anxiety scores were used to create high and low trait (and state) anxiety groups. The researchers then asked children to complete an AB task, to determine whether anxiety group would impact the processing of temporal information associated with threatening (angry) and ambiguous (neutral faces) versus positive (happy) facial expressions. In this task, children were required to identify two schematic facial targets (interspersed with non-facial stimuli), and the presentation lag between the first and second target face was progressively increased (the paper included four lags from < 200 ms to > 700 ms). The attentional blink effect results from the fact that when stimuli are presented in quick succession, and because of our finite attentional resources, the processing of the first target will impair the identification of the second target especially with shorter lags (< 500ms). This transient lapse of attention is termed an attentional blink (AB). The results confirmed the present of the AB effect, showing errors in the processing of the second target (misidentification or reporting that no second target was present) that decreased as the lag time between targets increased. There was no between group effect of trait anxiety on the AB and no effect of state anxiety overall. Children in the high trait anxiety group made fewer errors on neutral trials (across all lags) and showed better performance for face identification in angry trials. In contrast children in the low trait anxiety group showed superior performance for both emotional face stimuli. Detailed analysis of errors indicated that all children were more likely to miss neutral faces than motional faces, and children in the high trait anxiety group were disproportionately likely to misidentify happy stimuli as angry. A second experiment showed that anxiety effects on the attentional blink were evident only when children were processing emotional stimuli. The paper is important as the finding of improved performance in detecting angry faces fits with, and extends, the broader literature concerning spatially-based selective processing in children who experience elevated trait anxiety.

Some of the papers examining the attentional concomitants of heightened anxiety vulnerability focus on variability in attentional control, or more general executive functioning, rather than variability in attentional selectivity. For example, the work reported by Ng and Lee is unique in the current issue in that it tests a model of trait test anxiety related underachievement. This research considered the association between self-reported trait test anxiety and state anxiety, and performance on WM and mental arithmetic tasks in 11-year-old children. The study was designed to explore the moderating role of situational stress, which was experimentally manipulated. In the high situational stress condition the authors used a pseudo test scenario with false negative feedback, whereas the low stress condition was not presented as a test situation and no feedback was given. The paper extends previous work by including a self-reported measure of state anxiety and a physiological index of stress responses via cortisol measured at four time points (pre, post, 10 minute and 20 minute following low and high situational stress). Following the principles embodied in attentional control theory, Ng and Lee examined whether anxiety-linked differences in task performance emerged as discrepancies in performance effectiveness (expressed in terms of accuracy) or as discrepancies in

performance efficiency (expressed as a function of accuracy relative to time taken). The results of a path analysis showed that, across both experimental conditions, self-reported trait test anxiety was associated with lowered performance efficiency when completing mental arithmetic and WM tasks. The situational stress manipulation influenced children's self-reported state anxiety as intended, though children's physiological responses were not sensitive to this manipulation. However, the induced difference in self-reported state anxiety did not influence either the effectiveness or efficiency of executive functioning, as indexed by performance on the mental arithmetic and WM tasks. As the authors indicate, their findings lend support to attentional control theory. Given the demonstrated importance of trait test anxiety on such executive functioning tasks, the authors argue that children who experience anxiety around test situations could benefit from interventions designed to increase attentional control.

Hagenaars, Engelhard and Putman also examined the impact of a stress manipulation on a measure of attentional functioning. This study assessed attentional breadth (indexed by relative preference for local vs global processing) and the stress manipulation involved exposure to a traumatic film. This paper is the only adult study in the special issue, but the findings have potential implications for understanding the experience of anxiety and fear across development. It investigated local and global processing preferences and associations with the re-experience of horror and fear linked to the (experimentally induced) traumatic event. The authors point to previous research which suggests that a cognitive style that tends to focus on local (versus global) features is linked to the development of memory for traumatic events and an individual's re-experiencing of them. The study focused on individuals' memory for the traumatic film, measuring self-reported feelings of horror and control while watching the film, as well as before and afterwards. Individual difference measures considered symptoms of post-traumatic stress disorder (PTSD; re-experiencing, avoidance and arousal) and coping (via reappraisal to control intrusive thoughts linked to the film) one week after watching the film. Broader measures included self-reported individual differences symptoms of neuroticism and an experimental task to measure global/ local processing style. The results showed that a tendency towards a local processing style was linked to lower reports of re-appraisal (to control unwanted thoughts and regulate emotion), increased PTSD symptoms associated with re-experiencing , as well as lowered control and increased horror during watching the film. Further analysis indicated that processing style predicted individual variation in re-experiencing over and above other measured factors (e.g., re-appraisal, horror, neuroticism). The findings are consistent with the proposition that individuals diagnosed with PTSD remember and re-experience traumatic events and that this association in part reflects difficulties with the inhibition of local information. The paper is significant in highlighting a specific cognitive style that may place individuals at risk for re-experiencing distress post trauma and that could be targeted in prevention and intervention methods.

The empirical studies described thus far, investigating the attentional characteristics of variability in dispositional anxiety within non-clinical cohorts, each have focussed primarily either on anxiety-linked patterns of selective attentional bias to emotional information, or on anxiety-linked variation in attentional control. However, some of the papers in this special issue report studies that shed light on the potential relationship between these two facets of attentional function, in non-clinical cohorts varying in dispositional anxiety. For example, Susa-Erdogan et al. developed a task that measured the association between trait anxiety and attentional control in children aged 8-12 years, but that also considered how these children's performance on this attentional control task was affected by the presence of stimuli that differed in their emotional valence. The attentional control task assessed both inhibitory control and set-shifting. In the basic task, children were asked to follow colour cues to match one of two target letters, in the context of a distractor being compatible (same colour) or incompatible (different colour) with the target, but they were required do so in the presence of centrally presented angry or happy faces. Inhibitory control was a function of the difference between compatible and incompatible trials. Set shifting was added in a second experimental block by changing the colour of the cues between trials to generate a mixing cost measure (comparing performance on trials that required no set shifting between blocks) and a switching cost measure (comparing performance within the second block on trials that required a set shift versus those that did not). In support of task validity, the basic results indicated slower reaction times and increased errors for incompatible trials for no switch trials in the mixed versus the pure block and for trials that required shifting set. Additional analyses showed that elevated trait anxiety predicted higher compatibility scores (i.e., increased distractibility) in the context of happy faces. In addition, increased self-reported inhibitory control was linked to lower compatibility scores (less distractibility) for trials with angry faces. There was no interaction between anxiety and effortful control on task performance. The authors suggested that further

research should explore both positive and negative emotion processing in anxiety and could consider the possibility of interventions that foster the development of inhibitory control.

Grafton, Visu-Petra, Marcus, Liebregts and MacLeod also examined both attentional control and attentional bias to emotional stimuli within the same study. These researchers tested whether increased inhibitory control served to moderate biased attentional responding to threat in a sample of non-clinical 11-14-year-olds who reported elevated symptoms of social anxiety. Their work was motivated by the idea that monitoring the environment for signs of negative feedback will elevate feelings of social anxiety, but that the capacity to exercise inhibitory attentional control can regulate this negative affect. The study assessed attentional bias using a variant of a dot probe task, to generate a threat bias score reflecting increased attention to negative social information (angry versus happy faces). It assessed inhibitory control by measuring the ability of children and adolescents to follow directives to move attention away from or towards facial stimuli. The results supported the proposition that young people with increased inhibitory control were more able to avoid negative social information, indicating that this strategy potentially underpins effective emotion regulation in these individuals. On the basis of these results, the authors proposed that adolescents with elevated or clinical levels of social anxiety and poor inhibitory control could potentially benefit from cognitive training designed to increase inhibitory attentional control skills. In addition, they suggested that further research should aim to develop a better understanding of the specific nature of attentional control difficulties in anxiety to allow a more tailored approach in the use of intervention techniques.

Pavlou, Benson and Hadwin used eye movement methodology to also consider the moderating role of attentional control on selective attention to and disengagement from angry (versus happy) faces, in non-clinical children who varied in anxious disposition. This study revealed that neuroticism symptoms (a personality trait linked to both trait anxiety and clinical anxiety dysfunction) were positively associated with difficulties disengaging attention from threat (reflected in increased saccade latencies to move eyes from a centrally presented angry face to look at and identify a target). Similar to the results of Grafton et al., Pavlou et al. also found that the link between increased neuroticism symptoms and reduced attentional disengagement from threat was only evident for those children who reported low levels of attentional control. Furthermore, the results showed that psychoticism personality traits (typically linked with externalising disorders) were positively associated with distractibility, as demonstrated in increased eye movements (i.e., directional errors) to any emotion face. Preliminary data indicated that directional errors to angry faces mediated psychoticism traits and children's reports of companionship (one index of friendship quality); supporting previous research that has highlighted the negative impact of cognitive biases for threat in the development of friendships.

Those empirical studies reported in this special issue that were carried out to assess the attentional concomitants of variation in dispositional anxiety have extended knowledge and understanding concerning not only the nature of the attentional biases and attentional control impairment associated with anxious disposition, but also concerning the relationship between these two facets of anxiety-linked attentional functioning. When we turn to consider the studies that, in contrast, assessed the attentional correlates of anxiety pathology, we once again see this convergence. Some of these clinical studies have focussed principally on biased attentional responding to emotional information. For example, Nozadi and colleagues investigated whether the assessment of attentional bias to threat in young children could enhance prediction concerning whether these children subsequently develop a clinical anxiety disorder, with or without comorbid psychopathology. These researchers employed a dot probe procedure to assess attentional bias in 5 year old children, whose level of behavioural inhibition (BI) had previously been assessed when they were 2-3 years of age. The results showed that young children who displayed inhibited behaviours at 2-3 years of age and a selective attention bias (using a dot probe task) to threat aged 5 years were at increased risk of developing an anxiety disorder at 10 years. The paper also found that at 10 years of age the symptom profile of children was made up of three main psychopathology groups (anxiety, attention difficulties/ comorbid anxiety and a typical group). While the interaction between BI and cognitive bias characterised the anxiety group, bias was not associated with comorbid anxiety/ inattention group. Moreover, the comorbid group was more likely to make more errors in the experimental task. The authors proposed that poor performance could have led to lowered sensitivity for the detection of a threat bias in this group. Alternatively, they raised the possibility that anxiety in children with elevated symptoms of inattention may develop via pathways not associated with this characteristic cognitive profile. This paper represents a critical step in understanding inconsistent patterns of continuity from BI to anxiety in development that highlights the role of attentional biases in explaining developmental differences in populations at risk.

Also focussing primarily on the patterns of attentional bias associated with clinical anxiety, the paper by Shortt et al. continues a thematic interest in comorbidity. Participants were 16-year-old adolescents who met clinical criteria for either an anxiety disorder or conduct disorder (CD), or both, and also included was a control group without either disorder. The authors used a dot probe task to assess attention towards and difficulties disengaging attention from angry, fearful and happy faces. These faces were presented either for 500 ms to permit conscious awareness of stimulus content, or for 17ms (followed by a mask) to reduce conscious awareness of such content. With respect to basic task performance, the anxiety group showed decreased reaction times in the context of happy (versus angry faces) in the masked condition. Across both experimental conditions, adolescents diagnosed with CD took significantly longer to respond to all stimuli compared with the comorbid and typically developing groups. The authors noted that the co-occurrence of anxiety and CD was associated with a performance profile similar to that observed in the control group. Participants in the anxiety group demonstrated attentional avoidance of all emotional faces, and difficulties with attentional disengagement were exhibited by participants in the anxiety and CD groups in masked condition alone. The comorbid group again showed a performance profile that was most similar to the control group. These findings indicate similar attentional profiles linked to difficulties disengaging attention from masked emotional stimuli in adolescents diagnosed with anxiety or with CD. They suggest that further research is needed to understand the processing of emotional stimuli outside of conscious awareness and between different clinical groups.

While both these clinical studies focussed on anxiety-linked attentional bias, the final empirical paper investing attentional functioning in clinically anxious children also considered attentional control. Specifically, Pergamin-Hight et al. investigated attentional capture and disengagement from angry faces using a variant of a dot probe task, and also took a measure of interpretation bias, in 6-18-year-olds who met the diagnostic criteria for SAD and in a sample of matched non-clinical controls. In addition, these investigators took a parental report measure of children's attentional control capability. The results showed that, compared to the non-anxious control participants, children with SAD demonstrated greater difficulty disengaging attention from the threat-related stimuli, more evidence of an interpretation bias favouring threat, and reduced attentional control capability. Interestingly, in contrast to the findings obtained by Grafton et al and Pavlou et al., when assessing the attentional characteristics of dispositional anxiety in non-clinical children, it was not the case that variation in attentional control moderated the strength of the association between attentional bias (or interpretive bias) and SAD. Rather each of the three cognitive indices made a significant and independent contribution to the differentiation of children with and without SAD, and the attentional control measure accounted for the greatest amount of variance. This paper is therefore significant in showing independent effects of information processing biases and attentional control in the differentiating children and adolescents with and without SAD. Given the independence of their contributions, the authors suggest that the inclusion of intervention components that separately target the reduction of information processing biased that favour threat, and the enhancement of attentional control, may prove particularly effective in the treatment of SAD.

The final two papers in this issue directly evaluated intervention approaches based on the direct modification of anxiety-linked patterns of processing selectivity. The first of these studies assessed whether an intervention designed to reduce patterns of negative interpretation and attentional bias to threat could contribute to prevention of anxiety problems in young people temperamentally at risk for anxiety (White et al.). The second intervention study assessed whether a remotely delivered attentional bias modification procedure, configured to increase attention towards emotionally positive information, could yield therapeutic benefits for clinically anxious children living in rural and remote regions (Waters et al.).

The prevention study carried out by White et al. employed a cognitive training procedure intended to directly reduce the negative interpretation biases known to be associated with anxiety vulnerability. The investigators assessed the impact of this training not only on attentional bias to threat, but on children's feelings of stress during a subsequent two minute presentation challenge, and on other measures of anxiety and mood. Participants were children aged 9 to 12 years of age who, according to parental report measures, exhibited elevated levels of behavioural inhibition. Half of this group of children were exposed to the brief procedure comprising 50 trials designed to induce benign interpretations of ambiguous situations, and the other half received a placebo control procedure. This interpretive training task presented participants with scenarios describing, in first person format, emotionally ambiguous situations associated with starting a new school. Alternative candidate outcomes were provided, one consistent with a negative and one with a benign interpretation of the ambiguity, and participants had to identify what they considered to be the

more likely outcome. In the training condition alone, on 90% of trials feedback indicated that the participant was incorrect unless they chose the outcome consistent with the benign interpretation of ambiguity. Pre- and post-training interpretation bias was measured using an assessment variant of this task, and attentional bias to threat was assessed using a dot probe task. These two measures of cognitive bias were significantly correlated, but only the interpretive bias measure was affected by the training procedure, with assessment suggesting post-intervention an increase in benign interpretations in those who received the training, compared with the placebo group. (i.e., highlighting some positive impact on tasks similar to those that were trained). However, the training manipulation did not influence the mood measures, and the authors encourage further research to explore the limitations that may restrict the generalisation of induced change in interpretative bias to other facets of biased information processing, and to emotional experience.

Waters and colleagues assessed the effectiveness of a 12 session computer visual search task (versus wait-list control group) designed to train increased attention to positive stimuli in children aged 6 – 12 years who were diagnosed with an anxiety disorder. These children lived a remote rural location, and accessed the training procedure on the internet. Training was delivered across three weeks and in each session children completed 224 trials that involved searching for up to 3 “calm” or “good” images in arrays of 9 or 12 images, within which the remaining pictures were affectively negative. The intervention made use of jingles to maintain motivation and engagement. Families were contacted via telephone each week to reinforce the training schedule and to ensure treatment fidelity, and treatment acceptability was monitored at each session using self-report measures. Impact measures were blinded and included child, parent and clinician reported anxiety symptoms, internalising symptoms, as well as an index of global functioning. The study showed differences between the intervention and control groups post-intervention, with effects broadly maintained at a six month follow-up. The intervention group met criteria for fewer diagnoses, showed less clinical severity and higher levels of global functioning. Within the intervention group, there was a reduction in parent (but not child) reported internalising symptoms from pre- to post-intervention. Children who reported increased use of verbalisation during training showed greater reduction in clinical severity and fewer diagnoses post intervention, suggesting that explicit goal-based strategies were effective in promoting a more positive outcome. The authors note that, although drop out was systematic in that children in single parent families were most likely to withdraw, overall attrition was low. This paper indicates that clinically anxious children in regions with limited access to conventional mental health services can benefit from a remotely delivered intervention targeting the direct reduction of attentional bias to threat, and it provides information concerning aspects of delivery and engagement that can enhance outcomes.

Closing Comments

The theoretical and empirical papers in this special issue build on a growing evidence base that highlights the central role of attention biases to threat and attentional control in children and adolescents who are dispositionally at risk for anxiety and those who are diagnosed with an anxiety disorder. In addition, it supports the proposition that selective processing biases favouring threat information and impaired attention control represent promising therapeutic targets in interventions designed to prevent or alleviate anxiety dysfunction. The collection of papers showcases some of the best current research in this rapidly developing field. The papers move forward our understanding of the attentional underpinnings of anxiety vulnerability and dysfunction in children and young people, and our ability to creatively exploit our growing understanding in ways that better protect against and assist in the remediation of anxious affect in development. We are confident that readers of the special issue will find themselves well-informed about what already has been achieved in this field, and will be inspired to direct their own future research efforts towards addressing the important issues raised by this current work. We are delighted to have had the opportunity to bring these papers together, and we are grateful to the authors for contributing their work to this special issue.

References

Affrunti, N.W., & Woodruff-Borden, J. (2015). Parental perfectionism and over control: examining mechanisms in the development of child anxiety. *Journal of Abnormal Child Psychology, 43*, 517-29. https:/doi.org/10.1007/s10802-014-9914-5

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th Ed.). Washington, DC.

Asendorpf, J. B., Denissen, J. J., & van Aken, M. A. (2008). Inhibited and aggressive preschool children at 23 years of age: Personality and social transitions into adulthood. *Developmental Psychology, 44*, 997-1011. https:/doi.org/10.1037/0012-1649.44.4.997

Banks, S.J., Eddy, K.T., Angstadt, M., Nathan, P.J. & K. Phan, L. (2007). Amygdala–frontal connectivity during emotion regulation. *Social, Cognitive and Affective Neuroscience, 2*, 303-312. https:/doi.org/10.1093/scan/nsm029

Bar-Haim, Y., Lamy, D., Pergamin, L., Bekermans-Kranenburg, M.J., & van IJzendoorn, M.H. (2007). Threat-related attentional bias in anxious and non-anxious individuals: A meta-analytic study. *Psychological Bulletin, 133*, 1-24.

Bar-Haim, Y., Morag,I. & Glickman,S. (2011). Training anxious children to disengage attention from threat: a randomized controlled trial. *Journal of Child Psychology and Psychiatry*, 52, 861–869. https://doi.org/10.1111/j.1469-7610.2011.02368.x

Bechor, M., Pettit, J.W., Silverman, W.K., Bar-Haim, Y., Abend, R., Pine, D.S., Vasey, M.W., Jaccard, J., (2014). Attention bias modification treatment for children with anxiety disorders who do not respond to cognitive behavioural therapy: a case series. *Journal of Anxiety Disorders, 28*, 154-159. https:/doi.org/10.1016/j.janxdis.2013.09.001

Beck, A.T., Emery, G. & Greenberg, R.L. (1985). *Anxiety Disorders and Phobias: A Cognitive Perspective*. New York: Basic Books.

Beesdo, K., Pine, D.S., Lieb, R. & Wittchen, H.U. (2010). Incidence and risk patterns of anxiety and depressive disorders and categorization of generalized anxiety disorder. *Archives General Psychiatry, 67*, 47-57. https:/doi.org/10.1001/archgenpsychiatry.2009.177

Beesdo, K., Knappe, S. & Pine, D.S. (2009). Anxiety and Anxiety Disorders in Children and Adolescents: Developmental Issues and Implications for DSM-V. *Psychiatric Clinics of North America 32*, 483-524. https:/doi.org/10.1016/j.psc.2009.06.002

Berggren, N. & Derakshan, N. (2013). Attentional control deficits in trait anxiety: Why you see them and why you don't. *Biological Psychology, 92*, 440–446. https:/doi.org/10.1016/j.biopsycho.2012.03.007

Birrell, J., Meares, K., Wilkinson, A., & Freeston, M. (2011). Toward a definition of intolerance of uncertainty. *Clinical Psychology Review, 31,* 1198-1208. https:/doi.org/10.1016/j.cpr.2011.07.009

Bishop, S.J. (2007). Neurocognitive mechanisms of anxiety: An integrative account. *Trends in Cognitive Neuroscience, 11*, 307-316. https:/doi.org/10.1016/j.tics.2007.05.008

Bögels, S.M. & Brechman-Toussaint, M.L. (2006). Family issues in child anxiety: attachment, family functioning, parental rearing and beliefs. *Clinical Psychology Review*, 26, 834-56. https://doi.org/10.1016/j.cpr.2005.08.001

Brown, H.M., McAdams, T.A., Lester, K.J., Goodman, R., Clark, D.M. & Eley, T.C. (2013). Attentional threat avoidance and familial risk are independently associated with childhood anxiety disorders. *Journal of Child Psychology & Psychiatry, 54*, 678-85. https:/doi.org/10.1111/jcpp.12024

Carpenter, K.L.H., Angold, A., Chen, N-K., Copeland, W.E., Gaur, P., Pelphrey, K., et al. (2015). Preschool Anxiety Disorders Predict Different Patterns of Amygdala-Prefrontal Connectivity at School-Age. *PLoS ONE 10(1):* e0116854.

Chen, J. T., & Lovibond, P.F. (2016). Intolerance of Uncertainty Is Associated With Increased Threat Appraisal and Negative Affect Under Ambiguity but Not Uncertainty. *Behavior Therapy, 47*, 42-53. https:/doi.org/10.1016/j.beth.2015.09.004

Collins, K.A., Westra, H.A., Dozois, D.J. & Burns, D.D. (2004). Gaps in accessing treatment for anxiety and depression: challenges for the delivery of care. *Clinical Psychology, 24*, 583-616. https:/doi.org/10.1016/j.cpr.2004.06.001

Copeland, W.E., Angold, A., Shanahan, L & Costello, E.J. (2014). Longitudinal patterns of anxiety from childhood to adulthood: the Great Smoky Mountains Study. *Journal of the American Academy of Child and Adolescent Psychiatry, 53*, 21-33. https:/doi.org/10.1016/j.jaac.2013.09.017

Creswell, C., Waite, P. & Cooper, P.J. (2014). Assessment and management of anxiety. *Archives of Disease in* Childhood*, 99*, 674-678.

Creswell, C., Murray, L., Stacey, J. & Cooper, P. (2011). Parenting and child anxiety. In W.K. Silverman & A.P. Field Eds). *Anxiety disorder in children and adolescents. Cambridge* (pp. 299-322). Cambridge University Press. https:/doi.org/10.1017/cbo9780511994920.015

Crick, N.R., & Dodge, K.A. (1994). A review and reformulation of social information-processing mechanisms in children's social adjustment. *Psychological Bulletin, 115*, 74-101. https:/doi.org/10.1037/0033-2909.115.1.74

Darke, S. (1988). Anxiety and working memory capacity. *Cognition and Emotion, 2*, 145-154. https:/doi.org/10.1080/02699938808408071

Denham, S.A. (1998). *Emotional development in young children*. London: The Guilford press.

Derryberry D., & Reed M.A. (2002). Anxiety related attentional biases and their regulation by attentional control. *Journal of Abnormal* Psychology, 111, 225-236. https:/doi.org/10.1037//0021-843X.111.2.225

Duchesne, S., Larose, S., Vitaro, F. & Tremblay, R.E. (2011). Trajectories of anxiety in a population sample of children: Clarifying the role of children's behavioral characteristics and maternal parenting. *Development and Psychopathology, 22*, 361- 373. https:/doi.org/10.1017/S0954579410000118

Dudeney, J., Sharpe, L. & Hunt, C. (2015). Attentional bias towards threatening stimuli in children with anxiety: A meta-analysis. *Clinical Psychology Review, 40*, 66–75. https:/doi.org/10.1016/j.cpr.2015.05.007

Eisenberg, N., Cumberland, A., Spinrad, T. L., Fabes, R. A., Shepard, S. A., Reiser, M., et al. (2001). The relations of regulation and emotionality to children's externalizing and internalizing problem behavior. *Child Development, 72*, 1112- 1134. https:/doi.org/10.1111/1467-8624.00337

Eldar, S., Apter, A., Lotan, D., Edgar, K. P., Naim, R., Fox, N. A. et al. (2012). Attention bias modification treatment for pediatric anxiety disorders: A randomized controlled trial. *The American Journal of Psychiatry, 169*, 213-220. https:/doi.org/10.1176/appi.ajp.2011.11060886

Eley, T.C., McAdams, T.A., Rijsdijk, F.V., Lichtenstein, P., Narusyte, J. Reiss, D., Spotts, E.L., & Neiderhiser, J.M. (2015). The Intergenerational Transmission of Anxiety: A Children-of-Twins Study. *American Journal of Psychiatry. 172*, 630-7. https:/doi.org/10.1176/appi.ajp.2015.14070818

Erath, S. A., Flanagan, K. S., Bierman, K. L. (2007). Social anxiety and peer relations in early adolescence: Behavioural and cognitive factors. *Journal of Abnormal Child Psychology,* 35, 405-416. https:/doi.org/10.1007/s10802-007-9099-2

Etkin, A. (2012). Neurobiology of anxiety: from neural circuits to novel solutions? *Depression and Anxiety, 29*, 355-358. https:/doi.org/10.1002/da.21957

Eysenck, M. W. (1992). Anxiety: *The cognitive perspective*. Hove, England: Erlbaum.

Eysenck, M. W., Derakshan, N. (2011). New perspectives in attentional control theory. *Personality and Individual Differences, 50*, 955-960. https:/doi.org/10.1016/j.paid.2010.08.019

Eysenck, M. W., Derakshan, N., Santos, R., & Calvo, M. G. (2007). Anxiety and cognitive performance: Attentional control theory. *Emotion, 7*, 336-353.

Flakierska-Praquin, N., Lindström, M. & Gillberg, C. (1997). School phobia with separation anxiety disorder: a comparative 20- to 29-year follow-up study of 35 school refusers. *Comprehensive Psychiatry, 38*, 17-22. https://doi.org/10.1016/S0010-440X(97)90048-1

Fox, N.A. & Pine, D. S. (2012). Temperament and the Emergence of Anxiety Disorders. *Journal of the American Academy of Child and Adolescent Psychiatry, 51*, 125-128. https:/doi.org/10.1016/j.jaac.2011.10.006

Fox, N. A., Henderson, H. A., Marshall P. J., Nichols, K. E., & Ghera, M. M. (2005). Behavioral inhibition: Linking biology and behavior within a developmental framework. *Annual Review of Psychology, 56*, 235 – 262. https:/doi.org/10.1146/annurev.psych.55.090902.141532

Fox, E., Russo, R., Bowles, R. & Dutton, K. (2001). Do threatening stimuli draw or hold visual attention in subclinical anxiety? *Journal of Experimental Psychology General, 130*, 681–700. https:/doi.org/10.1037/0096-3445.130.4.681

Franz L., Angold A., Copeland W., Costello, E.J., Towe-Goodman, N., Egger, H. (2013). Preschool anxiety disorders in pediatric primary care: prevalence and comorbidity. *Journal of the American Academy of Child and Adolescent Psychiatry, 52*, 1294–1303, e1291. https:/doi.org/10.1016/j.jaac.2013.09.008

Gidron, Y. (2013). Trait anxiety. In: M. Gellman, & R. Turner, (Eds.), *Encyclopedia of Behavioral Medicine.* 1989. New York: Springer Science and Business Media.

Graham, B.M. & Milad, M.R. (2013). Prefrontal cortex regulation of emotion and anxiety. In D.S. Charney, P. Skar, J.D. Buxbaum & E.J. Nestler (Eds). *Neurobiology of Mental Illness*. Fourth Edition (pp. 580-592). Oxford: Oxford University Press.

Gramzsio, C. & Woodruff-Boden, J. (2015). Emotional reactivity and executive control: A pathway of risk for the development of childhood worry. *Journal of Anxiety Disorders, 35*, 35-41. https:/doi.org/10.1016/j.janxdis.2015.07.005

Grant, D.M., Beck, J.G., Farrow, S.M. & Davila, J. (2007). Do interpersonal features of social anxiety influence the development of depressive symptoms? *Cognition and Emotion, 21*, 646-663. https:/doi.org/10.1080/02699930600713036

Grills, A.E., Seligman, L., & Ollendick, T. (2014). Anxiety disorders in children and adolescents. In P.M.G. Emmelkamp & T. Ehring (Eds). *The Wiley handbook of anxiety disorders* (pp. 424-456). Chichester: Wiley. https:/doi.org/10.1002/9781118775349.ch22

Gulley, L.D., Hankin, B.L., Young, J. (2016). Risk for depression and anxiety in youth: The interaction between negative affectivity, effortful control, and stressors. *Journal of Abnormal Child Psychology, 44*, 207-218. https:/doi.org/10.1007/s10802-015-9997-7

Hadwin, J.A. & Richards, H.J. (2016). Working memory training and CBT reduces anxiety symptoms and attentional biases to threat: A preliminary study. *Front.Psychol.7*:47. https:/doi.org/10.3389/fpsyg.2016.00047

Hadwin, J.A., Brogan, J., and Stevenson, J. (2005). State anxiety and working memory in children: A test of Processing Efficiency Theory. *Educational Psychology, 25*, 379-393. https:/doi.org/10.1080/01443410500041607

Hancock, K.J., Mitrou, F., Shipley, M., Lawrence, D. & Zubrick, S.R. (2013). A three generation study of the mental health relationships between grandparents, parents and children. *BMC Psychiatry, 13*, 299. https:/doi.org/10.1080/01443410500041607

Hare, T.A., Tottenham, N., Galvan, A., Voss, H.U., Glover, G.H. & Casey, B.J., (2008). Biological substrates of emotional reactivity in adolescence during a go-no-go task. *Biological psychiatry, 63*, 927-934. https:/doi.org/10.1016/j.biopsych.2008.03.015

Hirsh, C.R. & Matthews, A. (2012). A cognitive model of pathological worry. *Behaviour, Research and Therapy, 50*, 636-646. https:/doi.org/10.1016/j.brat.2012.06.007

Horley, K., Williams, L.M. Gonsalvez, C & Gordon, E. (2004). Face to face: visual scanpath evidence for abnormal processing of facial expressions in social phobia. *Psychiatry Research 127*, 43–53. https:/doi.org/10.1016/j.psychres.2004.02.016

Hudson, J.L., Rapee, R.M., Lyneham, H.J., McLellan, L.F., Wuthrich, V.M., & Schniering, C.A. (2015). Comparing cognitive outcomes for children with different anxiety disorders following cognitive behavioural therapy. *Behaviour Research and Therapy, 72*, 30- 37. https:/doi.org/10.1016/j.brat.2015.06.007

Izard, C.E. (2007). Basic emotions, natural kinds, emotion schemas and a new paradigm. *Perspectives on Psychological science, 2*, 260-280. https:/doi.org/10.1111/j.1745-6916.2007.00044.x

James, A.C., James, G. Cowdrey, F.A., Soler, A., & Choke, A. (2015). Cognitive behavioural therapy for anxiety disorders in children and adolescents. *Cochrane Common Mental Disorders Group*. *The Cochrane Collection*. John Wiley & Sons Ltd. https:/doi.org/10.1002/14651858.CD004690.pub4

Jung, N., Wranke, C., Hamburger, K. & Knauff, M. (2014). How emotions affect logical reasoning: evidence from experiments with mood-manipulated participants, spider phobics, and people with exam anxiety. Frontiers of Psychol*ogy, 5*, 570. https:/doi.org/10.3389/fpsyg.2014.00570

Kendler, K.S., Prescott, C.A., Myers, J., & Neale, M.C. (2003). The structure of genetic and environmental risk factors for common psychiatric and substance misuse disorders in men and women. *Archives of General Psychiatry, 60*, 929-937. https:/doi.org/10.1001/archpsyc.60.9.929

Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005). Lifetime Prevalence and Age-of-Onset Distributions of DSM-IV Disorders in the National Comorbidity Survey Replication. *Arch Gen Psychiatry, 62*, 593-602. https:/doi.org/10.1001/archpsyc.62.6.593

Kujawa, A., Arfer, K.B., Klein, D.N. & Proudfit, G.H. (2014). Electrocortical reactivity to social feedback in youth: A pilot study of the Island Getaway task. *Developmental Cognitive Neuroscience, 10*, 140-147. https:/doi.org/10.1016/j.dcn.2014.08.008

Lau, J.Y.F. & Pine, D.S. (2008). Elucidating risk mechanisms of gene–environment interactions on pediatric anxiety: integrating findings from neuroscience. *European Archives of Psychiatry and Clinical Neuroscience, 258*, 97–106. Dhttps:/doi.org/10.1007/s00406-007-0788-1

Leach, L.S., Christensen, H., Mackinnon, A.J., Windsor, T.D., & Butterworth, P. (2008). Gender differences in depression and anxiety across the adult lifespan: The role of psychosocial mediators. *Social Psychiatry & Psychiatric Epidemiology, 43*, 983–998. https:/doi.org/10.1007/s00127-008-0388-z

LeDoux, J. (2003). The emotional brain, fear, and the amygdala. *Cellular and Molecular Neurobiology, 23*, 4727-4738. https:/doi.org/10.1023/A:1025048802629

Lee, K. & Bull, R. (2016). Developmental Changes in Working Memory, Updating, and Math Achievement. Journal of Educational Psychology, 108, 869-882. https:/doi.org/10.1037/edu0000090

Lewis, M. (2014). *The rise of conscious and the development of emotional life. Studying emotional development*. London: The Guilford Press.

Lonigan, C.J., & Vasey, M.W. (2009). Negative affectivity, effortful control, and attention to threat-relevant stimuli. *Journal of Abnormal Child Psychology, 37,* 387-399. https:/doi.org/10.1007/s10802-008-9284-y

Lowther, H. & Newman, E. (2014). Attention bias modification (ABM) as a treatment for child and adolescent anxiety: A systematic review. *Journal of Affective Disorders, 168*, 125-135. https:/doi.org/10.1016/j.jad.2014.06.051

MacLeod, C., & Clarke, P.J.F. (2015). The attentional bias modification approach to anxiety intervention. *Clinical Psychological Science, 3*, 58–78. https:/doi.org/10.1177/2167702614560749

MacLeod, C., Mathews, A., & Tata, P. (1986). Attentional bias in emotional disorders. *Journal of Abnormal Psychology, 95*(1), 15-20. https:/doi.org/10.1037/0021-843X.95.1.15

Maslowsky, J., Mogg, K., Bradley, B.P., McClure-Tone, E., Ernst, M., Pine, D.S., & Monk, C.S. (2010). A preliminary investigation of neural correlates of treatment in adolescents with generalized anxiety disorder. *Journal of Child and Adolescent Psychopharmacology, 20*, 105–111. https:/doi.org/10.1089/cap.2009.0049

Mathews, A. & Mackintosh, B. (1998). A Cognitive Model of Selective Processing in Anxiety. *Cognitive Therapy and Research, 22,* 539-560. https:/doi.org/10.1023/A:1018738019346

McLean, C.P., Asnaani A., Litz, B.T. & Hofmann, S.G. (2011). Gender differences in anxiety disorders: prevalence, course of illness, comorbidity and burden of illness. Journal of Psychiatric Research, 45, 1027- 1035. https:/doi.org/10.1016/j.jpsychires.2011.03.006

Meesters, C., Muris, P. & van Rooijen, B. J (2007). Psychopathol Behav Assess, 29: 149. doi:10.1007/s10862-006-9037-6. https:/doi.org/10.1007/s10862-006-9037-6

Merikangas, K.R., He, J.P., Burstein, M., Swanson, S.A., Avenevoli, S., Cui, L., ..& Swendsen, J. (2010). Lifetime Prevalence of Mental Disorders in US Adolescents: Results from the National Comorbidity Study-Adolescent Supplement (NCS-A). *Journal of the American Academy of Child and Adolescent Psychiatry, 49*, 980-989. https:/doi.org/10.1016/j.jaac.2010.05.017

Micco, J.A., Henin, A., Mick, E., Kim, S., Hopkins, C.A., Biederman, J., & Hirshfeld-Becker, D.R. (2009). Anxiety and depressive disorders in offspring at high risk for anxiety: a meta-analysis. *Journal of Anxiety Disorders. 23*, 1158- 1164. https:/doi.org/10.1016/j.janxdis.2009.07.021

Monk, C.S., Telzer, E.H., Mogg, K., Bradley, B.P., Mai, X., Louro, H.M., ..& Pine DS. (2008). Amygdala and ventrolateral prefrontal cortex activation to masked angry faces in children and adolescents with generalized anxiety disorder. *Archives General Psychiatry, 65*, 568-576. https:/doi.org/10.1001/archpsyc.65.5.568

Mogg, K. & Bradley, B.P. (1998). A cognitive-motivational analysis of anxiety. Behaviour Research and Therapy, 809-48. https:/doi.org/10.1016/S0005-7967(98)00063-1

Moser, J.S., Moran, T.P., Schroder, H.S., Donnellan, B & Yeung, N, (2013). On the relationship between anxiety and error monitoring: a meta-analysis and conceptual framework. *Frontiers in Human Neuroscience, 013*;7:466. https:/doi.org/10.3389/fnhum.2013.00466

Muris, P., & Ollendick, T.H. (2015). Children who are anxious in silence: a review on selective mutism, the new anxiety disorder in DSM-5. *Clinical Child and Family Psychology Review, 18*, 151-69. https:/doi.org/10.1007/s10567-015-0181-y

Muris, P., van Brakel, A. M. L., Arntz, A., & Schouten, E. (2011). Behavioral inhibition as a risk factor for the development of childhood anxiety disorder: A longitudinal study. *Journal of Child & Family Studies, 20*, 157-170. Mar 17. https:/doi.org/10.1007/s10826-010-9365-8

Muris, P. (2006). Unique and interactive effects of neuroticism and effortful control on psychopathological symptoms in non-clinical adolescents. *Personality and Individual Differences, 40*, 1409-1419. https:/doi.org/10.1016/j.paid.2005.12.001

Muris, P., de Jong, P.J. & Engelen, S. (2004). Relationships between neuroticism, attentional control, and anxiety disorders symptoms in non-clinical children. Personality and Individual Differences, 37, 789-797. https:/doi.org/10.1016/j.paid.2003.10.007

Muris, P., & Merckelback, H. (2001). The etiology of childhood specific phobia: A multifactorial model. In M.Vasey & M.R. Dadds (Eds). *The Developmental Psychopathology of Anxiety (pp. 355-385)*. Oxford: Oxford University Press. https:/doi.org/10.1093/med:psych/9780195123630.003.0016

Oar, E.L., Farrell, L.J. & Ollendick, T.H. (2015). One session treatment for specific phobias: An adaptation for paediatric blood–injection–injury phobia in youth. *Clinical Child and Family Psychology Review*, 18, 370–394. https:/doi.org/10.1007/s10567-015-0189-3

Ochsner, K.N., Bunge, S.A., Gross, J.J. & Gabrieli, J.D.E. (2002). Rethinking feelings: An fMRI study of the cognitive regulation of emotion. *Journal of Cognitive Neuroscience*, 14, 1215-1229. https:/doi.org/10.1162/089892902760807212

O'Toole, L.J., DeCicco, J.M, Berthod, S. & Dennis, T.A. (2013). The N170 to angry faces predicts anxiety in typically developing children over a two-year period. *Developmental Neuroscience, 38*, 352-362. https:/doi.org/10.1080/87565641.2013.802321

Owens, M., Koster, E.H. & Derakshan, N. (2013). Improving attention control in dysphoria through cognitive training: transfer effects on working memory capacity and filtering efficiency. *Psychophysiology, 50*, 297-307. https:/doi.org/10.1111/psyp.12010

Owens, M., Stevenson, J., Norgate, R., & Hadwin, J. A. (2008). Processing efficiency theory in children: Working memory as a mediator between trait anxiety and academic performance. *Anxiety, Stress and Coping, 21*(4), 417-430. https:/doi.org/10.1080/10615800701847823

Owens, M., Stevenson, J., Norgate, R. & Hadwin, J.A. (2012). Anxiety and Depression in Academic Performance: An Exploration of the Mediating Factors of Worry and Working Memory. *School Psychology International, 33*, 1-17. https:/doi.org/10.1177/0143034311427433

Pérez-Edgar, K. & Fox, N. A. (2005). Temperament and anxiety disorders. *Child and Adolescent Psychiatric Clinics, 14*, 681–706. https:/doi.org/10.1016/j.chc.2005.05.008

Pérez-Edgar, K., Bar-Haim, Y., McDermott, J. M., Chronis-Tuscano, A., Pine, D. S., & Fox, N. A. (2010). Attention biases to threat and behavioral inhibition in early childhood shape adolescent social withdrawal. *Emotion*, 10, 349–357. https:/doi.org/10.1037/a0018486

Pérez-Edgar, K., Reeb-Sutherland, B.C., McDermott, J.M., White, L.K., Henderson, H.A., Degnan, K.A., Hane A.A., Pine, D.S. & Fox, N.A. (2011). Attention biases to threat link behavioral inhibition to social withdrawal over time in very young children. *Journal of Abnormal Child Psychology*, 39, 885–895. https:/doi.org/10.1007/s10802-011-9495-5

Pérez-Edgar, K., Taber-Thomas, B., Auday, E., Morales, S. (2014). Temperament and attention as core mechanisms in the early emergence of anxiety. *Children and Emotion. New Insights into Developmental Affective Sciences, 26*, 42-56. https:/doi.org/10.1159/000354350

Rachman, S. (1998). *Anxiety*. Hove: Psychology Press.

Rapee, R.M. (2001). The development of generalized anxiety. In M. Vasey & M.R. Dadds (Eds). *The developmental psychopathology of anxiety (pp. 481-504)*. Oxford: Oxford University Press https:/doi.org/10.1093/med:psych/9780195123630.003.0021

Rapee, R. M., Schniering, C. A., & Hudson, J. L. (2009). Anxiety disorders during childhood and adolescence: Origins and treatment. *Annual Review of Clinical Psychology, 5*, 311-341. https:/doi.org/10.1146/annurev.clinpsy.032408.153628

Richards, H.J., Benson, V., Donnelly, N. & Hadwin, J.A. (2014). Exploring the function of selective attention and hypervigilance for threat in anxiety. *Clinical Psychology Review, 34*, 1-14. https:/doi.org/10.1016/j.cpr.2013.10.006

Richards, H. J., Benson, V., & Hadwin, J. A. (2012). The attentional processes underlying impaired inhibition of threat in anxiety: The remote distractor effect. *Cognition and Emotion, 26*, 934-942. https:/doi.org/10.1080/02699931.2011.630990

Richards, H.J. & Hadwin, J.A. (2011). An exploration of the relationship between trait anxiety and school attendance in young people. *School Mental Health, 3*, 326-244. https:/doi.org/10.1007/s12310-011-9054-9

Richards, A., French, C.C., Nash, G., Hadwin, J.A., & Donnelly, N. (2007). A comparison of selective attention and facial processing biases in typically developing children who are high and low in self-reported trait anxiety. *Developmental Psychopathology, 19*, 481-95. https:/doi.org/10.1017/S095457940707023X

Reinholdt-Dunne, L., Mogg, K., Vangkilde, S. A., Bradley, B. P., & Esbjørn, B. H. (2015). Attention control and attention to emotional stimuli in anxious children before and after cognitive behavioral therapy. *Cognitive Therapy and Research, 39*, 785–796. https:/doi.org/10.1007/s10608-015-9708-2

Rothbart, M. K., & Bates, J. E. (2006). *Temperament*. In N. Eisenberg, W. Damon & R. M. Lerner (Eds.). Handbook of child psychology: Social, emotional, and personality development (pp. 99-166). Hoboken, NJ: John Wiley & Sons.

Roughan, L., & Hadwin, J. A. (2011). The impact of working memory training in young people with social, emotional and behavioural difficulties. *Learning and Individual Differences, 21*, 759-764. https:/doi.org/10.1016/j.lindif.2011.07.011

Roza, S.J. Hofstra, M.B.,Van Der Ende, J., & Verhulst, F.C.(2003). Stable prediction of mood and anxiety disorders based on behavioral and emotional problems in childhood: A 14-year follow-up during childhood, adolescence, and young adulthood. A*merican Journal of Psychiatry,* 60, 2116–2121. https:/doi.org/10.1176/appi.ajp.160.12.2116

Rueda, M.R., Checa, P., & Rothbart, M.K. (2010). Contributions of attentional control to socioemotional and academic development. *Early Education and Development*, 21, 744-764. https:/doi.org/10.1080/10409289.2010.510055

Salum, G.A., Mogg, K., Bradley, B.P., Gadelha, A., Pan, P., Tamanaha, A.A.,…& Pine, D.S. (2013). Threat bias in attention orienting: Evidence of specificity in a large community-based study. *Psychological Medicine, 43*, 733–745. https:/doi.org/10.1017/S0033291712001651

Sari, B.A., Koster, E.H., Pourtois, G., Derakshan, N. (2015). Training working memory to improve attentional control in anxiety: A proof-of-principle study using behavioral and electrophysiological measures. *Biological Psychology*. https:/doi.org/10.1017/S0033291712001651

Shechner, T., Rimon-Chakir, A., Britton, J., Lotan, D.,Apter, A., Bliese, P.,Pine ,D. & Bar-Haim, Y. (2014). Attention bias modification treatment augmenting effects on cognitive behavioural therapy in children with anxiety: randomized controlled trial. *Journal of the American Academy of Child and Adolescent Psychiatry*, 53,61–71. https://doi.org/10.1016/j.jaac.2013.09.016

Shackman, A. J., Sarinopoulos, I., Maxwell, J. S., Pizzagalli, D. A., Lavric, A., & Davidson, R. J. (2006). Anxiety selectively disrupts visuospatial working memory. *Emotion, 6*(1), 40-61. https:/doi.org/10.1037/1528-3542.6.1.40

Shackman, A. J., Maxwell, J. S., McMenamin, B. W., Greischar, L. L. & Davidson, R. J. (2011). Stress potentiates early and attenuates late stages of visual processing. *Journal of Neuroscience, 31*, 1156 – 1161. https:/doi.org/10.1523/JNEUROSCI.3384-10.2011

Somerville, L. H., Whalen, P. J., & Kelley, W. M. (2010). Human bed nucleus of the stria terminalis indexes hypervigilant threat monitoring. *Biological Psychiatry, 68*, 416–424. https:/doi.org/10.1016/j.biopsych.2010.04.002

Spence, S.H. & Rapee, R.M. (2016). The etiology of social anxiety disorder: An evidence-based model. *Behaviour, Research & Therapy, 86*, 50-67. https:/doi.org/10.1016/j.brat.2016.06.007

Stirling, L.J., Eley, T.C. & Clark, D.M. (2006). Preliminary evidence for an association between social anxiety symptoms and avoidance of negative faces in school-age children. *Journal of Clinical Child and Adolescent Psychology, 35*, 440–445. https:/doi.org/10.1207/s15374424jccp3503_9

Susa, G., Pitica, I., Benga, O., & Miclea, M. (2012). The self-regulatory effect of attentional control in modulating the relationship between attentional biases toward threat and anxiety symptoms in children. *Cognition and Emotion, 26*, 1069-1083. https:/doi.org/10.1080/02699931.2011.638910

Trzaskowski, M., Zavos, H.M.S., Haworth, C.M.A., Plomin, R. & Eley, T.C., (2012). Stable genetic influence on anxiety-related behaviours across middle childhood. *Journal of Abnormal Child Psychology, 40*, 85–94. https:/doi.org/10.1007/s10802-011-9545-z

Van Ameringen, M., Mancini, C., & Farvolden, P. (2003). The impact of anxiety disorders on educational achievement. *Journal of Anxiety Disorders, 17*, 561- 571. https:/doi.org/10.1016/S0887-6185(02)00228-1

Verstraeten, K., Vasey, M. W., Raes, F., & Bijttebier, P. (2009). Temperament and risk for depressive symptoms in adolescence: Mediation by rumination and moderation by effortful control. *Journal of Abnormal Child Psychology, 37*, 349- 361. https:/doi.org/10.1007/s10802-008-9293-x

Visu-Petra, L., Miclea, M., Cheie, L., & Benga, O. (2009). Processing efficiency in preschoolers' memory span: A longitudinal investigation of individual differences related to age and anxiety. *Journal of Experimental Child Psychology, 103*, 30-48. https:/doi.org/10.1016/j.jecp.2008.09.002

Waite, P., & Creswell, C. (2014). Children and adolescents referred for treatment of anxiety disorders: Differences in clinical characteristics. *Journal of Affective Disorders, 167*, 326-332. https:/doi.org/10.1016/j.jad.2014.06.028

Waite, P., Whittington, L., & Creswell, C. (2014). Parent-child interactions and adolescent anxiety: A Systematic Review. Psychopathology Review, 1, 51-76. https:/doi.org/10.5127/pr.033213

Walkup, J.T., Albano, A.M., Piacentini, J., Birmaher, B., Compton, S.N., Sherrill, J.T…& Kendall, P.C. (2008). Cognitive Behavioral Therapy, Sertraline, or a Combination in Childhood Anxiety. *New England Journal of Medicine, 359*, 2753-2766. https:/doi.org/10.1056/NEJMoa0804633

Wang, Z, Hart, S.A., Kovas, Y., Lukowski, S., Soden, B., Thompson, L.A., Plomin, R, ..& Petrill, S.A. (2014). Who's afraid of math? Two sources of genetic variance for mathematical anxiety. *Journal of Child Psychology and Psychiatry, 55*, 1056–1064. https:/doi.org/10.1111/jcpp.12224

Waters, A. M., Mogg, K., & Bradley, B. P. (2012). Direction of threat attention bias predicts treatment outcome in anxious children receiving cognitive-behavioural therapy. *Behaviour Research and Therapy, 50*(6), 428-434. https:/doi.org/10.1016/j.brat.2012.03.006

Waters, A.M., Mogg, K., Bradley, B.P. & Pine, D.S. (2008). Attentional bias for emotional faces in children with generalized anxiety disorder. *Journal of the American Academy of Child and Adolescent Psychiatry* 47, 435–442. https:/doi.org/10.1097/CHI.0b013e3181642992

Williams, L.E., Oler, J.A., Fox, A.S., McFarlin, D.R., Rogers, G.M., Jesson, M.A., ..& Kalin N.H. (2015). Fear of the unknown: uncertain anticipation reveals amygdala alterations in childhood anxiety disorders. *Neuropsychopharmacology. 40*, 1428-1435. https:/doi.org/10.1038/npp.2014.328

Williams, J. M., Watts, F. N., MacLeod, C., & Mathews, A. (1988). *Cognitive psychology and emotional disorders.* Chichester, U.K.: John Wiley & Sons.

Wood, J.J., Lynne, S.D., Langer, D.A., Wood, P.A., Clark, S.L., Eddy, J.M. & and Ialongo, I. (2012). School Attendance Problems and Youth Psychopathology: Structural Cross-Lagged Regression Models in Three Longitudinal Datasets. *Child Development, 83*, 351-366. https:/doi.org/10.1111/j.1467-8624.2011.01677.x