ÇOCUKLUK ANKSİYETESİNİN BELİRTİLERİ, YAYGINLIĞI ve BİLİŞSEL AÇIKLAMALARI: TEORİ ve GÖRGÜL ÇALIŞMALAR
PRESENTATION, EPIDEMIOLOGY, and COGNITIVE ACCOUNTS of CHILDHOOD ANXIETY: THEORY and EMPIRICAL INVESTIGATIONS

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ETÜ Sosyal Bilimler Enstitüsü Dergisi | ETU Journal of Social Sciences Institute
S.15, Ekim| October 2022, Erzurum
e-ISSN: 2717 - 8706

Makale Türü | Article Types : Araştırma Makalesi | Research Article
Geliş Tarihi | Received Date : 14.03.2022
Kabul Tarihi | Accepted Date : 07.05.2022
Sayfa | Pages : 01-24
: http://dx.doi.org/10.29157/etusbed.1087802

https://dergipark.org.tr/etusbed
This article was checked by
iThenticate

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ETÜ Sosyal Bilimler Enstitüsü Dergisi (ETÜSBED), S. 15, Ekim 2022, Sayfa: 01-24

ÖZ

Sürekli anksiyete ve anksiyete bozuklukları çocukluk ve ergenlikte görülen en yaygın ve yıpratıcı bozukluklardan biridir. Çeşitli gelişimsel alanlarda bozukluğa yol açtıklarından ötürü ağır bir sosyal ve ekonomik yüktür. Dolayısıyla, çocukluk anksiyetesine genel bir kapsamlı bakış açısı sunmak için, bu incelemenin ilk amacı çeşitli anksiyete bozukluklarının ayırt edici özelliklerini, yaygınlık oranlarını, ortaya konuş biçimini ve gidişatını güncel veriler ışığında özetlemektir. Çocukluk anksiyetesinin bilişsel açıklamalarına giderek artan ilgi ile birlikte, bu derlemenin ikinci amacı bilgi işleme anlayışımızdaki ilerlemeyi ve gençlerde anksiyete bozukluklarına yol açan ilgili bilgi işlem yanlılıklarını sunmaktır. Özellikle, kaygılı çocukların tehdide ilişkin bilişlerindeki çarpıklıklara, tehdit edici bilginin işlendiği bilişsel aşamalara ve bu aşamalarda ortaya çıkan bilişsel yanlılıklara (dikkat, yorumlama ve bellek) ilişkin teoriler ele alınmıştır. Son olarak, dikkat yanlılığı bilginin sisteme girdiği ilk aşama olduğu ve yanlılıklar arasında potansiyel bir aracılık ilişkisi olduğu için, anksiyeteyi olduğu gibi diğer yanlılıkları da azaltmak adına tehdide ilişkin dikkat yanlılığını ortadan kaldırmanın önemi vurgulanmıştır.

Anahtar kelimeler: Anksiyete bozuklukları, çocukluk anksiyetesi, bilgi işlem yanlılıkları, gidişat, epidemiyoloji.

PRESENTATION, EPIDEMIOLOGY, and COGNITIVE ACCOUNTS of CHILDHOOD ANXIETY: THEORY and EMPIRICAL INVESTIGATIONS

ABSTRACT

Anxiety disorders and trait anxiety are one of the most common and impairing psychological conditions in childhood and adolescence. They cause impairments in various developmental domains and create a heavy social and economic burden. To present an extensive overall perspective on current issues of childhood anxiety, the first aim of this review is to outline the identifying hallmarks of diverse anxiety disorders, prevalence rates, manifestation, and prognosis in the light of recent research. With the growing interest in cognitive accounts of anxiety, the second aim is to present the trajectory of progress in our understanding of information processing and the related information processing biases en route to youth anxiety. Specifically, theories on distortions in children's anxiogenic cognitions, the cognitive stages to process threat-related information, and the cognitive biases (i.e., attention, interpretation, and memory) pertaining to each stage were addressed. Attention bias is the first stage of information processing and there is a potential mediational association between these biases. Therefore, finally, to further reduce the other biases as well as anxiety, the importance of eliminating attention bias for threat was highlighted.

Key words: Anxiety disorders, childhood anxiety, information processing biases, prognosis, epidemiology.

Introduction

Anxiety disorders are one of the most prevalent and debilitating disorders in childhood and adolescence. Studies indicate that not only clinical levels of anxiety, but also trait anxiety (i.e., the subclinical threshold of anxiety symptoms) is quite common in paediatric populations, ranging from 3.8% to 32% (Creswell, Waite & Cooper, 2014; Meltzer, Gatward, Goodman & Ford, 2003). Both types of anxiety linked difficulties are associated with disturbances and impairments in everyday functioning and overall wellbeing (Essau, Conradt & Petermann, 2000; Ezpeleta, Keeler, Erkanli, Costello & Angold, 2001; Woodward & Fergusson, 2001). Additionally, as is the case for most forms of psychopathology, the early onset of anxiety during childhood and adolescence hinders psychological wellbeing in adulthood with the manifestation and maintenance of either an anxiety disorder or other types of disorders (Beesdo, Knappe & Pine, 2009; Wehry, Beesdo-Baum, Hennelly, Connolly & Strawn, 2015; Woodward & Fergusson, 2001).

Cognitive accounts of anxiety have received a high volume of attention during the past three decades due to the efficacy of cognitive behavioural intervention techniques for the treatment of anxiety. However, most of these accounts have formulated anxiety models for adults, which have limited applicability to paediatric populations. Because developmental scopes of childhood and adolescence involve rapid changes in various domains such as cognitive and socio-emotional maturation in shorter periods of time, a downward extension of adult accounts to these populations appears to have restricted validity.

Therefore, the aim of this review is to present empirical work on the manifestation and epidemiology of childhood anxiety as well as the related cognitive accounts to provide an overall picture of anxiety in paediatric populations. As the focal point of all the cognitive postulations is information processing biases for threatening information, the associations between information processing stages and the biases are highlighted.

1. Childhood Anxiety in a Nutshell

1.1. From Normal to Pathological Anxiety: Definition and Classification

The developmental period between early childhood and late adolescence has been viewed as an exquisite period of life as it involves rapid and substantial changes in physical, cognitive, behavioural, and socioemotional domains. In this period, neurons and the neuronal connections get enriched (Harvard University,

Center of Developing Child, 2007), gradual cognitive maturation takes place along with the sophistication of executive functions (Diamond, 2013), children become aware that their thoughts are linked to the way they feel and act (Birney & Sternberg, 2011), they grow out of needing another person and physical sensation to calm down and learn how to manage their emotions on their own (Thompson, 1991), and they transform into individuals capable of having idiosyncratic social relationships each of which have particular dynamics (Eccles & Roeser, 2011). These developmental milestones are necessary for adaptive functioning in various areas of life. However, development in one or some of these areas can take a divergent path than normative development (Huberty, 2012a), which leads to poor wellbeing and functioning in childhood. Oftentimes, these divergent paths shape the boundaries of wellbeing in adulthood.

The most prevalent and the earliest form of psychological disorders during childhood and adolescence are anxiety disorders (Beesdo et al., 2009; Polanczyk, Salum, Sugaya, Caye & Rohde, 2015). It causes distress and functional impairments such as low educational achievement, poor relationships with peers and teachers, low self-competence (Essau et al., 2000; Ezpeleta et al., 2001), suicidal behaviour, substance abuse, and early parenthood (Woodward & Fergusson, 2001). Thus, it creates a significant economic and social burden (Bandelow & Michaelis, 2015; Bodden, Dirksen & Bögels, 2008).

In essence, anxiety is defined as a defensive response to anticipatory threats underlined by worries while fear is characterised as a defensive response to real-life dangers (Castro-Fonseca & Perrin, 2014; Huberty, 2012b; Pine, Helfinstein, Bar-Haim, Nelson & Fox, 2009). Although anxiety is categorised as a negative emotional state most of the time, it is an interesting type of emotion with its function to alert for dangers, to adapt oneself to the demands of the environment, and ultimately to keep oneself alive (Al-Biltagi & Sarhan, 2016; Beesdo-Baum & Knappe, 2012). Therefore, everyone stands at some point on a continuum from the necessity to the psychopathology of anxiety experience.

Manifestation of anxiety at certain ages and in specific contexts is even considered to be a hallmark of typical development in young people. For example, stranger anxiety, separation anxiety, night-time anxiety during infancy and toddlerhood; fear of specific objects/situations, school anxiety during childhood; and anxiety regarding rejection from peers during adolescence are thought to be age-appropriate expressions of anxiety (Beesdo et al., 2009). Therefore, identifying what constitutes normative, subclinical, or pathological anxiety and whether a young person is standing on the pathological side of the

anxiety experience appears to be especially challenging in childhood and requires a thorough assessment (Beesdo et al., 2009).

Nevertheless, scholars agree that anxiety becomes pathological in children when a) it is persistent and not transient, b) not developmentally appropriate for the child's age, c) the reaction is disproportioned to the source of threat and irrational, and d) it interferes with and impairs everyday functioning as well as psychosocial development of the child (Al-Biltagi & Sarhan, 2016; Beesdo et al., 2009; Castro-Fonseca & Perrin, 2014; Huberty, 2012b; Nauta, 2005).

Pathological anxiety can be manifested in different sets of symptoms; hence, the term anxiety disorders commonly denote a cluster of distinct but interrelated disorders, all of which are underlined by extreme anxious apprehension and behavioural disturbances. This multipartite nature of anxiety is reflected in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5: American Psychiatric Association [APA], 2013) and the International Classification of Diseases (ICD-11: World Health Organization [WHO], 2018).

In DSM-4-TR, seven main anxiety disorders are classified: (1) Separation Anxiety Disorder (i.e., excessive anxiety about separation from home or attachment figures, the only anxiety disorder that is considered to be specific to childhood in the manual); (2) Generalized Anxiety Disorder (i.e., excessive and uncontrollable worry in various and not specific contexts); (3) Specific Phobias (i.e., persistent and marked fear evoked by anticipation or presence of certain objects or situations); (4) Social Phobia or Social Anxiety Disorder (i.e., the fear of performing or being embarrassed/humiliated in unfamiliar social situations); (5) Panic Disorder with or without agoraphobia (i.e., having panic attacks and also having persistent worry regarding the possibility of having panic attacks, can be accompanied by agoraphobia, which is the fear of open or crowded places); (6) Post Traumatic Stress Disorder (i.e., reexperiencing and avoidance of certain events with heightened arousal after being exposed to a certain traumatic event); (7) Obsessive Compulsive Disorder (i.e., presence of obsessions, recurrent intrusive thoughts marked by anxiety and presence of compulsions, repetitive behavioural rituals or mental acts to reduce of stress caused by obsessions) (APA, 2000 as cited in Arnold et al., 2003).

The latest DSM (DSM-5; APA, 2013) shows considerable amendments in the organization and grouping of anxiety disorders. Distinctive from its predecessor DSM-4-TR, two anxiety disorder subcategories are now separate categories in DSM-5. Accordingly, Obsessive Compulsive Disorder has become a separate chapter on its own titled Obsessive Compulsive and Related Disorders. Similarly, Post Traumatic Stress Disorder has also become a separate

category called Trauma- and Stressor-Related Disorders (APA, 2013 cited in Kupfer, 2015); and agoraphobia is a diagnosis independent of the presence of panic disorder (Creswell et al., 2014).

It is important to note that a substantial amount of childhood anxiety research is published based on the classification, assessments, and diagnosis criteria led by DSM-4-TR (APA, 2000) before the relatively recent release of DSM-5 (APA, 2013). Therefore, it is necessary and inevitable to establish links between current research and DSM-4-TR for meaningful literature continuity. So, the broad term anxiety disorders refer to all the disorders organized under anxiety disorders in DSM-4-TR within the scope of this review.

1.2. Distribution of Childhood Anxiety: Prevalence Rates

According to the British National Mental Health Survey of 5 to 15-year-olds (Meltzer et al.2003), the proportion of community children having any type of anxiety disorder at any point in their lives is 3.8%. Given that the same survey noted that the lifetime prevalence of children having any type of emotional disorder is 4.3% (Meltzer et al., 2003), the anxiety prevalence rate appears to be quite high in the British developmental population. The data from The Great Smoky Mountains Study of Youth in the US suggests that the most prevalent disorder among children is an anxiety disorder with a prevalence rate of 5.7% (Costello et al., 1996). Similarly, the results of The Epidemiology of Childhood Psychopathology in Turkey study reported a prevalence rate of 5.3% with impairment (i.e., parents and teachers also reported the degree of impairment in family and school settings) (Ercan et al., 2019).

However, there are ups and downs with large ranges in the estimates of anxiety prevalence across studies due to varieties in the sample populations, countries, informants, anxiety measurements, the definition of anxiety disorders, the diagnostic systems used, and the length of retrospective prevalence rate period (Al-Biltagi & Sarhan, 2016; Beesdo et al., 2009; Costello, Mustillo, Erkanli, Keeler & Angold 2003; Pine, 1997; Kessler, Petukhova, Sampson, Zaslavsky & Wittchen, 2012). Especially more recent reviews have reported higher lifetime prevalence rates in children and adolescents that vary between 4.7 - 9.1% (Polanczyk et al., 2015), 5.3 – 16.7% (Ercan et al., 2019), 15 - 20% (Beesdo et al., 2009), 2 - 24% (Merikangas, Nakamura & Kessler, 2009), and 9 - 32% (Creswell et al., 2014).

Additionally, not only the prevalence of diagnosis but also subclinical anxiety symptoms in community samples of non-referred children (i.e., trait anxiety) seem to be considerably high with a range of 9.8 - 30.6% (Bernstein,

Borchart & Perwien, 1996), and 70% of school children indicate that "they worry every now and then" (Al-Biltagi & Sarhan, 2016, p.19).

Anxiety prevalence is affected by sex. According to McLean and colleagues (McLean, Asnaani, Litz & Hofmann, 2011), the lifetime male: female prevalence ratio of having any anxiety disorder is 1: 1.7 in adults. This ratio in developmental populations is yet to be clarified due to limited reports on this issue (Costello, Egger, Copeland, Erkanli & Angold, 2011). But researchers agree that girls have a greater preponderance to have an anxiety disorder compared to boys for almost all the anxiety disorder types (Beesdo et al., 2009; Bernstein et al., 1996; Costello et al., 1996; Costello et al., 2003; Huberty, 2012b; Lewinsohn, Gotlib, Lewinsohn, Seeley & Allen, 1998), which mimics the distribution trend in adult females. The prevalence shows a consistent and sharper increase in girls starting from the age of five with a peak in adolescence in comparison to boys (Merikangas et al., 2009) and the ratio gets more divergent with development, reaching 1: 2– 3 in adolescence (Beesdo-Baum & Knappe, 2012; Wehry et al., 2015). Accordingly, the prevalence of having an anxiety disorder in youth aged between (a) 2 to 8 ranges between 6.1 – 14.8%, (b) 6 to 12 is 12.3%, and (c) 13 to 18 is 11% (i.e., specific phobia and social phobia are the most common ones in all groups) (Costello, Egger et al., 2011).

1.3. Anxiety Prognosis from Childhood Onward

Anxiety disorder subtypes, age of onset, and the criteria that differentiate pathological anxiety from age-appropriate anxiety expressions determine how anxiety unfolds from early childhood into late adolescence, and into adulthood in some cases.

Temperamental characteristics such as behavioural inhibition are an acknowledged risk factor in developing an anxiety disorder (Pérez-Edgar, Taber-Thomas, Auday & Morales, 2014) during early childhood (age between 2 to 8). Development of separation anxiety and specific phobias are common in this age group (Costello, Egger et al., 2011). Some primary symptoms of separation anxiety are refusal to leave home or go to school, reluctance to develop friendships, and somatic complaints (Huberty, 2012b). Age of onset for specific phobias, on the other hand, is dependent on the type of stimulus/situation. Behavioural manifestations of specific phobias involve increased physiological symptoms, and attempts to escape or avoid the situation accompanied by crying, tantrums, hiding, and flight (Huberty, 2012b).

Most types of anxiety disorders start to develop during middle childhood (age between 8 to 12). Specific phobia, separation anxiety, social phobia (also

known as social anxiety disorder), and generalized anxiety disorder are the most prevalent anxiety types in this age group (Costello, Egger et al., 2011). While social phobia during mid childhood is usually predicted by shyness and behavioural inhibition early on and the diagnosis is first made in early adolescence, the primary symptoms involve extreme social discomfort and self-consciousness, preferring to spend time with adults rather than peers, and physiological reactions in social settings (Huberty, 2012b). Generalized anxiety disorder, on the other hand, is pervasive across various settings and is manifested as uncontrollable worry about daily functioning and the future, doubts in efficacy, perfectionism, and competence in various social situations including school (Huberty, 2012b).

During adolescence (age between 12 and 18), the formerly developed anxiety disorders, especially generalized anxiety disorder, social phobia, and specific phobia, appear to persist (Costello, Egger et al. 2011; Huberty, 2012b). In addition, the age of onset of panic disorder is specific to the adolescence period; reported to be during late adolescence years and occurs less frequently during childhood (Huberty, 2012b). The behavioural manifestations include heart palpitations, sweating, shaking, fears of dying, loss of control, and the fear of having a panic attack (Huberty, 2012b).

Even though anxiety symptoms are known to wax and wane, researchers point out that anxiety is carried over from childhood to adolescence (Costello, Copeland, & Angold, 2011) and especially from adolescence to adulthood by getting stronger (Craske & Waters, 2005; Gregory et al., 2007; Costello, Copeland et al., 2011).

This temporal persistence could be in the form of stability in diagnosis or symptoms. For example, social phobia was found to have the strongest persistent continuity from late childhood to early adolescence (Ferdinand, Dieleman, Ormel, & Verhulst, 2007). This is in accordance with Pine and colleagues' (Pine, Cohen & Brook, 2001) results on social anxiety continuity from adolescence to adulthood.

Temporal continuity can also be manifested with the linkages with development of other disorders. As such, the presence of anxiety disorders in childhood is considered a precursor of the forthcoming disorders later in life (Wehry et al., 2015). Consequently, anxiety becomes a predicting factor for the occurrence of other disorders and problems such as depression and substance abuse (Beesdo et al., 2009; Woodward & Fergusson, 2001). Longitudinal studies support former anxiety diagnosis leading to another diagnosis. Accordingly, Last and colleagues reported that clinically anxious children had gained new

anxiety or other disorders during the two-year follow up and one in third of them still had a disorder at the end of the follow up (Last, Perrin, Hersen & Kazdin, 1996). Likewise, a more recent study also supported that anxiety predicts the prospective occurrence of other disorders by showing longitudinal links between anxiety and consecutive depression (Copeland, Shanahan, Costello & Angold, 2009).

The ratio of comorbidity presence, which is very common in paediatric anxiety, is another marker of prognosis. Oftentimes other anxiety subtypes accompany a principal anxiety disorder (Kendall et al., 2010). But anxiety has the highest comorbidity rate with depression in youth (Brady & Kendall, 1992; Cummings, Caporino & Kendall, 2014), which ranges from 28 to 53.7% (O'Neil, Podell, Benjamin & Kendall, 2010) and results in greater impairment than sole anxiety diagnosis (Cummings et al., 2014).

How anxious youth respond to treatment profoundly impacts the course of anxiety, as well. Remission rates appear to fluctuate among studies. However, low remission rates in the long term are not uncommon. For example, 73% of children and adolescents had an anxiety disorder or depression after a 10-year follow up despite their initial improved anxiety (Beesdo-Baum & Knappe, 2012), which suggests that anxiety is recurrent over time.

2. Anxious Children's Cognition

Given that anxiety is one of the most prevalent and debilitating disorders in childhood, qualifying anxious children's neurological response style, cognitive profiles, how they cope with anxiogenic emotions, and how all these are manifested in their behaviour have been a longstanding interest for developmental psychopathology researchers. With the rise of cognitive-behavioural approaches, childhood models of anxiety have shown great acknowledgement of how anxious children's cognition operates.

2.1. Anxious Children's Minds: Threat Schemas, Dysfunctional Reasoning Patterns, and Biased Threat Processing

According to Beck and Clark's (1988; 1997; 2010) influential schema-based cognitive theory of anxiety and depression, cognitive processes are necessary for the generation and maintenance of both adaptive and maladaptive emotions, which lead to emotional difficulties/disorders in the latter case. One critical concept of the theory is called schema, which refer to the cognitive representations of our prior knowledge and experiences. Accordingly, information is processed by screening, encoding, organizing, storing, and retrieving stages in the light of pre-existing schemas (Beck & Clark, 1988; 1997).

These schemas are activated in the presence of appropriate environmental stimuli. Correspondingly, Beck and Clark (1988) characterize anxiety with a heightened appreciation of environmental cues, selectivity in detecting danger, and underestimation of personal capability in dealing with them.

Schemas are assumed to have a role in children's anxious cognition as well. Building upon Beck's work, Kendall and colleagues (Ingram & Kendall, 1987) have proposed a general cognitive theory of childhood anxiety. Accordingly, cognitive distortions are underlined by over-active danger related schemas, which consistently lead the individual to detect threat and finally result in dysfunctional behavioural circuits (Kendall, 1985; Kendall & Chansky, 1991). In line with this, empirical studies have shown that cognitive profiles of anxious children can be broadly characterised by abnormal threat perception (Dalgleish et al., 2003) underlined by sensitivity to threat (Ehrenreich & Gross, 2002).

Maladaptive thoughts and beliefs that result from dysfunctional thinking processes (Kendall, 1985) exemplify the frequency of anxious children's extraction of threat cues in the ordinary. Studies employing the Children's Negative Error Cognitive Questionnaire (CNECQ, Leitenberg, Yost & Carroll-Wilson, 1986) have reported that both trait anxious (Maric, Heyne, van Widenfelt & Westenberg, 2011; Schwartz & Maric, 2015; Watts & Weems, 2006; Weems, Costa, Watts, Taylor & Cannon, 2007) and clinically anxious (Weems, Berman, Silverman & Saavedra, 2001) children typically have reasoning distortions in favour of danger exaggeration such as catastrophising, overgeneralizing the results of one single negative event, take responsibility for negative events and indulge in self-accusation, and focus on only a negative aspect of a situation.

The literature remains inconclusive as to whether this threat related distorted thinking is specific to anxiety or some of them are also shared by children with depression (Schwartz & Maric, 2015). Nevertheless, working on and modifying these dysfunctional thinking patterns (i.e., cognitive restructuring) is an important part of the cognitive-behavioural treatments of anxiety (Alfano, Beidel & Turner, 2002; Kendall, 1985, Clark & Beck, 2010; Manassis, 2013).

2.2. Crick and Dodge's (1994) Social Information Processing Model

In addition to the reasoning distortions above, extensive empirical research also highlights the role of prioritized processing of threatening information in the aetiology or maintenance of anxiety in youth (Field & Lester,

2010; Hadwin, Garner & Perez-Olivas, 2006; de Jong, 2014; Manassis, 2013; Mathews, 1990; Muris & Field, 2008; Weems & Watts, 2005).

What underlies the production or maintenance of threat-related dysfunctional belief systems and biases in threat processing requires the co-operation of several different cognitive processes such as attention, learning, memory, and decision making (Beck & Clark, 1997, Crick & Dodge, 1994; Dodge, 1991). Therefore, information processing models are invaluable as they offer a description of how cognitive processes with emotional input are associated with each other and how they shape behaviour. Correspondingly, cognitive theories of anxiety consistently underline the role of information processing in explaining the aetiology of both childhood and adult anxiety (Alfano et al., 2002; Muris & Field, 2008).

Characterizing and describing how information processing unfolds in children and which processing biases nest in the corresponding information processing stages is crucial for developing appropriate assessment methods and targeting these distortions during treatment (Bijttebier, 2003; Ehrenreich & Gross, 2002; Daleiden & Vasey, 1997; Muris & Field, 2008). Also, examining age-related changes and the factors related to the emergence of information processing biases during development are important to get a better grasp of child psychopathology (Hadwin et al., 2006).

In that regard, Crick and Dodge's (1991, 1994) Social Information Processing Theory outlines a stepwise prescription of how cognition operates during information processing. The theory has been recognized by many (Bijttebier, 2003) since the likely distortions in the processing stages provide explanations of what underpins the occurrence of disruptive behaviour in children such as externalizing behaviours, (Lansford et al., 2006); depression, (Luebbe, Bell, Allwood, Swenson & Early, 2010); autism spectrum disorders, (Mazza et al., 2017); and social competence and school readiness (Ziv, 2013).

According to the model, children process information through 6 steps: (1) encoding; (2) interpretation; (3) goal construction; (4) response access; (5) response decision; and (6) enactment. In the encoding stage, children select the information to focus on and start the processing. The interpretation stage involves attaching a meaning to the information by referring to the previous schema database in the long-term memory. In the goal construction stage, the tendency to behave in a certain way based on arousal occurs. During the response access, children examine their previous experiences to find the most appropriate reaction to the situation. Finally, they decide on a response and the enactment based on the choice occurs (Crick & Dodge, 1994).

2.3. Formulation of Anxious Children's Information Processing Biases for Threat

Although Crick and Dodge's (1994) model has received substantial recognition, a framework specific to how threatening information is processed by children with anxiety was much needed. By extending their work, Daleiden and Vasey (1997) proposed a model to explain how threat-related schemas and biases may manifest themselves through information processing stages by combining Kendall's (Kendall & Chansky, 1991) cognitive theory of childhood anxiety with Crick and Dodge's (1994) model. By examining the results of the converging empirical research with anxious children, they outlined how anxiety typically occurs at different stages of the process.

In the original model (Crick & Dodge,1994; Dodge, 1991); the processing starts with encoding, which involves the reception of internal or external stimuli and entry of the most relevant/salient stimuli to the processing system. Accordingly, Daleiden and Vasey (1997) postulated that the encoding stage entails selective attention to threat cues. This bias that takes place on the attentional level and *attention bias* for threat occurs (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg & IJzendoorn, 2007). Extensive research has shown that anxious children process threatening information differentially, either compared to their non-anxious counterparts (Dalgleish, Moradi, Taghavi, Neshat-Doost, & Yule, 2001; Reid, Salmon & Lovibond, 2006; Roy et al., 2008) or compared to neutral information (Hunt, Keogh & French, 2007; Waters & Lipp, 2008a; Waters & Lipp, 2008b). Literature also confirms that anxious children are vigilant to threat (Hadwin et al., 2003) and spend relatively little time to decide that something is threatening (Waters, Wharton, Zimmer-Gembeck & Craske, 2008).

The interpretation stage involves assessment of the situation and making inferences about it based on prior experiences stored in the long-term memory (Crick & Dodge, 1994; Dodge, 1991). At this stage (Daleiden & Vasey, 1997), anxiety manifests itself by interpreting ambiguous situations as threatening and so *interpretation bias* takes place (Bögels, Snieder & Kindt, 2003; Creswell & O'Connor, 2006; Muris, Kindt et al., 2000; Muris, Merckelbach & Damsma, 2000). In accordance with this, empirical research revealed that anxious children prefer to use the threatening meaning of homograph words (e.g., arms) rather than neutral meaning in sentences (Taghavi, Moradi, Neshat-Doost, Yule & Dalgleish, 2000); and they better match physical symptoms of anxiety with anxious emotion (Muris, Mayer, Freher, Duncan & van den Hout, 2010).

Because prior experience is an important factor that shapes the way we interpret a situation, danger interpretation is intrinsically linked with pre-existing danger schemas. Therefore, memory is inevitably at play at the interpretation stage (Muris & Field, 2008; Weems & Watts, 2005). The propensity of remembering more negative information rather than positive information in congruence with a negative emotional state is called *memory bias* (Muris & Field, 2008). In support of this, literature has shown that anxious children recall more negative words or fewer positive words after being presented with a mixture of words (Dalgleish et al., 2003; Moradi, Taghavi, Neshat-Doost, Yule & Dalgleish, 2000; Vassilopoulos, 2012; Watts & Weems, 2006; Reid et al., 2006), and interestingly show superior recognition of faces with negative expressions (Foa, Gilboa-Schechtman, Amir & Freshman, 2000).

Goal construction involves psycho-physiological arousal that the meaning of the situation brings and requires determination of what to do within the corresponding situation (Crick & Dodge, 1994). As for anxiety, it is typically motivated by escape from danger and behavioural avoidance to reduce anxious arousal (Daleiden & Vasey, 1997). During response construction, anxious children refer to their previous experiences regarding how they had coped with similar stimuli/situations before, which usually consist of avoidant behaviours (Daleiden & Vasey, 1997). Following these, response selection and enactment comprising of avoidant strategies take place. No bias type is thought to occur specifically within these final three stages. However, considering that danger schemas need to be accessed to determine what to do and how to do in threatening situations, long term memory should be at play (Crick & Dodge, 1994). Therefore, it is safe to assume that memory bias for threat is in operation also during these stages.

The processing stages and different biases observed within these stages allow examining the potential contingency between these biases. Weems and Watts (2005) have posited that there may be a temporal mediational association between these biases. A similar integration approach was also embraced by Muris and Field (2008). Accordingly, cognitive distortions leading to anxiety start with attention bias with the selective encoding of threat into the system. This in turn awakens memories related to danger and results in an increased stream of negative memories. Information recalled from these memories leads to biases in interpretation. The interaction between memory bias and interpretation bias can also result in newly created danger schemas.

This suggests that aberrations in the processing of emotional information start with the encoding stage, where attention bias occurs for the disorder

related stimuli. So, attention bias appears to have a distinct role as it determines what information would be entered into the system for further processing. Furthermore, if indeed there is a contingency between the biases, attention bias appears to have the potential to modulate the following processing stages, which would ultimately impact the efficiency of response style to the threatening information. In other words, targeting to reduce attention bias in the first place may be linked to reduced occurrence of interpretation and memory biases.

Conclusion

Overall, anxiety disorders are one of the most common psychiatric disorders in children and adolescents with relatively high stability into adulthood. A rich volume of research during the past 30 years highlights the role of cognitive factors in the management of emotional information and how these are linked to the development and maintenance of anxiety. Therefore, the co-evolution of advancements in understanding the nature of anxiety in paediatric populations and cognition-based therapy techniques as anxiety intervention is not surprising. In that regard, a novel set of treatment techniques called cognitive bias modification techniques (i.e., computer-based intervention techniques to alter attention, interpretation, and memory biases in support of positive or neutral stimuli rather than disorder-related stimuli) appear to be promising in the treatment of anxiety (Beard, 2021; Hakamata et al., 2010; Kuckertz & Amir, 2017; Linetzky, Pergamin-Hight, Pine & Bar-Haim, 2015; MacLeod & Mathews, 2012; Tran, Hertel & Joorman, 2011).

References:

Al-Biltagi, M., & Sarhan, A. A. (2016). Anxiety Disorder in Children: Review. *Journal of Paediatric Care*, *1* (1), 18-28. https://doi.org/10.24218/jpci.2016.05

Alfano, C. A., Beidel, D. C., & Turner, S. M. (2002). Cognition in childhood anxiety: conceptual, methodological, and developmental issues. *Clinical Psychology Review*, *22* (8), 1209–1238. https://doi.org/10.1016/s0272-7358(02)00205-2

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th Ed., text rev.). Washington, DC: Author.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th Ed.). Washington, DC: Author. https://doi.org/10.1176/appi.books.9780890425596

Arnold, P., Banerjee, S. P., Bhandari, R., Lorch, E., Ivey, J., Rose, M., & Rosenberg, D. R. (2003). Childhood anxiety disorders and developmental issues in anxiety. *Current Psychiatry Reports*, *5* (4), 252–265. https://doi.org/10.1007/s11920-003-0054-9

Bandelow, B., & Michaelis, S. (2015). Epidemiology of anxiety disorders in the 21st century. *Dialogues in Clinical Neuroscience, 17* (3), 327-335.

Bar-Haim, Y., Lamy, D., Pergamin, L., Bakermans-Kranenburg, M. J., & van IJzendoorn, M. H. (2007). Threat-related attentional bias in anxious and nonanxious individuals: a meta-analytic study. *Psychological Bulletin*, *133* (1), 1–24. https://doi.org/10.1037/0033-2909.133.1.1

Beard C. (2011). Cognitive bias modification for anxiety: current evidence and future directions. *Expert review of neurotherapeutics*, *11* (2), 299–311. https://doi.org/10.1586/ern.10.194

Beck, A. T., & Clark, D. A. (1997). An information processing model of anxiety: automatic and strategic processes. *Behaviour Research and Therapy*, *35* (1), 49–58. https://doi.org/10.1016/s0005-7967(96)00069-1

Beck, A., & Clark, D. (1988). Anxiety and depression: An information processing perspective. *Anxiety Research*, 1 (1), 23-36. https://doi.org/10.1080/10615808808248218

Beesdo, K., Knappe, S., & Pine, D. S. (2009). Anxiety and anxiety disorders in children and adolescents: developmental issues and implications for DSM-V. *The Psychiatric Clinics of North America*, *32* (3), 483–524. https://doi.org/10.1016/j.psc.2009.06.002

Beesdo-Baum, K., & Knappe, S. (2012). Developmental epidemiology of anxiety disorders. *Child and adolescent psychiatric clinics of North America*, *21* (3), 457–478. https://doi.org/10.1016/j.chc.2012.05.001

Bernstein, G. A., Borchardt, C. M., & Perwien, A. R. (1996). Anxiety disorders in children and adolescents: a review of the past 10 years. *Journal of the American Academy of Child and Adolescent Psychiatry*, *35* (9), 1110–1119. https://doi.org/10.1097/00004583-199609000-00008

Bijttebier, P., Vasey, M. W., & Braet, C. (2003). The information-processing paradigm: a valuable framework for clinical child and adolescent psychology. *Journal of Clinical Child and Adolescent Psychology*, *32* (1), 2–9. https://doi.org/10.1207/S15374424JCCP3201_01

Birney, D. P., & Sternberg, R. J. (2011). The development of cognitive abilities. In M. H. Bornstein & M. E. Lamb (Eds.), *Developmental science: An Advanced Textbook*, 353–388. Psychology Press. https://doi.org/10.4324/9780203846766

Bodden, D. H. M., Dirksen, C. D., & Bögels, S. M. (2008). Societal burden of clinically anxious youth referred for treatment: A cost-of-illness study. *Journal of Abnormal Child Psychology, 36* (4), 487–497. https://doi.org/10.1007/s10802-007-9194-4

Bögels, S. M., Snieder, N., & Kindt, M. (2003). Specificity of dysfunctional thinking in children with symptoms of social anxiety, separation anxiety and generalised anxiety. *Behaviour Change, 20* (3), 160–169. https://doi.org/10.1375/bech.20.3.160.24836

Brady, E. U., & Kendall, P. C. (1992). Comorbidity of anxiety and depression in children and adolescents. *Psychological Bulletin*, *111* (2), 244–255. https://doi.org/10.1037/0033-2909.111.2.244

Castro- Fonseca, A. &, Perrin, S. (2014). The clinical phenomenology and classification of child and adolescent anxiety. In W.K. Silverman & A.P. Field (2nd Ed.), *Anxiety Disorders in Children and Adolescents*, 25-55. New York: Cambridge University Press. https://doi.org/10.1017/CBO9780511994920.003

Center on the Developing Child (2007). *The Science of Early Childhood Development* (InBrief). Retrieved from https://developingchild.harvard.edu/resources/inbrief-science-of-ecd/

Clark, D. A., & Beck, A. T. (2010). Cognitive theory and therapy of anxiety and depression: convergence with neurobiological findings. *Trends in Cognitive Sciences*, *14* (9), 418–424. https://doi.org/10.1016/j.tics.2010.06.007

Copeland, W. E., Shanahan, L., Costello, E. J., & Angold, A. (2009). Childhood and adolescent psychiatric disorders as predictors of young adult disorders. *Archives of General Psychiatry*, *66* (7), 764–772. https://doi.org/10.1001/archgenpsychiatry.2009.85

Costello, E. J., Angold, A., Burns, B. J., Stangl, D. K., Tweed, D. L., Erkanli, A., & Worthman, C. M. (1996). The Great Smoky Mountains Study of Youth. Goals, design, methods, and the prevalence of DSM-III-R disorders. *Archives of General Psychiatry*, *53* (12), 1129–1136. https://doi.org/10.1001/archpsyc.1996.01830120067012

Costello, E. J., Copeland, W., & Angold, A. (2011). Trends in psychopathology across the adolescent years: what changes when children become adolescents, and when adolescents become adults? *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, *52* (10), 1015–1025. https://doi.org/10.1111/j.1469-7610.2011.02446.x

Costello, E.J., Egger, H.L., Copeland, W., Erkanli, A., & Angold, A. (2011). The developmental epidemiology of anxiety disorders: Phenomenology, prevalence, and comorbidity. In W. Silverman & A. Field (Eds.), *Anxiety Disorders in Children and Adolescents*, 56 - 75. Cambridge: Cambridge University Press. https://doi:10.1017/CBO9780511994920.004

Costello, E.J., Mustillo, S., Erkanli, A., Keeler, G., & Angold, A. (2003). Prevalence and development of psychiatric disorders in childhood and adolescence. *Archives of General Psychiatry*, *60* (8), 837–844. https://doi.org/10.1001/archpsyc.60.8.837

Craske, M. G., & Waters, A. M. (2005). Panic disorder, phobias, and generalized anxiety disorder. *Annual Review of Clinical Psychology*, *1*, 197–225. https://doi.org/10.1146/annurev.clinpsy.1.102803.143857

Creswell, C., & O'Connor, T. G. (2006). 'Anxious cognitions' in children: An exploration of associations and mediators. *British Journal of Developmental Psychology, 24* (4), 761–766. https://doi.org/10.1348/026151005X70418

Creswell, C., Waite, P., & Cooper, P. J. (2014). Assessment and management of anxiety disorders in children and adolescents. *Archives of Disease in Childhood*, *99* (7), 674–678. https://doi.org/10.1136/archdischild-2013-303768

Crick, N. R., & Dodge, K. A. (1994). A review and reformulation of social information-processing mechanisms in children's social adjustment. *Psychological Bulletin, 115* (1), 74–101. https://doi.org/10.1037/0033-2909.115.1.74

Cummings, C. M., Caporino, N. E., & Kendall, P. C. (2014). Comorbidity of anxiety and depression in children and adolescents: 20 years after. *Psychological Bulletin*, *140* (3), 816–845. https://doi.org/10.1037/a0034733

Daleiden, E. L., & Vasey, M. W. (1997). An information-processing perspective on childhood anxiety. *Clinical Psychology Review*, *17* (4), 407–429. https://doi.org/10.1016/s0272-7358(97)00010-x

Dalgleish, T., Moradi, A. R., Taghavi, M. R., Neshat-Doost, H. T., & Yule, W. (2001). An experimental investigation of hypervigilance for threat in children and adolescents with post-traumatic stress disorder. *Psychological Medicine*, *31* (3), 541–547. https://doi.org/10.1017/s0033291701003567

Dalgleish, T., Taghavi, R., Neshat-Doost, H., Moradi, A., Canterbury, R., & Yule, W. (2003). Patterns of processing bias for emotional information across clinical disorders: a comparison of attention, memory, and prospective cognition in children and adolescents with depression, generalized anxiety, and posttraumatic stress disorder. *Journal of Clinical Child and Adolescent Psychology, 32* (1), 10–21. https://doi.org/10.1207/S15374424JCCP3201_02

de Jong, P. (2014). Information Processing. In P. Emmelkamp & T. Ehring (Eds), *The Wiley Handbook of Anxiety Disorders,* 125 - 148. West Sussex: Wiley-Blackwell. https://doi.org/10.1002/9781118775349.ch9

Diamond A. (2013). Executive functions. *Annual Review of Psychology*, *64*, 135–168. https://doi.org/10.1146/annurev-psych-113011-143750

Dodge, K. A. (1991). Emotion and social information processing. In J. Garber & K. A. Dodge (Eds.), *Cambridge studies in social and emotional development: The development of emotion regulation and dysregulation,* 159–181. Cambridge University Press. https://doi.org/10.1017/CBO9780511663963.009

Eccles, J. S., & Roeser, R. W. (2011). School and community influences on human development. In M. H. Bornstein & M. E. Lamb (Eds.), *Developmental science: An advanced textbook*, 571–643. Psychology Press. https://doi.org/10.4324/9780203846766

Ehrenreich, J. T., & Gross, A. M. (2002). Biased attentional behavior in childhood anxiety. A review of theory and current empirical investigation. *Clinical Psychology Review*, *22* (7), 991–1008. https://doi.org/10.1016/s0272-7358(01)00123-4

Ercan, E. S., Polanczyk, G., Akyol Ardıc, U., Yuce, D., Karacetın, G., Tufan, A. E., Tural, U., Aksu, H., Aktepe, E., Rodopman Arman, A., Başgül, S., Bılac, O., Coşkun, M., Celık, G. G., Karakoc Demırkaya, S., Dursun, B. O., Durukan, İ., Fidan, T., Perdahlı Fiş, N., Gençoğlan, S., … Yıldız, N. (2019). The prevalence of

childhood psychopathology in Turkey: a cross-sectional multicenter nationwide study (EPICPAT-T). *Nordic journal of psychiatry*, *73* (2), 132–140. https://doi.org/10.1080/08039488.2019.1574892

Essau, C. A., Conradt, J., & Petermann, F. (2000). Frequency, comorbidity, and psychosocial impairment of anxiety disorders in German adolescents. *Journal of Anxiety Disorders*, *14* (3), 263–279. https://doi.org/10.1016/s0887-6185(99)00039-0

Ezpeleta, L., Keeler, G., Erkanli, A., Costello, E. J., & Angold, A. (2001). Epidemiology of psychiatric disability in childhood and adolescence. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, *42* (7), 901–914. https://doi.org/10.1111/1469-7610.00786

Ferdinand, R. F., Dieleman, G., Ormel, J., & Verhulst, F. C. (2007). Homotypic versus heterotypic continuity of anxiety symptoms in young adolescents: evidence for distinctions between DSM-IV subtypes. *Journal of Abnormal Child Psychology*, *35* (3), 325–333. https://doi.org/10.1007/s10802-006-9093-0

Field, A. P., & Lester, K. J. (2010). Is there room for 'development' in developmental models of information processing biases to threat in children and adolescents? *Clinical Child and Family Psychology Review*, *13* (4), 315–332. https://doi.org/10.1007/s10567-010-0078-8

Foa, E. B., Gilboa-Schechtman, E., Amir, N., & Freshman, M. (2000). Memory bias in generalized social phobia: remembering negative emotional expressions. *Journal of Anxiety Disorders*, *14* (5), 501–519. https://doi.org/10.1016/s0887-6185(00)00036-0

Gregory, A. M., Caspi, A., Moffitt, T. E., Koenen, K., Eley, T. C., & Poulton, R. (2007). Juvenile mental health histories of adults with anxiety disorders. *The American Journal of Psychiatry*, *164* (2), 301–308. https://doi.org/10.1176/ajp.2007.164.2.301

Hadwin, J. A., Donnelly, N., French, C. C., Richards, A., Watts, A., & Daley, D. (2003). The influence of children's self-report trait anxiety and depression on visual search for emotional faces. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, *44* (3), 432–444. https://doi.org/10.1111/1469-7610.00133

Hadwin, J. A., Garner, M., & Perez-Olivas, G. (2006). The development of information processing biases in childhood anxiety: a review and exploration of its origins in parenting. *Clinical Psychology Review*, *26* (7), 876–894. https://doi.org/10.1016/j.cpr.2005.09.004

Hakamata, Y., Lissek, S., Bar-Haim, Y., Britton, J. C., Fox, N. A., Leibenluft, E., Ernst, M., & Pine, D. S. (2010). Attention bias modification treatment: a meta-analysis toward the establishment of novel treatment for anxiety. *Biological Psychiatry*, *68* (11), 982–990. https://doi.org/10.1016/j.biopsych.2010.07.021

Huberty, T. J. (2012a). Foundations of Developmental Psychopathology. In T.J. Huberty (Ed.), *Anxiety and depression in children and adolescents: Assessment, intervention, and prevention,* 3-28. Springer Science + Business Media. https://doi.org/10.1007/978-1-4614-3110-7

Huberty, T. J. (2012b). The Developmental Psychopathology of Anxiety. In T.J. Huberty (Ed.), *Anxiety and depression in children and adolescents: Assessment, intervention, and prevention*, 29-53. Springer Science + Business Media. https://doi.org/10.1007/978-1-4614-3110-7

Hunt, C., Keogh, E., & French, C. C. (2007). Anxiety sensitivity, conscious awareness and selective attentional biases in children. *Behaviour Research and Therapy*, *45* (3), 497–509. https://doi.org/10.1016/j.brat.2006.04.001

Ingram, R., & Kendall, E. (1987). The cognitive side of anxiety. *Cognitive Therapy and Research*, 11 (5), 523-536. https://doi.org/10.1007/BF01183856

Kendall P. C. (1985). Toward a cognitive-behavioral model of child psychopathology and a critique of related interventions. *Journal of Abnormal Child Psychology*, *13* (3), 357–372. https://doi.org/10.1007/BF00912722

Kendall, P. C., Compton, S. N., Walkup, J. T., Birmaher, B., Albano, A. M., Sherrill, J., Ginsburg, G., Rynn, M., McCracken, J., Gosch, E., Keeton, C., Bergman, L., Sakolsky, D., Suveg, C., Iyengar, S., March, J., & Piacentini, J. (2010). Clinical characteristics of anxiety disordered youth. *Journal of Anxiety Disorders*, *24* (3), 360–365. https://doi.org/10.1016/j.janxdis.2010.01.009

Kendall, P., & Chansky, T. (1991). Considering cognition in anxiety-disordered children. *Journal of Anxiety Disorders*, 5 (2), 167-185. https://doi.org/10.1016/0887-6185(91)90027-Q

Kessler, R. C., Petukhova, M., Sampson, N. A., Zaslavsky, A. M., & Wittchen, H. (2012). Twelve-month and lifetime prevalence and lifetime morbid risk of anxiety and mood disorders in the United States. *International Journal of Methods in Psychiatric Research*, *21* (3), 169–184. https://doi.org/10.1002/mpr.1359

Kuckertz, J. M., & Amir, N. (2017). Cognitive bias modification. In S. G. Hofmann & G. J. G. Asmundson (Eds.), *The science of cognitive behavioral therapy*, 463–491. Elsevier Academic Press. https://doi.org/10.1016/B978-0-12-803457-6.00019-2

Kupfer D. J. (2015). Anxiety and DSM-5. *Dialogues in Clinical Neuroscience*, *17*(3), 245–246.

Lansford, J. E., Malone, P. S., Stevens, K. I., Dodge, K. A., Bates, J. E., & Pettit, G. S. (2006). Developmental trajectories of externalizing and internalizing behaviors: factors underlying resilience in physically abused children. *Development and Psychopathology*, *18* (1), 35–55. https://doi.org/10.1017/S0954579406060032

Last, C. G., Perrin, S., Hersen, M., & Kazdin, A. E. (1996). A prospective study of childhood anxiety disorders. *Journal of the American Academy of Child and Adolescent Psychiatry*, *35* (11), 1502–1510. https://doi.org/10.1097/00004583-199611000-00019

Leitenberg, H., Yost, L. W., & Carroll-Wilson, M. (1986). Negative cognitive errors in children: questionnaire development, normative data, and comparisons between children with and without self-reported symptoms of depression, low self-esteem, and evaluation anxiety. *Journal of Consulting and Clinical Psychology*, *54* (4), 528–536. https://doi.org/10.1037//0022-006x.54.4.528

Lewinsohn, P. M., Gotlib, I. H., Lewinsohn, M., Seeley, J. R., & Allen, N. B. (1998). Gender differences in anxiety disorders and anxiety symptoms in adolescents. *Journal of Abnormal Psychology*, *107* (1), 109–117. https://doi.org/10.1037//0021-843x.107.1.109

Linetzky, M., Pergamin-Hight, L., Pine, D. S., & Bar-Haim, Y. (2015). Quantitative evaluation of the clinical efficacy of attention bias modification treatment for anxiety disorders. *Depression and Anxiety*, *32* (6), 383–391. https://doi.org/10.1002/da.22344

Luebbe, A. M., Bell, D. J., Allwood, M. A., Swenson, L. P., & Early, M. C. (2010). Social information processing in children: specific relations to anxiety, depression, and affect. *Journal of Clinical Child and Adolescent Psychology*, *39* (3), 386–399. https://doi.org/10.1080/15374411003691685

MacLeod, C., & Mathews, A. (2012). Cognitive bias modification approaches to anxiety. *Annual review of clinical psychology*, *8*, 189–217. https://doi.org/10.1146/annurev-clinpsy-032511-143052

Manassis, K. (2013). Cognitive findings in childhood anxiety: Translations for clinical practice. *Translational Neuroscience*, 4 (1), 88-95. https://doi.org/10.2478/s13380-013-0110-9

Maric, M., Heyne, D. A., van Widenfelt, B. M., & Westenberg, P. M. (2011). Distorted Cognitive Processing in Youth: The Structure of Negative Cognitive

Errors and Their Associations with Anxiety. *Cognitive Therapy and Research*, *35* (1), 11–20. https://doi.org/10.1007/s10608-009-9285-3

Mathews A. (1990). Why worry? The cognitive function of anxiety. *Behaviour Research and Therapy*, *28* (6), 455–468. https://doi.org/10.1016/0005-7967(90)90132-3

Mazza, M., Mariano, M., Peretti, S., Masedu, F., Pino, M. C., & Valenti, M. (2017). The Role of Theory of Mind on Social Information Processing in Children with Autism Spectrum Disorders: A Mediation Analysis. *Journal of Autism and Developmental Disorders*, *47* (5), 1369–1379. https://doi.org/10.1007/s10803-017-3069-5

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* (8), 1027–1035. https://doi.org/10.1016/j.jpsychires.2011.03.006

Meltzer, H., Gatward, R., Goodman, R., & Ford, T. (2003). Mental health of children and adolescents in Great Britain. *International Review of Psychiatry, 15* (1-2), 185–187. https://doi.org/10.1080/0954026021000046155

Merikangas, K. R., Nakamura, E. F., & Kessler, R. C. (2009). Epidemiology of mental disorders in children and adolescents. *Dialogues in Clinical Neuroscience*, *11* (1), 7–20.

Moradi, A. R., Taghavi, R., Neshat-Doost, H. T., Yule, W., & Dalgleish, T. (2000). Memory bias for emotional information in children and adolescents with posttraumatic stress disorder: a preliminary study. *Journal of Anxiety Disorders*, *14* (5), 521–534. https://doi.org/10.1016/s0887-6185(00)00037-2

Muris, P., & Field, A. P. (2008). Distorted cognition and pathological anxiety in children and adolescents. *Cognition and Emotion, 22* (3), 395–421. https://doi.org/10.1080/02699930701843450`

Muris, P., Kindt, M., Bögels, S., Merckelbach, H., Gadet, B., & Moulaert, V. (2000). Anxiety and threat perception abnormalities in normal children. *Journal of Psychopathology and Behavioral Assessment, 22* (2), 183–199. https://doi.org/10.1023/A:1007588524525

Muris, P., Mayer, B., Freher, N. K., Duncan, S., & van den Hout, A. (2010). Children's internal attributions of anxiety-related physical symptoms: age-related patterns and the role of cognitive development and anxiety sensitivity. *Child Psychiatry and Human Development*, *41* (5), 535–548. https://doi.org/10.1007/s10578-010-0186-1

Muris, P., Merckelbach, H., & Damsma, E. (2000). Threat perception bias in nonreferred, socially anxious children. *Journal of Clinical Child Psychology*, *29* (3), 348–359. https://doi.org/10.1207/S15374424JCCP2903_6

Nauta, M. H. (2005). Anxiety disorders in children and adolescents: Assessment, cognitive behavioural therapy, and predictors of treatment outcome. [S.l.]: [S.n.].

O'Neil, K. A., Podell, J. L., Benjamin, C. L., & Kendall, P. C. (2010). Comorbid depressive disorders in anxiety-disordered youth: demographic, clinical, and family characteristics. *Child Psychiatry and Human Development*, *41* (3), 330–341. https://doi.org/10.1007/s10578-009-0170-9

Pérez-Edgar, K., Taber-Thomas, B., Auday, E., & Morales, S. (2014). Temperament and attention as core mechanisms in the early emergence of anxiety. In K.H. Lagattuta, C.A. Davis (Eds.) *Children and Emotion,* 42-56. Karger Publishers. https://doi.org/10.1159/isbn.978-3-318-02489-0

Pine, D. S. (1997). Childhood anxiety disorders. *Current Opinion in Pediatrics*, *9* (4), 329-338. https://doi.org/10.1097/00008480-199708000-00006

Pine, D. S., Cohen, P., & Brook, J. (2001). Adolescent fears as predictors of depression. *Biological Psychiatry*, *50* (9), 721–724. https://doi.org/10.1016/s0006-3223(01)01238-0

Pine, D. S., Helfinstein, S. M., Bar-Haim, Y., Nelson, E., & Fox, N. A. (2009). Challenges in developing novel treatments for childhood disorders: lessons from research on anxiety. *Neuropsychopharmacology, 34* (1), 213–228. https://doi.org/10.1038/npp.2008.113

Polanczyk, G. V., Salum, G. A., Sugaya, L. S., Caye, A., & Rohde, L. A. (2015). Annual research review: A meta-analysis of the worldwide prevalence of mental disorders in children and adolescents. *Journal of Child Psychology and Psychiatry, 56* (3), 345–365. https://doi.org/10.1111/jcpp.12381

Reid, S. C., Salmon, K., & Lovibond, P. F. (2006). Cognitive Biases in Childhood Anxiety, Depression, and Aggression: Are they Pervasive or Specific? *Cognitive Therapy and Research, 30* (5), 531–549. https://doi.org/10.1007/s10608-006-9077-y

Roy, A. K., Vasa, R. A., Bruck, M., Mogg, K., Bradley, B. P., Sweeney, M., Bergman, R. L., McClure-Tone, E. B., Pine, D. S., & CAMS Team (2008). Attention bias toward threat in pediatric anxiety disorders. *Journal of the American Academy of Child and Adolescent Psychiatry*, *47* (10), 1189–1196. https://doi.org/10.1097/CHI.0b013e3181825ace

Schwartz, J. S., & Maric, M. (2015). Negative Cognitive Errors in Youth: Specificity to Anxious and Depressive Symptoms and Age Differences. *Behavioural and Cognitive Psychotherapy*, *43* (5), 526–537. https://doi.org/10.1017/S1352465814000228

Taghavi, M. R., Moradi, A. R., Neshat-Doost, H. T., Yule, W., & Dalgleish, T. (2000). Interpretation of ambiguous emotional information in clinically anxious children and adolescents. *Cognition and Emotion, 14* (6), 809–822. https://doi.org/10.1080/02699930050156645

Thompson, R. (1991). Emotional regulation and emotional development. *Educational Psychology Review*, 3 (4), 269-307. https://doi.org/10.1007/BF01319934

Tran, T. B., Hertel, P. T., & Joormann, J. (2011). Cognitive bias modification: Induced interpretive biases affect memory. *Emotion, 11* (1), 145–152. https://doi.org/10.1037/a0021754

Vassilopoulos, S. P. (2012). Social anxiety and memory biases in middle childhood: A preliminary study. *Hellenic Journal of Psychology*, *9*, 114-131.

Waters, A. M., & Lipp, O. V. (2008a). The influence of animal fear on attentional capture by fear-relevant animal stimuli in children. *Behaviour Research and Therapy*, *46* (1), 114–121. https://doi.org/10.1016/j.brat.2007.11.002

Waters, A. M., & Lipp, O. V. (2008b). Visual search for emotional faces in children. *Cognition and Emotion, 22* (7), 1306–1326. https://doi.org/10.1080/02699930701755530

Waters, A. M., Wharton, T. A., Zimmer-Gembeck, M. J., & Craske, M. G. (2008). Threat-based cognitive biases in anxious children: comparison with non-anxious children before and after cognitive behavioural treatment. *Behaviour Research and Therapy*, *46* (3), 358–374. https://doi.org/10.1016/j.brat.2008.01.002

Watts, S. E., & Weems, C. F. (2006). Associations among selective attention, memory bias, cognitive errors and symptoms of anxiety in youth. *Journal of Abnormal Child Psychology*, *34* (6), 841–852. https://doi.org/10.1007/s10802-006-9066-3

Weems, C. F., Berman, S. L., Silverman, W. K., & Saavedra, L. M. (2001). Cognitive errors in youth with anxiety disorders: The linkages between negative cognitive errors and anxious symptoms. *Cognitive Therapy and Research, 25* (5), 559–575. https://doi.org/10.1023/A:1005505531527

Weems, C. F., Costa, N. M., Watts, S. E., Taylor, L. K., & Cannon, M. F. (2007). Cognitive errors, anxiety sensitivity, and anxiety control beliefs: their

unique and specific associations with childhood anxiety symptoms. *Behavior Modification*, *31* (2), 174–201. https://doi.org/10.1177/0145445506297016

Weems, C. F., & Watts, S. E. (2005). Cognitive Models of Childhood Anxiety. In C. M. Velotis (Ed.), *Anxiety Disorder Research,* 205–232. Nova Science Publishers.

Wehry, A. M., Beesdo-Baum, K., Hennelly, M. M., Connolly, S. D., & Strawn, J. R. (2015). Assessment and treatment of anxiety disorders in children and adolescents. *Current Psychiatry Reports*, *17* (7), 52. https://doi.org/10.1007/s11920-015-0591-z

Woodward, L. J., & Fergusson, D. M. (2001). Life course outcomes of young people with anxiety disorders in adolescence. *Journal of the American Academy of Child and Adolescent Psychiatry*, *40* (9), 1086–1093. https://doi.org/10.1097/00004583-200109000-00018

World Health Organization. (2018). *International classification of diseases for mortality and morbidity statistics* (11th Revision). Retrieved from https://icd.who.int/browse11/l-m/en

Ziv Y. (2013). Social information processing patterns, social skills, and school readiness in preschool children. *Journal of Experimental Child Psychology*, *114* (2), 306–320. https://doi.org/10.1016/j.jecp.2012.08.009