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# The effect of habituation and changes in cognition on anxious children's performance on the WISC-IV

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THE EFFECT OF HABITUATION AND CHANGES IN COGNITION ON
ANXIOUS CHILDREN'S PERFORMANCE ON THE WISC-IV

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To my husband Daniel NoackLeSage and my parents Ilona and Ralf Noack. Thank you for your continuous support, kind words of encouragement, and loving patience.

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An meinen Mann Daniel NoackLeSage und meine Eltern, Ilona und Ralf Noack. Danke für eure grenzenlose Unterstützung, eure freundlichen Worte der Ermutigung, und euer liebevolles Verständnis.

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# ABSTRACT

Researchers have shown that children with anxiety disorders perform worse on intelligence tests than children with no diagnosable disorders. At this point, two theories have been put forth to describe the direction of this relationship: anxiety results in lowered test performance, and underlying cognitive deficits result in the development of anxiety. Lowered test performance as a result of anxiety may either be due to attention-deficits due to state anxiety or anxiety-elicited difficulties with long-term retention and learning. The purpose of this study was to further examine the first theory: that clinical levels of anxiety can hamper intelligence test performance in children with anxiety disorders due to attention-deficits in the testing situation. Although anxious children were expected to perform worse at the beginning of testing than non-anxious controls, this discrepancy should have diminished over time as a result of habituation. This study drew from data collected at the Psychological Services Center at Louisiana State University as part of the child psychoeducational testing performed there. From an overall possible sample of 259, a total of 72 children (52% male) were identified as candidates for the current study. Subsequently, they were assigned to one of three groups based on their diagnostic profiles: Anxious Group (n=22), Control Group (n=30), or Comorbid Group (n=20). Contrary to the hypothesis, no differences were observed between children in the anxious, comorbid, and control groups on FSIQ. Further, no significant improvements were seen across subtests in the anxious group. The current findings suggest that habituation to the testing situation has no significant effect on anxious children's performance on IQ tests. Suggestions for future studies and limitations are outlined in the discussion section.

# CHAPTER 1. INTRODUCTION

Anxiety disorders are defined as fear or anxiety that is persistent or excessive, often leading the affected individual to engage in dysfunctional or maladaptive behaviors (Barlow, 2004). Whereas fear is considered the immediate physical response (e.g., increased heart rate) to a specific stimulus, anxiety is based on the individual's anticipation of adverse outcomes in the future (Barlow, 2004). Although distinct, anxiety and fear often overlap to varying degrees among the different types of disorders. One way to differentiate between the various anxiety diagnoses is the stimuli that elicit the fear or anxiety in an individual, however many other differences exist. But even individuals with the same anxiety diagnosis differ in the way they experience (e.g., intensity, duration) and react to the feared stimulus. Behavioral responses to the aversive stimulus can range from avoidance to aggression, in accordance with the familiar fight or flight response (Cannon, 1929). The fight or flight response is a concept describing two categories of behaviors in which a person may engage in when feeling threatened. More recent conceptualizations have pushed towards the inclusion of the freeze and fright response into the fight or flight model (Bracha, Ralston, & Matsukawa, 2004). Overall these behaviors are responses to the activity of the sympathetic nervous system that may result in lower or higher blood pressure, heart rate, and respiratory rate. Whereas the freeze, flight, or fight responses are a result of increased activity of the sympathetic nervous system, the fright response result in decreased activity. According to Bracha, Ralston, and Matsukawa (2004), freeze and fright responses may appear similar, but have different underlying mechanisms and different evolutionary benefits. Whereas the freeze response allows for heightened awareness of the surrounding environment, fright results in tonic immobility and may have previously increased survival by mimicking death and allowing escape from a deceived predator (Bracha, Ralston, &

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Matsukawa, 2004). Whether a person becomes aggressive, freezes, withdraws, or experiences tonic immobility depends on a number of variables that are out of the scope of this paper (Barlow, 2004; Bracha, Ralston, & Matsukawa, 2004; Cannon, 1929; Dienstbier, 1989). Behaviors depend on the situational circumstances and the individual's chronological and developmental age (American Psychiatric Association, 2013; Endler & Kocovski, 2001). It is therefore important to consider developmental aspects, especially when diagnosing children, since some fears and anxieties can be considered age-appropriate and important for cognitive development (e.g., separation anxiety in toddlers) whereas others are considered maladaptive (e.g., selective mutism; American Psychiatric Association, 2013).

**1.1 Impairment, Trajectories, and Consequences**

Anxiety disorders greatly impair children's social and intellectual development. Anxious children are often slower to reach age-appropriate milestones, since they avoid situations that may otherwise foster communication and other cognitive and adaptive skills (Davis et al., 2011). Most childhood anxiety disorders are likely to be maintained into adulthood and may increase the likelihood of developing homotypic and/or heterotypic comorbid disorders. Whereas developing homotypic disorders such as depression or other anxiety disorders is more common, the development of heterotypic disorders such as externalizing disorders (i.e., attention-deficit/hyperactivity disorder, ADHD; oppositional defiant disorder, ODD; or conduct disorder, CD) is less common (Bittner et al., 2007). Besides the poor prognosis suggesting potential development of comorbid disorders, childhood anxiety disorders have also been associated with school-refusal behavior (Berg, 1992; Bernstein & Garfinkel, 1986), decreased quality of life (Barrera & Norton, 2009), poor social skills, rejection by peers, and peer-victimization (Epkins & Heckler, 2011).

Some research has shown that children with anxiety disorders may perform more poorly on achievement tests in comparison to undiagnosed controls, but these findings are controversial. Although some studies have found that anxious children's performance on tests of achievement is lower than that of non-diagnosed control groups (Goetz, Preckel, Pekrun, & Hall, 2007; Kessler, Foster, Saunders, & Stang, 1995; Preckel, Holling, & Vock, 2006), others have found no differences (Davis, Ollendick, & Nebel-Schwalm, 2008; Ialongo, Edelsohn, Werthamer-Larsson, Crockett, & Kellam, 1996). More recent research by Grills-Taquechel, Fletcher, Vaughn, Denton and Taylor (2013) found that individuals with high scores on harm avoidance performed better on academic achievement tests. It is possible that harm avoidance serves as a protective factor for academic achievement by maintaining attention in anxious populations (Grills-Taquachel et al., 2013).

Lastly, anxious children perform more poorly on measures of intelligence in comparison to children without an anxiety disorder (Davis et al., 2008; Hodges & Plow, 1990). The directionality of this phenomenon was described by two theories: anxiety results in lowered performance on measures of intelligence (Davis et al., 2011; Kendall & Pimentel, 2003), and children with underlying cognitive deficits are more likely to develop an anxiety disorders (Martin et al., 2007; Weeks et al., 2013). The former theory can be explained in two ways. First, attention-deficits elicited by high state anxiety during the testing situation can result in poor performance, and second, state anxiety in educational settings resulted in lower rates of learning and retention.

The purpose of this study was to further examine the first theory: that clinical levels of anxiety can hamper intelligence test performance in children with anxiety disorders due to higher state anxiety in the testing situation. The current study investigated anxious children's

performance on measures of intelligence and children's performance on subtests of intelligence measures over the testing session. Changes in cognition and habituation to the testing situation during administration of intelligence quotient (IQ) measures were expected to result in a decrease in anxiety. Since the testing situation does not typically allow for overt avoidance of the feared situation, children with one or multiple comorbid anxiety diagnoses, such as social anxiety disorder (SoP), generalized anxiety disorder (GAD), separation anxiety disorder, SAD, or panic disorder (PD), were exposed to the feared situation for a prolonged session of up to 2 hours. The prolonged exposure was expected to result in decreased physiological and psychological distress due to habituation to the testing situation and changes in cognition (Feske & Chambless, 1995; Foa & Kozak, 1986). As anxiety decreases, performance on measures of intelligence was expected to increase.

In the literature on anxiety disorders, two aspects of anxiety are often discussed: state anxiety and trait anxiety. According to Spielberg, who put forth the state-trait model of anxiety, trait anxiety is a person specific, fixed predisposition similar to a personality trait, and state anxiety is the situation specific emotional state of an individual (as cited in Barlow, 2004). Further, the intensity of anxiety in a specific situation (state anxiety) is determined by an interaction of trait anxiety (the person) and the type of situation to which the person is exposed (Endler & Kocovski, 2001). This interaction has been described in the multidimensional interaction model of anxiety, which states that trait anxiety has to be congruent with the situation to result in state anxiety (Endler & Kocovski, 2001). As a result, the type of anxiety disorder a child is diagnosed with will determine whether or not this child experiences state anxiety during the testing situation. For example, individuals with SoP are thought to experience higher anxiety during intelligence testing because it constitutes a social interaction during which social

judgment is possible. On the other hand, a person with a specific phobia of animals (e.g., dogs) is unlikely to experience heightened anxiety during the testing situation, since the individual will not be exposed to the feared stimulus.

**1.2 Anxiety Disorders**

SoP, SAD, and GAD are often jointly focused upon in the literature on childhood anxiety disorders. Not only are these disorders more prevalent in children and adolescents than other anxiety disorders, they are also highly comorbid with one another. Additionally, these three disorders respond similarly to various treatment approaches, including cognitive-behavioral therapy (CBT) and medication (Velting, Setzer, & Albano, 2004). In addition, SoP, GAD, and SAD, as well as PD, are relevant to the current study since they are more likely to result in increased anxiety during testing compared to other anxiety disorders such as specific phobias. Individuals with PD were also included in the current study, since individuals with PD may experience anxiety about bodily sensation in a testing situation.

SoP is excessive anxiety or fear of being socially judged or negatively evaluated in one or multiple innocuous social situations. As such, SoP impairs an individuals' functioning in social, academic, and other important settings (American Psychiatric Association, 2013). More specific to the testing situation, a socially anxious child may be nervous about performing poorly or acting in a way that would elicit the examiner's disapproval.

SAD in children and adolescents, on the other hand, is defined as marked and age-inappropriate anxiety or fear of being separated from an attachment figure. Although children with SAD may worry about being separated from loved ones, they are also often concerned that caregivers or they themselves will come to harm when they are not together. Symptoms must be experienced for a four-week duration to meet clinical diagnostic criteria (American Psychiatric

Association, 2013). Since children with SAD are separated from their caregivers during the testing situation, it is likely that their performance on measures of IQ is impaired due to distraction by worried thoughts or physical and emotional arousal.

GAD is pervasive, generalized worry and anxiety concerning a multitude of situations. This worry has to be difficult to stop and must have occurred most of the time over the past six months. Children and adolescents must experience at least one physical symptom when they worry, such as irritability, muscle tension, restlessness, fatigue, inattention, or difficulty sleeping or falling asleep (American Psychiatric Association, 2013). Worrying during a testing situation may result in lower attention and performance on IQ measures in children diagnosed with GAD.

PD is diagnosed when an individual experiences recurring, un-cued panic attacks leading to a change in behavior due to fear of subsequent panic attacks and concerns about potential consequences (American Psychiatric Association, 2013). Diagnostic criteria use the term un-cued to clarify that panic attacks, in individuals with PD, are not elicited by a feared stimulus (American Psychiatric Association, 2013). This is particularly important since panic attacks can be a symptom of other anxiety disorders. For example, an individual with SAD may experience a panic attack in a public speaking context. However, research has shown that physical arousal can increase anxiety in individuals with PD. Furthermore, physical arousal and catastrophic cognitions can elicit panic attacks in individuals with PD (Blechert, Wilhelm, Meuret, Wilhelm, & Roth, 2010; De Cort et al., 2013; Hayward, Ahmad, & Wardle, 2000). The intensity of arousal necessary to elicit a panic attack in a testing situation has not been reported in the literature. Furthermore, individuals with PD allocate more of their attentional resources to focus on physical sensations than individuals without PD (Hayward, Ahmad, & Wardle, 2000). Therefore, physical arousal when entering a testing situation, subsequent increase in anxiety, and lowered

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attentional resources due to worry and non-task related thoughts are likely to lead to lower test performance in individuals with PD compared to non-anxious controls (Sommer & Arendasy, 2013).

SoP, SAD, PD, and GAD theoretically should lead to impairment during test taking: being separated from caregivers, performing in front of a stranger, being anxious about bodily sensations, or being uncertain about the outcome of testing, may lead to increased anxiety in individuals with SAD, SoP, PD, and GAD respectively in the testing situation (state anxiety). Other anxiety disorders such as obsessive-compulsive disorder (OCD) and posttraumatic stress disorder (PTSD), may also influence testing-performance (Kira, Lewandowski, Somers, Yoon, & Chiodo, 2012; Taner, Bakar, & Oner, 2011); however, in the new *Diagnostic and Statistical Manual of Mental Disorders 5th Edition* (*DSM-5*) these disorders received an individual section and are not further categorized under the anxiety disorders subheading.

A specific phobia is diagnosed when an individual shows marked distress or avoidance in anticipation or during exposure to the feared stimulus and has been for at least six months. Specific phobias (i.e., animal type, environmental type, blood-injection-injury type and situational type) are unlikely to interfere with performance on tests (American Psychiatric Association, 2013).

A review article by LeBeau et al. (2010) examined the literature for evidence that test anxiety could stand as its own diagnosis in the new *DSM-5* and be classified as a type of specific phobia (American Psychiatric Association, 2013). Further, research has supported that individuals with test anxiety have lower test scores than their non-anxious counterparts (Ackerman &Heggestad, 1997; Hembree, 1988; Sommer & Arendasy, 2013). However, LeBeau et al. (2010) determined that test anxiety is better conceptualized as a symptom of other anxiety

disorders, such as SoP or GAD. Therefore, test anxiety is not considered a diagnosis in the new *DSM-5* (American Psychiatric Association, 2013).

In the recent changes from *Diagnostic and Statistical Manual of Mental Disorders 4ᵗʰ Edition – Text Revision* (*DSM-IV-TR*) to *DSM-5* the requirements for a diagnosis of SoP, SAD, PD, and GAD in children remained relatively unchanged (American Psychiatric Association, 2000; American Psychiatric Association, 2013). Although researchers have discussed the implications of potential changes to the new *DSM-5* GAD criteria (Comer, Pincus & Hofmann, 2012), the changes that were implemented in the new *DSM-5* are not expected to lead to differences in prevalence rates in children as a result of the switch from *DSM-IV-TR* to *DSM-5* (American Psychiatric Association, 2000; American Psychiatric Association, 2013). Likewise, Kerns, Comer, Pincus, and Hofmann (2013) stated that the new *DSM-5* performance only specifier for SoP is less meaningful than the previous generalized subtype specifier. However, differences in specifiers do not seem to change the prevalence rates or the population being diagnosed with SoP. Comparing the diagnostic criteria for PD and SAD in the *DSM-IV-TR* and *DSM-5*, it appears that little has changed and that most children meeting diagnostic criteria for PD and SAD according to the *DSM-IV-TR* will still meet criteria for the disorder according to the new *DSM-5* (American Psychiatric Association, 2000; American Psychiatric Association, 2013).

**1.3 Prevalence**

According to Kessler, Chiu, Demler, and Walters (2005), anxiety disorders are the most prevalent class of disorders, with an estimated lifetime prevalence of 28.8%. Although the median onset for anxiety disorders is 11 years of age, the mean onset of anxiety disorders in the interquartile range is 15 years of age (Kessler et al. 2005). It is important to consider that age-of-onset varies greatly between the different anxiety disorders, with specific phobias and SAD

having the earliest median onset around 7 years of age, SoP having its median onset around 13 years of age and PD and GAD having its median onset around 23 to 30 years of age (Kessler et al. 2005; Kessler, Petukhova, Sampson, Zaslavsky, & Wittchen, 2012).

Kessler et al. (2012) further considered differences in lifetime prevalence for anxiety disorders in adolescence (13-17 years) and adulthood (18-64 years) in male and female individuals. GAD, SoP, PD, and SAD have an estimated lifetime prevalence of 2.2%, 8.6%, 2.3% and 7.7% in adolescence and 6.2%, 13%, 5.2% and 6.6% in adulthood respectively. Overall, females are more likely to be diagnosed with an anxiety disorder than males. Whereas in adolescence the lifetime prevalence of an anxiety disorder for females is approximated at 38.3%, it is approximated at 26.7% for males (Bittner et al., 2007; Costello, Mustillo, Erkanli, Keeler, & Angold, 2003; Kessler et al., 2012). This discrepancy increases in adulthood, where lifetime prevalence of anxiety disorders is estimated at 40.4% for females and 26.4% for males (Kessler et al., 2012).

Lifetime morbidity risk, the likelihood of individuals to be diagnosed with an anxiety disorder within their lifetime, is estimated to be 41.7% for any anxiety disorder, and more specifically 9%, 13%, 6.8% and 8.7% for GAD, SoP, PD, and SAD respectively (Kessler, Petukhova, Sampson, Zaslavsky, & Wittchen, 2012). Further, SAD is more commonly seen during childhood and appears to dissipate by age 16. On the other hand, the likelihood of developing SoP and PD increases from childhood through adolescence, especially in females (Costello et al., 2003). Furthermore, Bittner et al. (2008) states childhood SAD may predict PD in adulthood. Researchers have also noted a slight increase in GAD throughout adolescence into adulthood (Costello et al., 2003).

**1.4 Etiology**

      Researchers have considered genetic and environmental factors when assessing risk factors responsible for increased likelihood of anxiety disorder expression in childhood and adolescence. Heritability of anxiety disorders has been established by a multitude of twin and heritability studies (Gregory and Eley, 2007; Gelernter & Stein, 2009). As with many other psychopathologies, anxiety disorders are considered polymorphic, meaning a multitude of genes are responsible for phenotypic expression of anxiety, making it difficult to predict development, maintenance, and outcome of childhood anxiety disorders based on genotype (Trzaskowski et al., 2013). Considering that heritability estimates across various anxiety disorders have been relatively stable, Gregory and Eley (2007) conducted a study addressing the issue of differences in genetic predispositions in different anxiety disorders. They concluded that there is reason to believe that the underlying genetic predispositions for various anxiety disorders, as well as depression, are identical (Gregory & Eley, 2007).

      However, differentiating whether variances in phenotype are a result of gene expression or environmental factors still provide a challenge (Smoller, Block, & Young, 2009). Overall, genetic expression and environmental factors are highly interrelated. Child-temperament and parent psychopathology, both subject to gene expression, may lead to maladaptive parent-child interaction and maladaptive parenting styles (e.g., overprotection and control). Additionally, these factors may lead to modeling of dysfunctional behaviors and expose the child to life experiences that may foster the development of anxiety disorders (Biederman et al., 2001; Dadds & Roth, 2008; Epkins & Heckler, 2011; McLaughlin et al., 2010; Rutter et al., 1997; Smoller, Block, & Young, 2009). A child growing up in a social environment based on the above

mentioned variables is likely to experience greater emotional reactivity, increasing the likelihood of developing an anxiety disorder in the future (McLaughlin et al., 2010).

## 1.5 Assessment

As with many other disorders, a multi-method, multi-source approach is considered important in the assessment of anxiety in children (March & Albano, 1996; Silverman & Ollendick, 2005). A multi-method and multimodal assessment approach allows for integration of information through different means and from various sources, such as caregivers, teachers, and the child him or herself. In the literature, parent-child agreement on measures of anxiety is often low. A plethora of underlying variables is thought to contribute to this discrepancy, including child and parent impression management, type of psychopathology, and symptom type (e.g., internalizing versus externalizing; Reuterskiöld, Öst, & Ollendick, 2008; Rockhill et al., 2007). Literature supports the assertion that children are better reporters of internalizing symptoms than their parents (Rockhill et al., 2007). However, the literature also provides controversial accounts on agreement between parent and child ratings on externalizing symptoms (Rockhill et al., 2007; Stanger & Lewis, 1993). Nevertheless, individual reports should not be used in isolation to inform diagnostic decisions and clinical judgment. The use of a multi-method, multi-source approach assessing child behavior in multiple contexts is continuously suggested superior to the former approach (March & Albano, 1996; Mohr & Schneider, 2013; Silverman & Ollendick, 2005; Stanger & Lewis, 1993).

Using different means of assessment such as questionnaires, interviews, and observations is also important. Questionnaires are useful screening measures that inform the clinician about a variety of disorders and whether they should be further investigated. More precisely, questionnaires can provide information about potential comorbid and differential diagnoses.

However, observations of child-parent interaction along with structured and semi-structured diagnostic interviews such as the Anxiety Disorder Interview Schedule for *DSM-IV*: Child and Parent Versions (ADIS-IV-C/P) are essential, as they provide more detailed information about behavioral contingencies and situational difficulties that result in impairment (Mohr & Schneider, 2012; Silverman & Albano, 1996; Velting, Setzer, & Albano, 2004).

## 1.6 Theoretical Framework

One of the most widely used theories explaining the mechanisms underlying anxiety disorders is Emotional Processing Theory (EPT) (Foa, Huppert, & Cahill, 2006). According to Foa, Huppert, and Cahill (2006), EPT differentiates between normal and pathological fear and anxiety by whether the fear/anxiety elicits functional or dysfunctional behavioral outcomes. Anxiety and fear are normal and important aspects of life, as anxiety and fear promote avoidance and escape from dangerous situations and therefore increase the chance of survival. EPT hypothesizes that pathological fear and anxiety occurs when physical and cognitive responses, usually reserved for dangerous situations, are employed in safe situations. An association is formed between the physical arousal, maladaptive cognitions, and the safe stimulus, leading the individual to engage in maladaptive behaviors when subsequently exposed to the stimulus. For example, a socially anxious individual with anxiety and fear of public speaking may be asked to present in front of her class and experience physical symptoms (i.e., increased heart rate, shaky knees and sweaty hands) and maladaptive thoughts (e.g., I will faint or I will embarrass myself in front of everyone). In return, maladaptive thoughts and physical arousal may result in dysfunctional behaviors, such as avoiding the situation and choosing to receive a failing grade for the assignment instead. Once a situation is avoided, physical and cognitive processes will return to normal, keeping the individual from learning that the feared situation was not actually

dangerous and making it more likely for the maladaptive behavior to occur in the future. This model of anxiety and fear, defined by reciprocal interaction between thoughts, physical sensations, and behavior, has been recurrently described in the literature and builds the framework for understanding and treating anxiety disorders (Barlow, 2004; Velting, Setzer, & Albano, 2004).

**1.7 Habituation and the Cognitive Model**

Exposure to a feared stimulus or situation over a prolonged period of time reliably results in anxiety reduction (Barlow, 2004). Research with human subjects commonly measures anxiety through subjective units of distress ratings (SUDs). The SUDs allow individuals to rank the intensity of current distress on a rating scale, with the lowest rating representing no distress and the highest rating representing highest intensity of distress (Hayes, Hope, VanDyke, & Heimberg, 2007). Whereas the majority of researchers use a SUDs rating scale ranging from 0-100 (Hayes et al., 2007; Howard, Murphy, & Clarke, 1983; Price & Anderson, 2007), other SUDs rating scales can be employed (e.g., SUDs rating scales ranging from 0 to 8; Silverman & Albano, 1996). Smaller rating scales and visual representations of SUDs ratings (e.g., feeling thermometer in the ADIS-IV-C/P) may allow younger children to better conceptualize the ratings and provide more reliable answers (Silverman & Albano, 1996).

Measures of physiological arousal (e.g., heart rate or skin conductance) or behavior changes (e.g., behavioral avoidance task; BAT) have also been used to measure anxiety (Boulougouris, Marks, & Marset, 1971; Turner, Beidel, & Epstein, 1991). The decrease in anxiety during prolonged exposures to a feared stimulus is often attributed to two processes: habituation and changes in cognition. Habituation is simply defined as behavioral inhibition resulting from repeated or continuous exposure to a stimulus (Groves & Thompson, 1970).

Changes in cognition occur during habituation when physical arousal decreases and catastrophic cognitions are disconfirmed (Öst, 2012). According to Öst's cognitive-behavioral model, an individual's anxiety symptoms (e.g., physical arousal and catastrophic thoughts) most often result in avoidance of the feared stimulus (Öst, 2012). Although the catastrophic outcome is unlikely to occur, being able to escape the situation strengthens the belief that the feared outcome was only avoided because of the escape. This in turn reinforces escape behavior in the future. However, inability to escape will result in a decrease of physical arousal over time, disconfirm the catastrophic cognitions (Hofmann, 2008), and increase the likelihood that the person will tolerate the situation in the future. Physiological arousal and occurrence of catastrophic thoughts will decrease with each subsequent exposure (Öst, 2012). Although it has previously been assumed that new associations with the stimulus overwrite old associations, many researchers now consider this thought to be inaccurate. Instead it is now believed that the individual retains both old and new associations to the feared stimulus, but elicits the new or old associations based on the previous learning experience and the current exposure situation (Bouton, 2004; Foa & Kozak, 1986; Rescorla, 2001). It is assumed that both processes are, to varying degrees, responsible for the decrease in anxiety.

Multiple studies have been conducted to determine how long an individual with OCD, specific phobias, and agoraphobia had to be exposed to a feared stimulus before they habituated (Foa & Chambless 1977; Grayson, Foa & Steketee, 1982; Olatunji, Wolitzky-Taylor, Willems, Lohr, & Armstrong, 2009). Whereas Grayson, Foa, and Sreketee (1982) and Olatunji et al. (2009) found a significant reduction in SUDs rating after 30 minutes of exposure to the fear-eliciting stimulus, Foa and Chambless (1978) found different response patterns emerge. Although most participants in Foa and Chambless' (1978) study showed a curvilinear pattern

with an increase in SUDs ratings over the first forty-five minutes of being exposed to the stimulus and a subsequent decrease, approximately one-third of participants showed a linear decline in subjective fear. Unfortunately, research investigating the required lengths of exposure necessary to achieve clinically significant symptom reduction is sparse, especially when considering anxiety disorders, such as SoP, GAD, and SAD. Furthermore, methodological differences between the above-mentioned studies make it difficult to generalize and draw conclusions for the current study. Despite a dearth of research on this matter, exposure and habituation are vital in reducing symptoms of anxiety.

**1.8 Intelligence and Anxiety**

Intelligence is a multifaceted construct that is highly debated (Flynn, 2012; Weinberg, 1989). Simply defined, intelligence is a person's ability to solve problems (Weinberg, 1989). Although some individuals, such as Charles Spearman, believe in the existence of a general intelligence ($g$ factor) represented by a single numerical index, others consider intelligence to be comprised of multiple separate mental abilities that cannot be expressed in a single number (Dearborn, 1927; Guilford, 1967; Thurstone, 1938). Whereas the former theory has been generally supported, the latter has been criticized in that the separate mental abilities correlate to a high degree warranting integration into a single, general intelligence score (Gardner, 1983). One frequently used measure of general intelligence is the Wechsler-Intelligence Scale for Children – Fourth Edition (WISC-IV), providing a single numerical quotient of intelligence (full-scale intelligence quotient, FSIQ; Wechsler, 2003). Measures of intelligence are particularly important since general intelligence is a good predictor of how successful people are in their academic, work, and social life (Chuderski, 2013).

As stated earlier, a vast amount of research has been conducted considering the effects of anxiety on children's performance on measures of intelligence. Whereas earlier research by Hodges and Plow (1990) found that children with clinically significant anxiety disorders showed decreased performance on measures of intelligence, later research by Zimet, Zimet, Farley, and Adler (1994) did not support these findings. More recently, in an attempt to shed light on the methodological discrepancies of those previous studies, Davis et al. (2008) replicated the results of both studies by assigning participants to groups in the same manner as described in the respective research designs. Hodges and Plow (1990) assigned participants to more than one group, thereby disregarding mutual exclusivity, whereas Zimet et al. (1994) created groups based on primary diagnosis only, not considering secondary or tertiary diagnoses in the case profile (effectively creating the same problem). In addition to replicating previous findings, Davis et al. (2008) also provided an alternative solution to the comorbidity and group assignment issue by using groups that were mutually exclusive. In other words, only individuals with one or multiple anxiety disorders anywhere in their diagnostic profile, but no other comorbidities, were assigned to the "pure" Anxiety Group. Further, only individuals without a diagnosis were eligible for assignment into the Control Group. As intended, Davis et al. (2008) replicated the findings of the previous studies using their respective research designs, but also showed that when controlling for comorbidity, clinically anxious individuals had significantly lower IQ scores than non-anxious individuals.

More recently however, Munson (2009) found that anxious children had higher full-scale IQ scores than non-anxious controls. Although verbal comprehension, perceptual reasoning, and working memory scores were similar between anxious and non-anxious groups, processing speed scores were significantly higher in the anxious group (Munson, 2009). Considering the

inconsistency of these findings with the previous literature, differences in IQ scores between anxious and control groups may be better explained by Munson's research design (2009). Munson (2009) used a child self-report measure, the Multidimensional Anxiety Scale for Children (MASC; March, 1997) to derive at the respective groups. According to Muris, Pennen, Sigmond, and Mayer (2008), child self-report measures are unreliable tools when assessing child psychopathological symptoms, making the use of the MASC as a tool for group assignment a questionable choice. Also, participants in the Davis et al. (2008), Zimet et al. (1994), and Hodges and Plow (1990) studies were diagnosed with clinically significant anxiety, whereas Munson (2009) used a sample of children whose scores on the MASC rarely exceeded the clinical cutoff.

Researchers have also explored anxious and non-anxious children's performance on IQ indices. Although the current study is utilizing the WISC-IV (Wechsler, 2003), previous research concerning intelligence and anxiety disorders has used an older version, the Wechsler Intelligence Scale for Children-third edition (WISC-III; Wechsler, 1991). Although the WISC-III and WISC-IV are similar, they differ in the types of subtests and indices used to derive at FSIQ (see Figure 1). The WISC-IV provides a general measure of intelligence (FSIQ) as well as four indices of intelligence: verbal comprehension index (VCI), perceptual reasoning index (PRI), processing speed index (PSI), and a working memory index (WMI) (Wechsler, 2003).

Contradictory to Munson's findings, most research has shown that individuals with anxiety perform more poorly on tests of working memory (Munson, 2009; Stout, Shackman, & Larson, 2013; Toren et al., 2000; Vance, Ferrin, Winther, & Gomez, 2013; Vasa et al., 2007). Utilizing the WISC-III, Davis et al. (2008) found that anxious children's verbal IQ was significantly lower than the verbal IQ of pure controls. However, research on the effects of anxiety on verbal IQ and more precisely performance on the VCI are scarce as well a

| Wechsler Intelligence Scale for Children-third edition (1991) | Wechsler Intelligence Scale for Children-fourth edition (2003) |
|---|---|

**WISC-III**

Full Scale IQ

| Performance | Verbal |
|---|---|
| 1. Picture Completion | 2. Information |
| 3. Coding | 4. Similarities |
| 5. Picture Arrangement | 6. Arithmetic |
| 7. Block Design | 8. Vocabulary |
| 9. Object Assembly | 10. Comprehension |

**WISC-IV**

Full Scale IQ

| Perceptual Reasoning | Verbal Comprehension | Working Memory | Processing Speed |
|---|---|---|---|
| 1. Block Design $M_t$=11:17 | 2. Similarities $M_t$=9:49 | 3. Digit Span $M_t$=4:26 | 5. Coding $M_t$=3:34 |
| 4. Picture Concepts $M_t$=10:08 | 6. Vocabulary $M_t$=9:47 | 7. Letter-Number Sequencing $M_t$=5:53 | 10. Symbol Search $M_t$=3:22 |
| 8. Matrix Reasoning $M_t$=6:06 | 9. Comprehension $M_t$=10:18 | | |

Indices
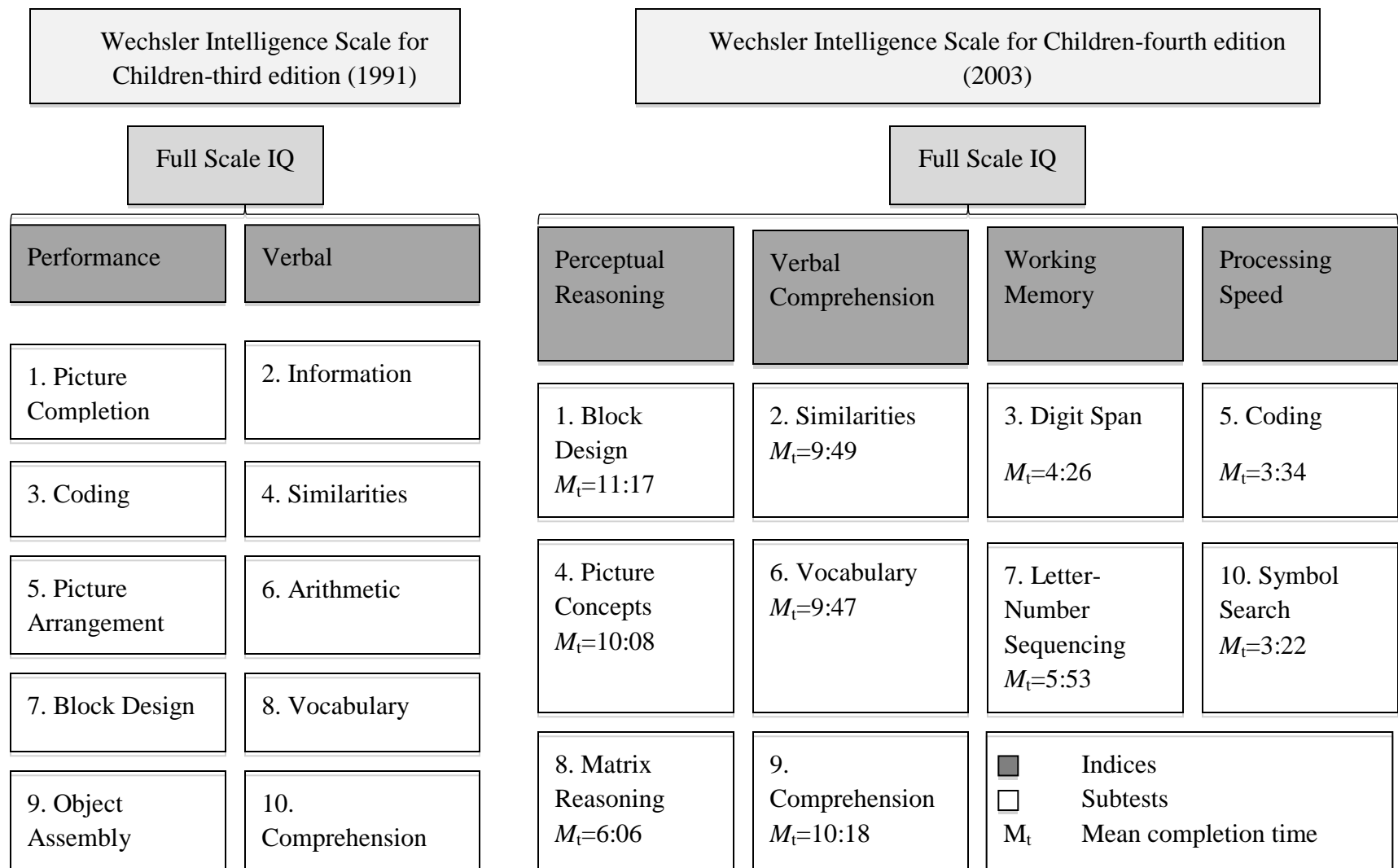Subtests
$M_t$ Mean completion time

Figure 1. Indices and subtests of the WISC-III and WISC-IV (Wechsler, 1991; Wechsler, 2003). Index scores are a result of the subtests in the rectangles listed directly below them. Subtest rectangles are numbered according to their respective order during test administration. Mean completion time for subtests are given for WISC-IV subtests, but are commensurate to WISC-IV subtest completion times (Ryan, Glass & Brown, 2007)

controversial (Mayes & Calhoun, 2007; Wechsler, 1991). Studies on processing speed found that anxious children performed better on these measures than controls (Calhoun & Mayes, 2005: Munson, 2009) whereas others found no significant differences (Mayes & Calhoun, 2007).

Multiple studies have supported that individuals with PTSD have deficits in Working Memory, Perceptual Reasoning, and Processing Speed (Kira, Lewandowski, Somers, Yoon, & Chiodo, 2012; Rutkowski, Vasterlin, Proctor & Anderson, 2010; Yasik, Saigh, Oberfield, & Halamandaris, 2007). These findings are not supported for GAD, SoP, PD, or SAD. It appears that the underlying mechanisms in PTSD are different from those of other anxiety disorders in respect to performance on measures of intelligence (Rutkowski et al., 2012). PTSD should therefore be considered separately from other anxiety disorders when studying performance on intelligence measures, and is similarly even included in its own separate section diagnostically in the new *DSM-5* (American Psychiatric Association, 2013).

In general research appears to support differences on the WMI for individuals diagnosed with SAD, GAD, PD, and SoP, but provides rather inconclusive results for the other indices (Stout, Shackman, & Larson, 2013; Toren et al., 2000; Vance, Ferrin, Winther, & Gomez, 2013; Vasa et al., 2007). Although lower FSIQ in children with GAD, SAD, PD, or SoP may be due to an overall lower performance on all subtests, special attention should be paid to subtests of the WMI.

Working Memory is often defined as a mechanism that allows a person to hold multiple items of information in short term memory while manipulating them to derive at a solution for a complex mental task (Baddeley, 2007). The WISC-IV uses the subtests Digit Span and Letter-Number-Sequencing of the WMI to provide an estimate for working memory capacity. Digit Span measures the number of items of a category (i.e., numbers) a person can hold in memory

and recite, as well as the number of these items a person can successfully manipulate and correctly recite. Letter-Number Sequencing complicates the task, by requiring the individual to manipulate items from both categories (letters and numbers) and ordering them by category and numerical/alphabetical order.

The underlying variables responsible for anxious children's lower performance on IQ measures are widely debated in the literature. Whereas some argue that anxiety symptoms result in worse performance on measures of cognition (Davis et al., 2011; Kendall & Pimentel, 2003), others argue that cognitive deficits increase the risk for developing anxiety (Martin et al., 2007; Weeks et al., 2013). The former hypothesis offers three explanations: that children with anxiety disorders learn less over time as a result of state anxiety in learning situation and that anxious children may have difficulty paying attention to test content due to task-irrelevant thinking and worry as a result of state anxiety, or a combination of both (Davis et al., 2011; Sommer & Arendasy, 2013; Kendall & Pimentel, 2003). The belief that anxious children retain less information in learning situation is supported by the current literature, stating that motivation and memory are compromised if a person is subjected to continuous stress as is experienced by anxious individuals (Kleen, Sitomer, Killeen, & Conrad, 2006; Sweis, Veverka, Dhillon, Urban, & Lucas, 2013). Furthermore, anxious children are less likely to learn during a testing condition, contrary to their non-anxious counterparts (Tse & Pu, 2012).

Unfortunately, a dearth of research on anxiety-produced inattention provides a challenge to defining precise, evidence-based theories about this concept. Although a plethora of research has dealt with reasons for test anxious individual's poor performance, less research has been conducted on why individuals with other anxiety disorders perform more poorly on tests than controls. However, literature on test anxiety may provide some insight. In 1971, Wine stated that

individuals diagnosed with test anxiety divide their attention between variables relevant to task completion and variables relevant to their own person. According to Wine (1971), anxious individuals are more occupied with their own person during testing, are less likely to thoroughly utilize task instructions, and are more likely to worry than non-anxious individuals. Despite multiple aspects leading to poorer performance on tests, worry has been the most studied and is highly correlated with poor test performance (Hembree 1988, Liebert & Morris, 1967; Sena, Lowe, & Lee, 2007; Stöber & Pekrun, 2004). Maladaptive thoughts and negative self-talk, two aspects of worry, are also components of other anxiety disorders such as GAD, SoP, SAD, and PD, and may contribute to difficulties focusing at the task at hand. A further variable that affects performance on tests is fear of negative evaluation. Friedman and Bendas-Jacob (1997) stated that fear of negative evaluation could be both fear of negative evaluation by others as well as fear of not meeting one's own standards. Whereas the former is an important symptom of SoP, the latter is a symptom of perfectionism that may occur in individuals with GAD (American Psychiatric Association, 2013). Although this research is specific to test anxiety, it appears that the underlying symptoms described are similar to symptoms seen in other anxiety disorders relevant to the current study.

The latter theory, however, supports the idea that children with lower cognitive ability may be at higher risk for developing an anxiety disorder (Martin et al., 2007; Weeks et al., 2013). If anxiety is the reason for lower performance on measures of IQ, one might expect that reduction in anxiety would increase performance on IQ tests across the subtests, since inattention and anxiety are positively correlated and the testing situation itself may be a form of prolonged exposure. If, however, cognitive difficulties increase the risk for developing an anxiety disorder, anxious children's performance on intelligence measures across subtests is unlikely to increase

as a result of exposure. It is most likely that both hypotheses are correct to varying degrees. Either way, findings of the current study will provide further insight into the effects of habituation on anxious children's performance on IQ measures.

**1.9 Hypotheses and Rationale**

Hypothesis 1: Based on the findings of Davis et al. (2008), it was hypothesized that children in the pure anxiety group would have lower FSIQ scores than children in the control group, but that children in the comorbid group would have Full Scale IQ scores similar to or lower than the anxious group.

Hypothesis 2: It was hypothesized that anxious children would perform worse on the first subtest of the WISC-IV compared to the control group, but that the discrepancy in scores would slowly decrease throughout testing, presumably as a result of habituation to the test and testing environment. Individuals in the comorbid group were expected to perform similarly to the anxious group on the first subtest, but show no or only minimal improvement in scores from the first to last subtest of the WISC-IV.

Hypothesis 3: Anxious children were expected to have lower scores on the first measure of Working Memory (Digit Span) of the WISC-IV compared to the control and comorbid group. However, anxious children's performance was expected to improve as a result of habituation to the testing environment by the second and last measure of Working Memory (Letter-Number Sequencing) of the WISC-IV. This hypothesis was supported by research proposing that anxious children's deficits are specific to working memory (Stout, Shackman, & Larson, 2013; Toren et al., 2005; Vance, Ferrin, Winther, & Gomez, 2013; Vasa et al., 2007).

Hypothesis 4: Based on the above described research (Foa & Chambless 1978; Grayson, Foa, & Steketee, 1982; Olatunji et al., 2009), anxious children's performance on the WISC-IV

was expected to be lower than that of children in the control group on the first subtest, but commensurate to children in the control group by the fifth subtest. This hypothesis was based on research stating that most individuals habituate to a feared stimulus after approximately 30 minutes (Grayson, Foa, & Steketee; Olatunji et al., 2009).

If the hypothesis was supported that exposure to the test and testing environment leads to performance improvements on subtests for anxious children but not for non-anxious control groups or children with internalizing and externalizing disorder comorbidity, then the validity of IQ testing results in determining intelligence in an anxious population becomes questionable. This in turn could help determine whether anxious children's performance on standardized tests is representative of their overall ability. Interventions and accommodations might be required to get a more accurate assessment of intellectual functioning in the anxious population (e.g., one might need to provide them with preliminary testing placebo "exercises" that do not interfere with the IQ assessment but allow them to habituate to the setting, examiner, and procedures). Furthermore, such results would provide insight into the impairment anxious children might experience during testing conditions in their everyday lives. If state anxiety during tests lowers anxious children's academic performance, it may also influence their performance in high-stakes standardized testing situations potentially resulting in life-altering consequences that could have been prevented.

However, if anxious children's performance on measures of intelligence were overall lower compared to children without a diagnosis and in addition anxious children did not improve across subtests of the IQ measure, these findings would suggest that state anxiety during the testing situation does not result in lower performance. Further, these findings would support the theory that either anxious children learn and retain less information in academic settings than

their non-anxious peers or that cognitive-deficits increase the likelihood that a child develops an anxiety disorder. In this case, the findings would support the need for early-interventions to either prevent the development of anxiety disorders in children with lower cognitive abilities or by increasing detection and accessibility to services for anxious children.

## CHAPTER 2. METHOD

### 2.1 Participants

The current study used a subsample of participant data from ongoing data collection at the Psychological Services Center at Louisiana State University. Participants were between the ages of 7 and 16 years of age, and sought services for assessment or treatment at the PSC prior to July 2013. Age criteria of the study are based on age requirements of measures used (i.e., ADIS-IV-C/P versions can be completed by children between the ages of 7 and 16 and their parents). Participants seeking services after this date were not included in the current study due to clinic changes in diagnostic criteria from *DSM-IV-TR* to *DSM-5* (American Psychiatric Association, 2000; American Psychiatric Association, 2013). The original dataset consisted of 259 participants (see Figure 2). Of these 259 participants, 67 were excluded because they did not meet the age criteria for this study. From the remaining 192 participants, 41 individuals were excluded because they had not been administered the measures of interest, the ADIS-IV-C/P or WISC-IV, or because their data was incomplete, as would be the case when individuals were administered the abbreviated WISC-IV. Thirty-three individuals of the remaining 151 participants were omitted because they had been diagnosed with a disorder incompatible with the purpose of this study: Major depressive disorder/dysthymia (n=3), learning disorder (n=3), developmental disorder (n=3), externalizing disorders non-comorbid with an anxiety disorder (n=15), or other disorders including Tourette's disorder, etc. (n=9). Out of the subsequent sample of 118 participants, 22 individuals were diagnosed with one or multiple anxiety disorders but no other comorbid disorders (i.e., anxious group), 20 individuals were diagnosed with comorbid anxiety and externalizing disorders (i.e., comorbid group), and 76 individuals were diagnosis-free. To create a pure control group, and avoid any confounding effect of sub-clinical symptoms,
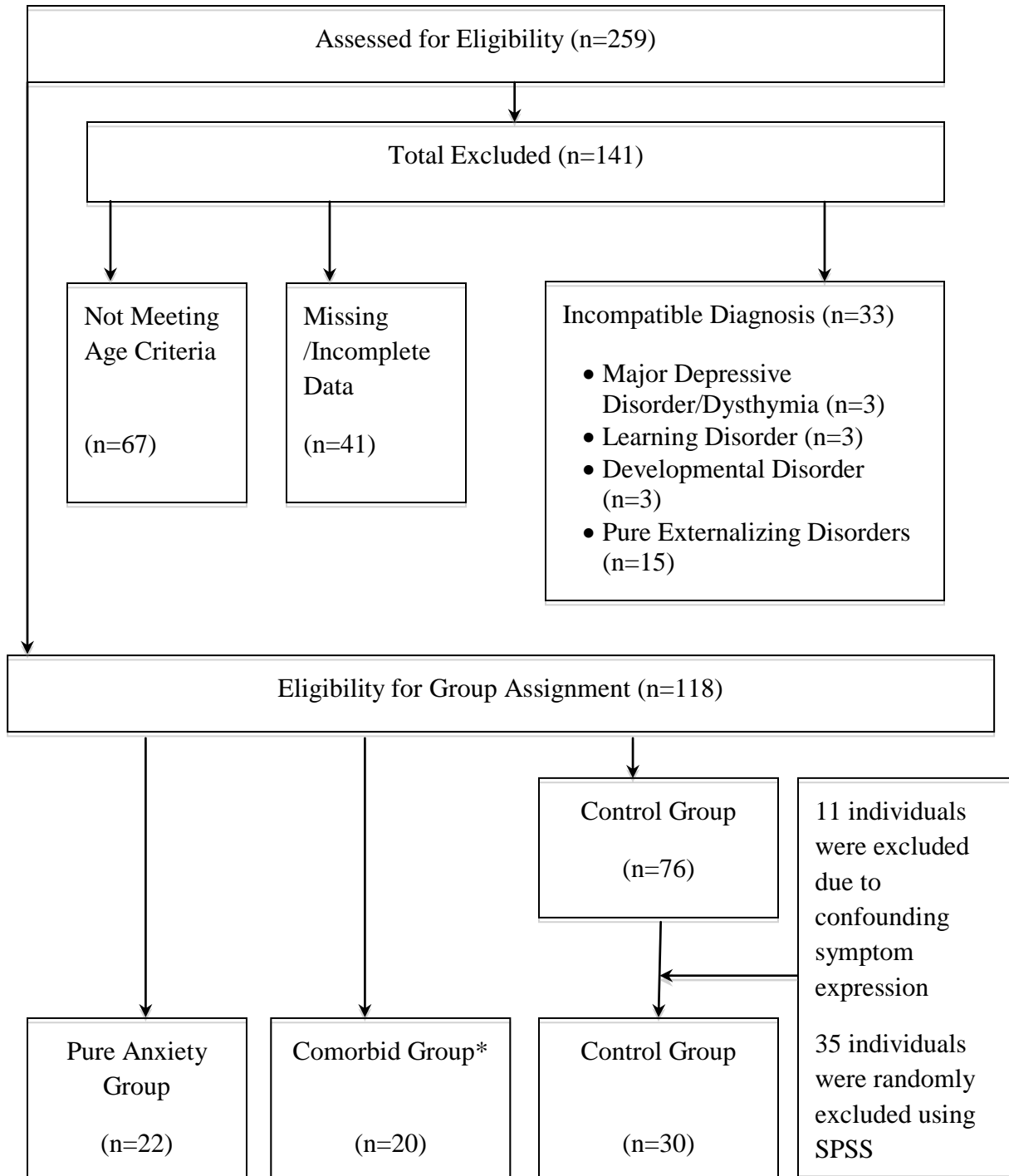
Figure 2. Participant flow chart. *The comorbid group consists of individuals with at least one anxiety disorder (e.g., SoP, SAD, or GAD) and at least one externalizing disorder (e.g., ADHD, ODD, CD, etc.)

an additional 11 individuals with sub-clinical symptoms (e.g., SoP, enuresis, ADHD) were omitted from the 76 diagnosis-free individuals. The control group of 65 individuals was further reduced to meet the homogeneity of variance assumption for data analyses. According to Leech, Barrett, and Morgan (2008), the size of the largest group in a study cannot exceed 1.5 times the size of the smallest group in order to meet the assumption of homogeneity of variance (see Figure 2). Therefore, from the remaining 65 participants a random sample of 30 individuals was selected using the SPSS random sampling option (see demographic information Table 1). The final sample of 72 participants consisted of three groups: a pure anxious group (n=22), a comorbid group (n=20), and a control group (n=30).

Overall, children between the ages of 7 and 16 years were eligible, unless they met criteria for a diagnosis of a learning disorder, pervasive developmental disorder, PTSD, or intellectual disability (i.e., mental retardation per *DSM-IV-TR*). Exclusion criteria were based on research findings stating that children diagnosed with one of the above-mentioned diagnoses performed more poorly than typically developing, diagnosis-free individuals on measures of IQ, and would therefore confound the overall study goal (American Psychiatric Association, 2000; Kira et al., 2012; Mayes & Calhoun, 2007). Individuals with a diagnosis of ADHD or disruptive behavior disorders were also excluded unless they additionally met criteria for a clinically significant anxiety disorder (SAD, GAD, PD or SoP) making them eligible for inclusion in the comorbid group. Having a comorbid group will provide further information about the impact exposure has on anxiety if an additional externalizing diagnosis is present. Individuals diagnosed with one or multiple specific phobias but without a diagnosis of SAD, GAD, PD or SoP were also excluded from the study due to insufficient research or theoretical explanations that would provide support for phobic children's performance on IQ or achievement measures.

Table 1. Demographic information of participants

| | | Anxious Group | Comorbid Group | Pure Control Group | Total | Statistical Analyses |
|---|---|---|---|---|---|---|
| | n | 22 | 20 | 30 | 72 | |
| | % | 30.6 | 27.7 | 41.7 | 100.0 | |
| **Sex** | | | | | | |
| Female | n | 10 | 12 | 12 | 34 | Chi-Square Test |
| | % | 45.5 | 60.0 | 40.0 | 47.2 | $\chi^2(2) = (1.966)$, $p>.05$ |
| Male | n | 12 | 8 | 18 | 38 | |
| | % | 54.5 | 40.0 | 60.0 | 52.8 | |
| **Age (in years)** | | | | | | |
| M (SD) | | 10.91 (2.33 | 10.25 (2.20) | 9.93 (2.41) | 10.32 (2.33) | One-way ANOVA F(2,69)=1.508, p>0.05 |
| 7-10 | n | 11 | 11 | 18 | 40 | Chi-Square Test |
| | % | 27.5 | 27.5 | 45.0 | 55.6 | $\chi2(2)= (.408)$, p>.05 |
| 10-16 | n | 11 | 9 | 12 | 32 | |
| | % | 34.4 | 28.1 | 37.5 | 44.4 | |
| **Ethnicity** | | | | | | |
| Caucasian | n | 18 | 14 | 24 | 56 | |
| | % | 81.8 | 77.8 | 88.9 | 83.6 | |
| African American | n | 3 | 3 | 2 | 8 | Fisher's Exact Test p=0.59 |
| | % | 13.6 | 16.7 | 7.4 | 11.9 | |
| Hispanic | n | 1 | 0 | 1 | 2 | |
| | % | 4.5 | 0.0 | 3.7 | 3.0 | |
| Other | n | 0 | 1 | 0 | 1 | |
| | % | 0.0 | 5.6 | 0.0 | 1.5 | |

**2.2 Measures**

*Anxiety Disorder Interview Schedule for DSM-IV: Child and Parent Versions (ADIS-IV-C/P):* The ADIS-IV-C/P (Silverman & Albano, 1996) are complimentary, semi-structured parent and child interviews allowing for a comprehensive inquiry of childhood psychopathology, in particular anxiety symptomology and interference. The interviews are validated for children ages 7 to 16 years of age and based on *DSM-IV-TR* criteria (American Psychiatric Association, 1994). Interviewees rate symptoms and interference on a 9-point scale from 0 (none) to 8 (very severe), with a rating of 4 being considered clinically significant (Silverman & Albano, 1996). Interrater reliability for child reported anxiety symptoms was good to excellent (k=.72-.91) and interrater reliability for parent reported child anxiety symptoms was considered excellent (k=.78-.86) (Silverman, Saavedra, & Pina, 2001). Overall test-retest reliability for SAD, SoP, PD, and GAD for the ADIS-IV-C ranged from .78 to .95 and was considered excellent overall and in both the younger (7-10 years) and older (11-16 years) children, with Interclass Correlation Coefficients (ICC) ranging from 0.85 to 0.92 and 0.81 to 0.99 respectively (Silverman, Saavedra, & Pina, 2001). Test-retest reliability for the parent interview was overall considered excellent (ICC=0.81-0.96), but whereas reports concerning younger children were considered excellent (ICC=0.86-0.99), ICC scores for the older group were considered good (ICC=0.52-0.94) (Silverman, Saavedra, & Pina, 2001).

*The Wechsler Intelligence Scale for Children:* The WISC-IV is a test of intellectual ability that is individually administered to children 6 to 16 years of age providing a general intelligence score, the FSIQ (Standard scores: M=100, SD=15). The WISC-IV consists of 10 required subtests (Standard scores: M=10, SD=3) that in different combinations determine four indices (Standard scores: M=100, SD=15): the VCI (Similarities, Vocabulary and

Comprehension), the PRI (Block Design, Picture Concepts, Matrix Reasoning), the WMI (Digit Span and Letter-Number Sequencing), and the PSI (Coding and Symbol Search; Wechsler, 2003; see Figure 1). Both internal consistency for the four indices and test-retest reliability are considered good with Pearson correlation coefficients of r=.91 to .92 and r=.96 to .97 respectively (Wechsler, 2003).

## 2.3 Procedure

Examiners were trained doctoral student clinicians practicing under the supervision of a licensed psychologist at the PSC at Louisiana State University. Examiners had been trained on administering and rating the ADIS-IV-C/P and WISC-IV. Diagnoses were decided during weekly supervision meetings with the supervising licensed clinician. In addition to the ADIS-IV-C/P and the WISC-IV, other measures were administered and rated, allowing for more fully informed clinical diagnostic decision. IRB approval was obtained at the inception of the project and maintained for data collection at the PSC (See Appendix A).

Prior to receiving services, parents or guardians provided informed consent and children provided assent. Services for psychoeducational evaluation typically included three 3-hour sessions scheduled approximately one week apart. During the first session, parents were asked to fill out a demographic information form and were subsequently administered the ADIS-IV-P by a secondary examiner, while the primary examiner of the case administered the ADIS-IV-C to the child. The WISC-IV was administered to the child during the second session and subsequent tests of achievement were administered during a third session. Examiners maintained the subtest order during administration of the WISC-IV as described in the WISC-IV manual (Wechsler, 2003). Results and diagnostic impressions were discussed weekly during supervision meetings

with the supervising licensed psychologist. Following the last session, consensus meetings were scheduled with the two examining graduate clinicians and the psychologist.

The current study compared three groups on their performance on the WISC-IV: anxious group, comorbid group, and control group. To be included in the anxious group, children needed a primary diagnosis of SAD, SoP, PD or GAD and may have had additional anxiety disorders in their diagnostic profile, but may not have had any other comorbid diagnoses. To be eligible for inclusion in the comorbid group, children needed to be diagnosed with both an externalizing and an anxiety disorder (either SAD, SoP, PD, or GAD). The control group consisted of children not meeting criteria for any diagnosis.

## CHAPTER 3. RESULTS

### 3.1 Power Analysis

An *a-priori* power analysis was conducted via G*Power to determine the required sample size needed for a 3x2 repeated-measures, within-between interaction ANOVA as described in the following sections (Buchner, Erdfelder, Faul, & Lang, 2009). In adherence to previous research methodology by Munson (2009) and Davis et al. (2008) the effect size f was set at 0.25 (medium). A Bonferroni correction was used in order to account for the number of analyses being conducted and was reduced from a probability error coefficient alpha of .05 to .0125. As recommended by Field (2005), power was set at 0.8. According to the conducted power analysis a total sample size of 60 was required for the current study. Considering the current sample size of 72, the current study had sufficient power.

### 3.2 Preliminary Analyses

A one-way ANOVA was conducted to determine whether mean age of participants was significantly different between the three groups. The assumption of homogeneity of variance was met for the age variable according to the Levene's test. There was no statistically significant difference of mean age among the three groups $F(2,69)=1.508$, $p>0.05$. A chi-square analysis was conducted to investigate the relationship between the demographic variables (gender and ethnicity) and the three groups. A chi-square analysis for association was conducted between gender and the anxious, comorbid, and control group. Expected cell frequencies were greater than five and there was no significant association between gender and the diagnostic groups, $\chi^2(2) = (1.966)$, $p>.05$. A chi-square analysis of association was conducted on ethnicity and the three groups. However, even after combining African American, Hispanic, Asian, and individuals identifying as Other in a combined ethnicity group, expected cell frequency remained

below 5. A Fisher's exact test was therefore conducted to account for expected cell frequencies below 5. The Fisher's exact test indicated that the anxious, control, and comorbid groups did not significantly differ by ethnicity (p=0.59; Lowry, 2013). Descriptive statistics showed that individuals in the combined ethnicity category and Caucasian category were approximately equally distributed across the anxious (i.e., 81.8% Caucasian; 18.2% combined ethnicity group), comorbid (i.e., 77.8% Caucasian; 22.2% combined ethnicity group), and control group (i.e., 88.9% Caucasian; 11.1% combined ethnicity group).

The following information was provided via descriptive statistics. The final sample was approximately evenly distributed by gender, with 52.8% of individuals being male and 47.2% female. The majority of participants identified as Caucasian (83.6%), and significantly fewer identified as African American (11.9%), Hispanic (3%), and "Other" (1.5%). Five out of the 72 participants (6.9%) did not provide demographic information concerning their ethnic/racial identity. This data was not representative of the race distribution in Louisiana. According to the 2010 Census, 62% of Louisiana citizens are Caucasian, 32% are African American, 1.5% are Asian, and 3.8% identified as other or as two or more (U.S. Census Bureau, 2010). The data was also not representative of ethnicity, with 4.4% of Louisiana citizens identifying as Hispanic (U.S. Census Bureau, 2010).

Although the participants did not differ significantly by age and group assignment as was determined by the above-described ANOVA, the inclusion of a large age-range (7-16 years of age) of participants warranted further analyses. Of particular interest were differences between two groups: children younger than eleven years of age and preadolescents and adolescents eleven years and older. According to Kessler (2005), mean age of onset for anxiety disorders is eleven years of age, which allows for the hypothesis that more children in the anxious and comorbid

group will be above 11 years of age compared to the control group. A chi-square analysis of association was conducted to determine grouped age differences within the three diagnostic groups. Expected cell frequencies met the minimum criteria of 5 and results were non-significant, $\chi^2(2)= (.408)$, $p>.05$.

Independent t-tests were conducted to determine whether differences in performance on FSIQ, or one of the five subtests of interest (Block Design, Symbol Search, Digit Span, Letter-Number Sequencing, Picture Concepts) existed based on gender, age (i.e., participants 10 years and younger, participants 11 years and older), and ethnicity (i.e., Caucasian and combined ethnicity group). Independent t-tests did not indicate any differences in FSIQ based on gender $t(70)=.351$, $p>.05$, ethnicity $t(65)=.904$, $p>.05$, or age $t(70)=-.825$, $p>.05$. Assumptions for homogeneity of variance were met according to the Levene's test for all three t-tests.

A subsequent t-test was conducted to determine differences in mean performance on the Block Design based on gender, ethnicity, and age group. The Levene's test was statistically significant for the t-test looking at mean performance on Block Design and age group. Homogeneity of variance was not assumed and adjustments made to account for the violation of the homogeneity of variance assumption. The independent t-tests did not indicate statistically significant differences in Block Design based on gender $t(70)=1.287$, $p>.05$, ethnicity $t(65)=.201$, $p>.05$, or age $t(69.36)=1.617$, $p>.05$. Further, independent t-tests did not indicate any differences in mean performance on the Symbol Search subtest based on gender $t(70)=-.308$, $p>.05$, ethnicity $t(65)=-.748$, $p>.05$, or age $t(70)=-.235$, $p>.05$. The Levene's tests were not statistically significant for these three t-tests. Additionally, independent t-tests indicated no significant differences of Digit Span scores based on gender $t(70)=-.874$, $p>.05$, ethnicity $t(65)=-.413$,

*p*>.05, and age t(70)=-.865, *p*>.05. The homogeneity of variance assumption was met according to the Levene's tests for this comparison.

Homogeneity of variance could not be assumed for the comparison of mean scores on letter-number sequencing by age group (i.e., Levene's test; *p*<.05). Unequal variances were therefore assumed for this t-test. Results of the t-tests indicated no statistically significant differences on letter-number sequencing based on gender t(69)=.703, *p*>.05. However, statistically significant differences existed between mean performance on the letter-number sequencing subtest by ethnicity t(64)=2.974, *p*<.01, *d*=.88 and age group t(68.89)=-2.123, *p*<.05, *d*=0.49. Descriptive statistics indicated that children 10 years and younger performed worse on the digit-span subtest (*M*=9.12, *SD*=3.56) than children 11 years and older (*M*=10.66, *SD*=2.54). Further, Caucasian children had statistically higher scores on the letter-number sequencing score (*M*=10.27, *SD*=2.88), than children in the combined ethnicity group (*M*=7.27, *SD*=3.85). These findings are surprising considering the standardization of WISC-IV scores based on different age groups and ethnicities (Wechsler, 2003). A literature review has not provided any research on either of these findings. Although the findings might be coincidental, the large effect size for differences on letter-number sequencing scores between Caucasian individuals and individuals of other ethnic groups and the small effect size for differences on letter-number sequencing scores between children of the different age groups warrants further investigation. As this is out of the scope for this study, further analyses will take these differences into consideration and adjust for them.

Further, no statistically significant differences were found in digit-span subtest performance based on gender t(70)=-.874, *p*>.05, age t(70)=-.865, *p*>.05, and ethnicity t(65)=-.413, *p*>.05. Levene's tests for all three t-tests were non-significant. Lastly, independent t-tests

indicated no statistically significantly differences in mean picture concept subtest scores based on ethnicity t(64)=1.860, *p*>.05 and age t(69)=-.239, *p*>.05, and gender t(69)=-.412, *p*>.05. The homogeneity of variance assumption was met for all three t-tests.

**3.3 Primary Analyses**

Differences in ADIS-IV-C/P severity scores were not considered in the following analyses since individuals were already assigned to their respective groups based on consensus diagnostic decisions. Additionally, demographic variables were excluded from further analyses since a priori data analyses indicated no significant differences between demographic variables and dependent variables. A one-way ANOVA indicated no significant differences in Full Scale IQ of the WISC-IV between the anxious group (*M*=95.00, *SD*=13.56), the comorbid group (*M*=95.90, *SD*=23.00) and control group (*M*=97.07, SD=13.75), F(2,69)=.099, *p*=.91, $\omega^2$=.025 (see Table 2, see Figure 3). The homogeneity of variance assumption was met for this analysis.

Table 2. Means and Standard Deviations for WISC-IV Subtests (n=72)

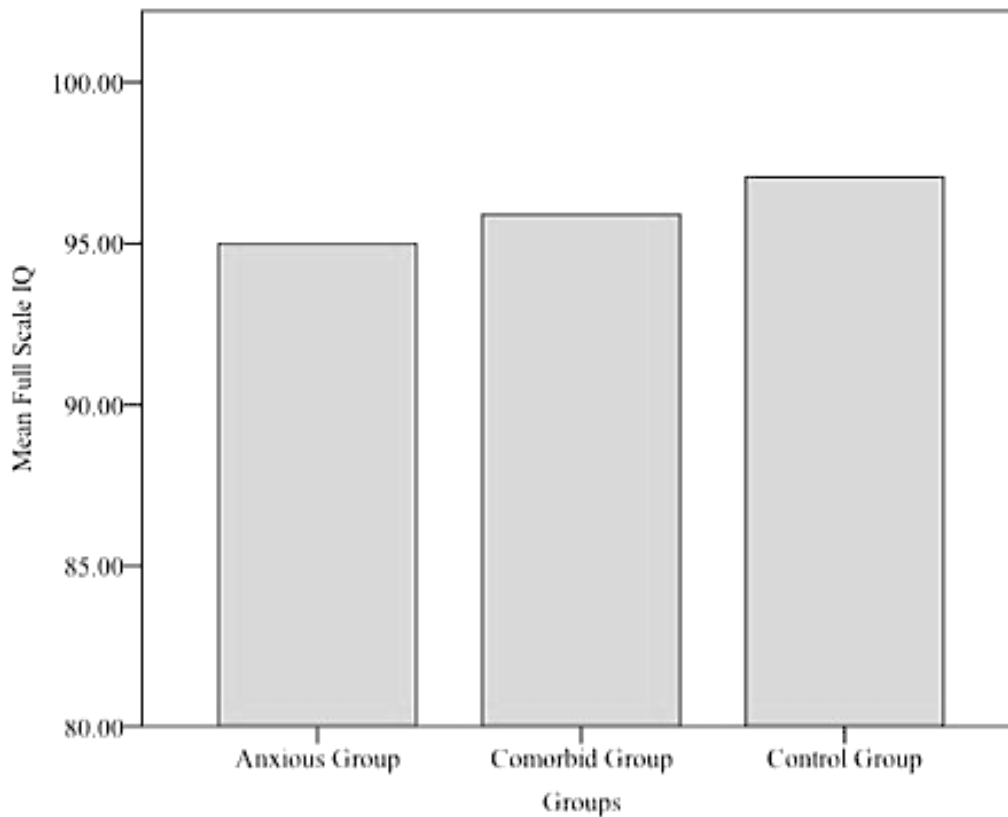| Subtest | Anxious Group Mean (SD) | Comorbid Group Mean (SD) | Control Group Mean (SD) | Total Mean (SD) |
|---|---|---|---|---|
| Full Scale IQ | 95.00 (13.57) | 95.90 (23.01) | 97.07 (13.75) | 96.11(16.55) |
| Block Design | 7.96 (2.10) | 9.05 (3.14) | 8.87 (2.80) | 8.64 (2.71) |
| Digit Span | 9.48 (3.25) | 10.30 (2.64) | 9.30 (2.38) | 9.65 (2.73) |
| Coding | 7.68 (2.80) | 7.90 (2.99) | 7.43 (2.69) | 2.64 (2.77) |
| Letter-Number Sequencing | 9.90 (2.43) | 10.25 (3.24) | 9.30 (3.76) | 9.75 (3.25) |
| Symbol Search | 8.36 (2.65) | 8.55 (2.86) | 9.77 (3.36) | 9.00 (3.05) |

Figure 3. Bar graph representing mean FSIQ scores of the WISC-IV for the anxious, comorbid, and control group.

A 3x2 repeated-measures, within-between ANOVA was conducted to determine differences in performance from the first (Block Design) to the last subtest (Symbol Search) of the WISC-IV between the anxious, comorbid, and control group as described in Hypothesis 2. The 3x2 repeated-measures, within-between ANOVA indicated no significant main (F $(1,69)=0.46$, $p=.51$, partial $\eta^2=.007$ ) or interaction effects (F$(2,69)=1.06$, $p=.35$, partial $\eta^2=.03$). Participants in the anxious group did not differ in their performance on the Block Design subtest of the WISC-IV ($M=7.96$, $SD=2.10$) compared to the comorbid group ($M=9.05$, $SD=3.14$) or the control group ($M=8.87$, $SD=2.80$). No significant differences emerged when comparing the anxious group ($M=8.36$, $SD=2.65$), comorbid group ($M=8.55$, $SD=2.86$), and control group

(*M*=9.77, *SD*=3.36) on their performance on the Symbol Search subtest of the WISC-IV. The

Box's test of equality of covariance matrices was non-significant. Descriptive statistics showed a

minimal increase in performance of the anxious and pure control group and a slight decrease in

performance of the comorbid group from the first to the last subtest. However, these trends were
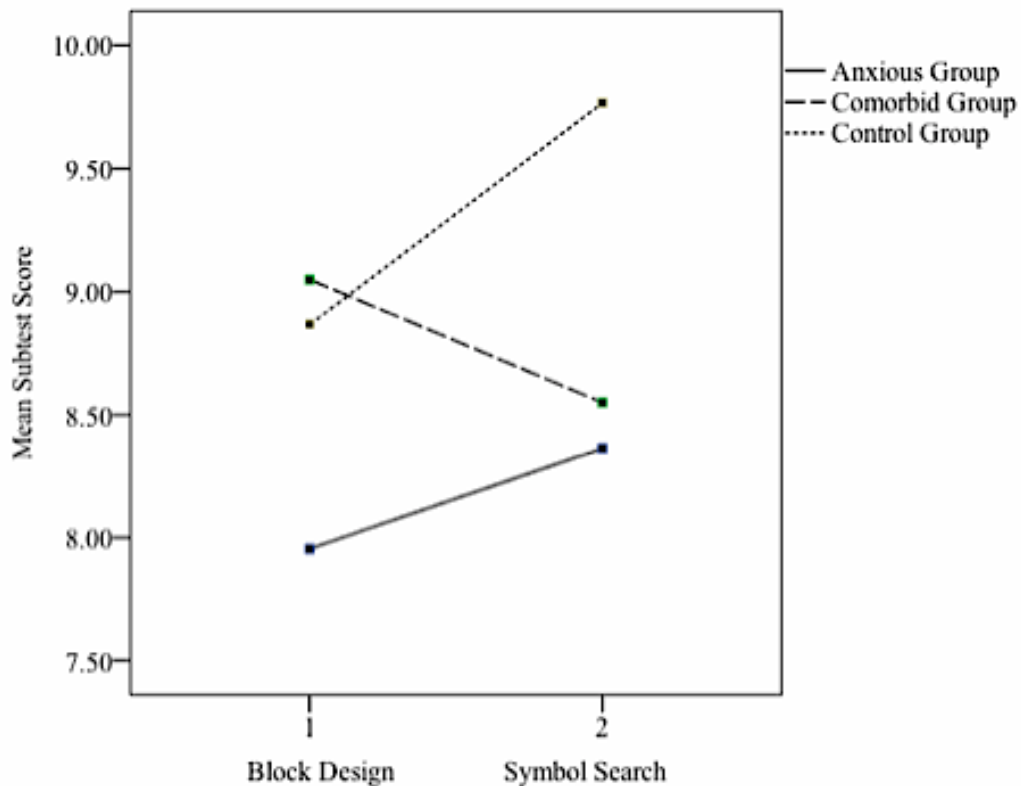
not statistically significant (see Figure 4).



Figure 4. Profile Plot Block Design and Symbol Search. Profile plot representing mean group
performance of the anxious, comorbid and control group on the WISC-IV Block Design and
Symbol Search subtests as well as interaction effects over time.

Since preliminary analyses indicated that individuals performed differently on the letter-

number sequencing subtest based on age and ethnicity, further adjustments were necessary to

conduct an analyses comparing anxious, control, and comorbid children's performance on the

working memory subscales. A 3x2 repeated measures ANCOVA was conducted to determine

differences in performance on working memory subtests over time among the anxious, control, and comorbid groups as described in Hypothesis 3. The analysis indicated no significant main ($F_{(1,61)}=.021$, $p=.885$, partial $\eta^2 =.00$) or interaction effects between the groups and WMI ($F_{(2,61)}=.818$, $p=.446$, partial $\eta^2 =.026$) after adjusting for age and ethnicity. The anxious group did not perform significantly different from the comorbid and control group from the Digit Span subtest ($M=9.48$, $SD=3.25$; $M=10.30$, $SD=2.64$; and $M=9.30$, $SD=2.38$ respectively) to the Letter-Number Sequencing subtest ($M=9.90$, $SD=2.43$; $M=10.25$, $SD=3.24$ and $M=9.30$, $SD=3.76$ respectively) of the WISC-IV (See Figure 5).
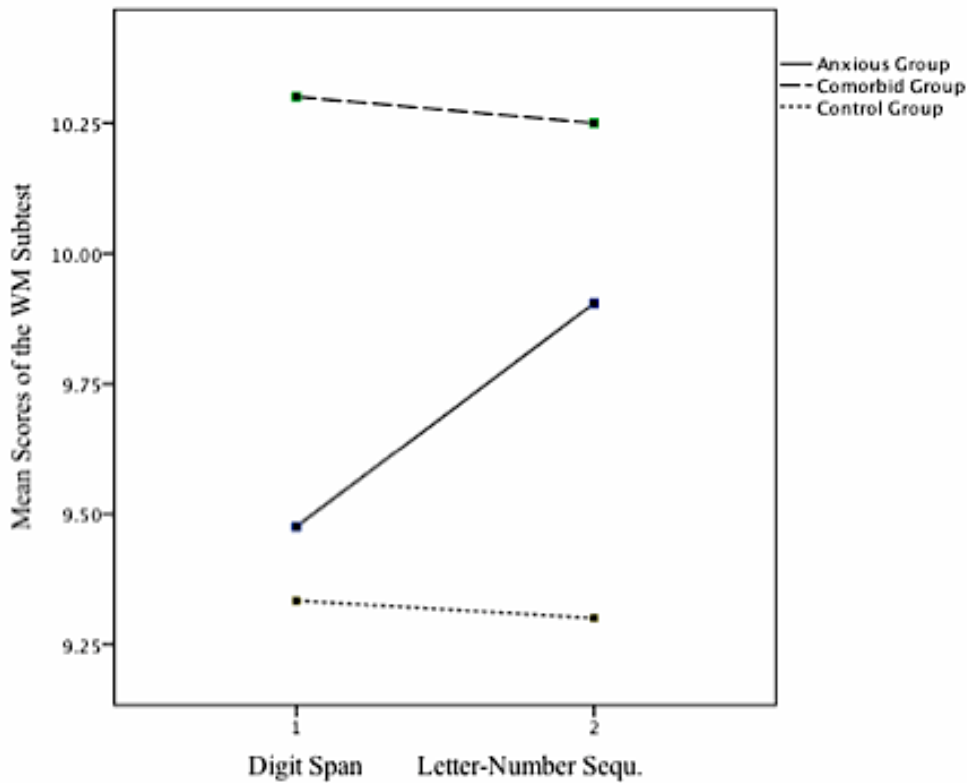


Figure 5. Profile Plot Digit Span and Letter-Number Sequencing. Profile plot representing mean group performance of the anxious, comorbid and control group on the WISC-IV Digit Span and Letter-Number Sequencing subtests as well as interaction effects over time.

An additional 2x2 repeated-measures, within-between ANOVA was conducted to compare mean performance scores of the anxious and control groups on the first and fifth subtests of the WISC-IV as described in Hypothesis 4. No significant main effects (F(1,50)=0.65, $p$=.43, partial $\eta^2$ =.013) or interaction effects emerged (F(1,50)=.08, $p$=.78, partial $\eta^2$ =.002). The anxious group ($M$=7.96, $SD$=2.10) performed similarly to the control group ($M$=8.87, $SD$=2.80) on the Block Design and Coding subtest ($M$=7.68, $SD$=2.80). $M$=8.30, $SD$=3.26) of the WISC-IV (see Figure 6, see Table 3).
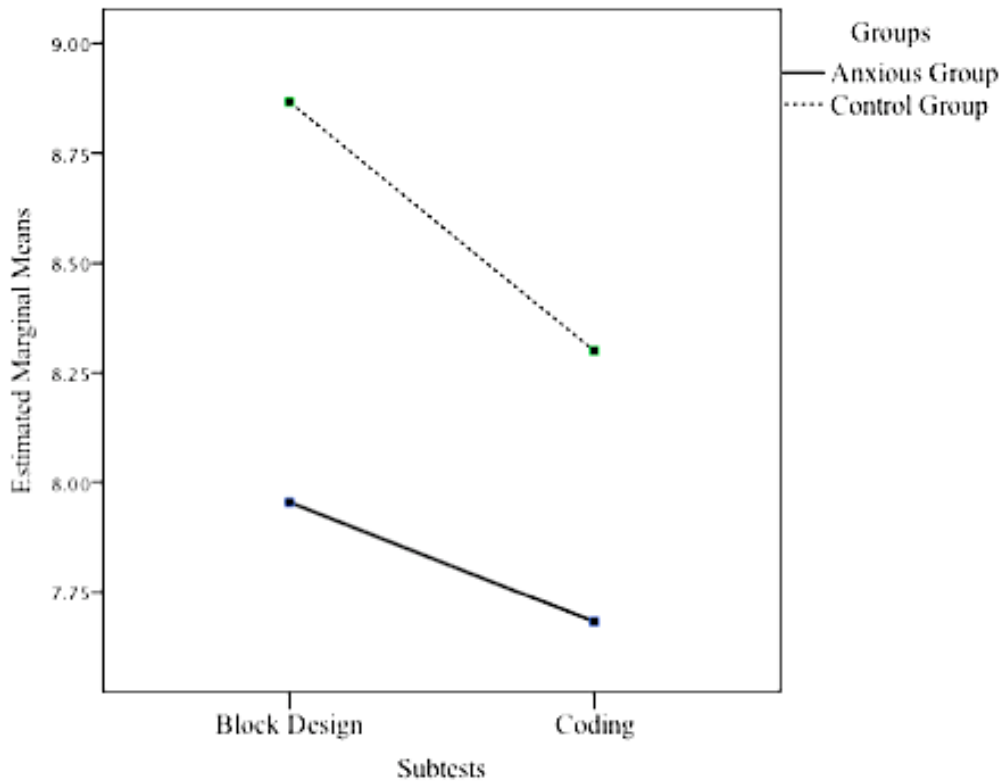


Figure 6. Profile Plot Block Design and Coding. Profile plot representing mean group performance of the anxious and control group on the WISC-IV Block Design and Coding subtests as well as interaction effects over time.

Table 3. Summary of one-way and repeated measures ANOVAs.

| Type of Analysis | Index / Indices | F | p | |
|---|---|---|---|---|
| One Way ANOVA | Full Scale IQ | 0.09 | 0.91 | ☐ |
| **Repeated Measures ANOVA** | | | | |
| • Main Effect | Block Design/ Symbol Search | 0.46 | 0.50 | |
| • Main Effect | Anxious, Comorbid, Control Group | 1.06 | 0.35 | |
| • Interaction Effect | Block Design/ Symbol Search xGroups | 1.56 | 0.22 | ☐ |
| **Repeated Measures ANOVA** | | | | |
| • Main Effect | Digit Span/ Letter Number Sequencing | 0.07 | 0.79 | |
| • Main Effect | Anxious, Comorbid, Control Group | 0.96 | 0.39 | |
| • Interaction Effect | Digit Span/ Letter Number Sequencing xGroup | 0.12 | 0.89 | |
| **Repeated Measures ANOVA \*\*** | | | | |
| • Main Effect | Block Design/ Coding | 2.61 | 0.11 | |
| • Main Effect | Anxious and Control Group | 1.28 | 0.29 | |
| • Interaction Effect | Block Design/ Coding  xGroup | 0.34 | 0.72 | |

# CHAPTER 4. DISCUSSION

The goal of the present study was to further investigate FSIQ discrepancies between children with an anxiety disorder and an undiagnosed control group. Although research on this issue had been controversial, a recent study by Davis et al. (2008) attempted to provide clarification by replicating the methodology and results of two previous studies and additionally offering a third solution ameliorating the previous methodologies (Hodges and Plow, 1990; Zimet et al., 1994). Davis et al. (2008) supported the findings of Hodges and Plow (1990) using an improved methodology. According to these findings, children with anxiety had significantly lower, average IQ scores than their undiagnosed counterparts. The purpose of the current study was to replicate Davis et al.'s methodology and findings, but in addition shed light on two previously established theories that were put forth to explain the directionality of the relationship between anxiety and the tendency to perform worse on measures of IQ. To determine whether anxiety results in lowered test performance (Davis et al., 2011; Kendall & Pimentel, 2003), underlying cognitive deficits result in the development of anxiety (Martin et al., 2007; Weeks et al., 2013), or whether both theories in part explain the discrepancy, the current study looked at the effects of habituation on performance on subtests of the WISC-IV (Wechsler, 2003). In comparison to children without a diagnosis, children with anxiety disorders were expected to perform significantly worse on the first subtest of the WISC-IV (i.e., Block Design), but commensurate by the last subtest (i.e., Symbol Search). Of further interest to the study were also the effects of habituation on working memory subtests, and the effects of habituation over a 30-minute period. These hypotheses had been based on a plethora of research that supported the idea that anxious children perform worse on measures of working memory compared to control groups (Stout, Shackman, & Larson, 2013; Toren et al., 2005; Vance, Ferrin, Winther, & Gomez,

2013; Vasa et al., 2007), and research on duration required to achieve efficient habituation effects (Foa & Chambless 1978; Grayson, Foa, & Steketee, 1982; Olatunji et al., 2009).

The findings of the current study did not indicate a statistically significant discrepancy between FSIQ of children with an anxiety disorder compared to those without a diagnosis. However, FSIQ of anxious children in the current study ($M$=95.0) was similarly impaired as FSIQ of anxious children in the Davis et al. (2008) study ($M$=94.8), showing a small but robust deficit in FSIQ compared to the population mean (i.e., FSIQ of 100). Different aspects of the current study may have contributed to the non-significance of the findings. First, the effect size for FSIQ differences between the groups was small (i.e., $\omega^2$=.025). Further, whereas Davis et al. (2008) compared the anxious group to a control group with an average FSIQ of 109.5, the control group of the current study had an average FSIQ of 97.07. The discrepancy between IQ scores in the two studies is approximately 12 IQ points. It is possible that these findings are a result of sampling bias, a potential limitation of the current study. All children in the present study were referred to the PSC and may have differed from a community sample of children who did not seek services. More specifically, although individuals in the control condition did not receive a diagnosis, they had originally been brought to the outpatient clinic for evaluation of some caregiver-perceived difficulty or problem. Therefore, the current study's participants who were assigned to the control group may differ from participants selected by chance from the community. Although the differences of IQ scores among the anxious and control groups were non-significant, the current findings support a small, but nevertheless reliable difference between the FSIQ of anxious children compared to the population.

The current study also compared the performance of children with at least one externalizing (e.g., ADHD) and one anxiety disorder, to the control group and anxious group.

Overall, children in the control (*M*=97.07), comorbid (*M*=95.90), and anxious group (*M*=95.00) had average IQ scores below the national mean (*M*=100), but were not significantly different from one another (see Table 2). Research has reliably supported that individuals with externalizing disorders, in particular ADHD, have lower scores on measures of intelligence than controls (Biederman, Fried, Petty, Mahoney, & Faraone, 2012; Yang et al., 2013). Although the current study did not have a pure externalizing group, a comorbid group was created including children with an anxiety and an externalizing disorder. According to a meta-analytic review by Frazier and Youngstrong (2008), children with ADHD have an average FSIQ that is 9 points lower than children in a control group. In the current study, individuals with an externalizing and internalizing disorder had an average FSIQ of 95.9. Although, children with a comorbid diagnosis performed below the national mean, they performed superior to what would have been expected according to Frazier and Youngstrong (2008) in comparison to the control group, but also according to the average national IQ. Therefore, future research should investigate whether anxiety moderates the relationship between ADHD and performance on FSIQ measures. To allow for such a comparison, a pure externalizing disorder groups would have to be established in addition to a comorbid and control group.

Additionally, recent research has attempted to shed light on the lower performance of children with ADHD. Biederman et al. (2012) identified a subgroup of individuals with ADHD and separated them form other children with ADHD based on parental FSIQ deficits. Results suggested that IQ deficits were highly correlated to parental IQ deficits, non-dependent on ADHD diagnosis. According to Biederman et al. (2012), children with parents of average or above average IQ did not show discrepancies in FSIQ compared to children in the control group. Considering that this study is the first of its kind, research replicating these findings is necessary.

If, however, findings can be replicated, then subsequent studies could explore whether such tendencies occur in anxious populations as well.

A second purpose of this study was to determine the effects of habituation on anxious children's performance on the WISC-IV (Wechsler, 2003). It was expected that anxious children's performance would improve from the first to the last subtest compared to children in the control group as a result of habituation to the testing environment (Öst, 2012). However, anxious children's performance on Block Design was comparable to children in the control group. Further, the results did not indicate a significant improvement from the first to the last subtest for anxious children compared to that of the control group. Since individuals were given the WISC-IV subtests in the recommended order, one possible explanation for this result is that norming criteria for the WISC-IV may have taken into account potential habituation effects (Wechsler, 2003).

A second possible explanation could be, that the anxiety of children in our current sample (i.e., children with SoP, SAD, PD, and GAD) did not interfere with testing. According to Alpert and Haber (as cited in Zeidner, 1998), anxiety during testing is bidimensional, that is, anxiety can be either facilitating or debilitating. Whether anxiety is facilitating or debilitating depends on several characteristics. Birjandi and Alemi (2010) stated that intensity of anxiety determines whether it is facilitating or debilitating, but a review by Zeidner (1998) evaluated several other aspects of anxiety, the person and the situation that may interfere with or facilitate performance on a test. More precisely, Zeidner (1998) stated that an individuals' attitudes towards anxiety, the type of anxious responding, and the type of test used might determine whether anxiety is debilitating or facilitating. For example, a test-taker perceiving that anxiety will be a hindrance might perform worse than a person with a more positive attitude. Further, a person may respond

to anxiety by increasing focus on the task at hand, or with distracting thoughts to avoid the situation, resulting in improved or worsened test performance respectively. Lastly, answering questions cautiously may be beneficial during problem solving subtests, but may result in poor performance on timed subtests, which is an example of how type of subtest is important in determining whether anxiety is debilitating or facilitating. Additionally, Sommer and Arendasy (2013) suggested that children who had previous aversive experiences with testing might experience greater state anxiety before and during testing compared to individuals who had positive experiences. Since previous experiences an anxiety before, during, and after the test were not assessed in the current study, it is unclear what variables may have influenced, if at all, the testing performance of these children.

Whereas a number of studies have provided evidence that anxious children perform worse on measures of Working Memory compared to control groups (Stout, Shackman, & Larson, 2013; Toren et al., 2000; Vance, Ferrin, Winther, & Gomez, 2013; Vasa et al., 2007), the current study was not able to support these findings. Anxious children's performance on Digit Span, subtest 3, and Letter-Number Sequencing, subtest 7, was not significantly different from children in the control and comorbid groups. Future research could further tease apart potential confounding variables that may increase or decrease anxious children's performance on measures of working memory.

Earlier research has indicated that individuals show a decrease in physical arousal over a period of approximately 30 minutes as a result of habituation to a feared stimulus (Grayson, Foa, & Steketee; Olatunji et al., 2009). This research lead to the assumption stated in hypothesis 4 that anxious individual's performance would improve by the 5th subtest (i.e., Coding) compared to a control group (Foa & Chambless, 1977; Grayson, Foa, & Steketee, 1982; Olatunji et al., 2009).

However, individuals in the control and anxious group scored similarly on the Block Design and Coding subtest of the WISC-IV (Wechsler, 2003). It is possible that heightened physical arousal during the first subtests of the WISC-IV does not impair performance, or that physical arousal does not differ between anxious and non-anxious children.

The current study provided some clarification concerning the two theories earlier described. The results indicate that habituation to the testing situation did not result in significant improvements of anxious children's performance on subtests compared to that of their non-anxious counterparts. This is contraindicative to the theory that anxious children perform worse in testing situations due to debilitating state anxiety. However, state anxiety was not directly measured, and future studies should investigate the various variables that may result in worse performance during testing as described earlier. Further, future studies could look at habituation to testing situations on other tests, as the WISC-IV may have been normed to account for small habituation effects over times. Although the present findings do not support the idea that anxiety during testing results in worse performance, they do not contradict some of the other theories: underlying cognitive deficits might result in the development of anxiety or anxiety might results in decreased long-term retention and learning over time.

Although the current results did not indicate that anxious children might benefit from habituation to the testing session prior to taking an intelligence test such as the WISC-IV, the current study's methodological design provides only limited information about anxious children's performance in similar real life testing situations. Two examples of such real-life situations during which anxiety may produce problematic effects are national, standardized high-stakes tests such as the Scholastic Assessment Test (SAT) or American College Testing (ACT). Standardized, national high-stakes tests are different from clinical measures of intelligence in

three aspects. For one, outcomes of high-stakes tests usually have a greater impact on an individual's future than do intelligence tests. Second, SAT and ACT tests are highly advertised resulting in greater societal pressure to perform well and greater potential to be asked to disclose test results to friends and families. Third and lastly, at the Psychological Services Center, psychoeducational evaluations consisted of three sessions, of which the intelligence test was conducted during the second session. Therefore, rapport was well established by the time children come in for their second session, which may reduce overall anxiety and improve performance. Future studies should attempt to simulate high-stakes testing situations to further understand potential implications of anxiety on test performance.

Future studies should attempt to replicate Davis et al.'s (2008) finding using a more representative control sample, include a larger participant pool, and potentially compare patients in an inpatient setting to a community control group. In additional to replicating the Davis et al. (2008) study, this would help determine whether individuals with more severe anxiety show the expected FSIQ patterns. Further, future studies could look at habituation effects in real-life (e.g., SAT, ACT or LEAP) or simulated testing situations to determine whether anxious children's performance will improve over time. Having a larger sample to look at differences between individuals diagnosed with only one anxiety disorder (e.g., GAD, SoP, SAD, or PD) and without any comorbid diagnoses should also be considered in future research. It would also be useful to determine the importance of rapport in anxious children's ability to perform commensurate to control groups on tests and the quality of rapport and time invested to build rapport necessary to achieve this goal. Lastly, future research could measure physical arousal of children in anxious, externalizing and control groups during test administration to look at potential differences.

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# APPENDIX

## IRB Approval

### Project Report and Continuation Application
*(Complete and return to IRB, 131 David Boyd Hall.*
*Direct questions to IRB Chairman Robert Mathews 578-8692.)*

**IRB#:** 2637 **Your Current Approval Expires On:** 5/31/2013

**Review type:** Expedited **Risk Factor:** Minimal

**PI:** Thompson Davis **Dept:** Psychology **Phone:** (225) 578-1500

**Student/Co-Investigator:** Marie Nebel-Schwalm

**Project Title:** Anxiety Disorders Clinic: Assessment

**Number of Subjects Authorized:** 200

Institutional Review Board
Dr. Robert Mathews, Chair
131 David Boyd Hall
Baton Rouge, LA 70803
P: 225.578.8692
F: 225.578.5983
irb@lsu.edu | lsu.edu/irb

**Date Sent:** 3/4/2013

Please read the entire application. Missing information will delay approval!

I. PROJECT FUNDED BY: LSU proposal #: 0

II. PROJECT STATUS: Check the appropriate blank(s); and complete the following:
- ✓ 1. **Active, subject enrollment continuing**; # subjects enrolled: 232
- ___ 2. **Active, subject enrollment complete**; # subjects enrolled: ___
- ___ 3. **Active, subject enrollment complete**; work with subjects continues.
- ___ 4. **Active, work with subjects complete**; data analysis in progress.
- ___ 5. Project **start postponed**
- ___ 6. Project **complete**; end date __/__/__
- ___ 7. **Project cancelled**: no human subjects used.

III. PROTOCOL: (Check one).
- ✓ Protocol continues as previously approved
- ___ Changes are requested*
    - *List (on separate sheet) any changes to approved protocol.*

IV. UNEXPECTED PROBLEMS: (did anything occur that increased risks to participants):
- ➤ State number of events since study inception: N/A since last report: 0
- ➤ If such events occurred, describe them and how they affect risks in your study, in an attached report.
- ➤ Have there been any **previously unreported** events? Y/N N ?
    *(if YES, attach report describing event and any corrective action).*

V. CONSENT FORM AND RISK/BENEFIT RATIO:
Does new knowledge or adverse events change the risk/benefit ratio? Y/N N;
Is a corresponding change in the consent form needed? Y/N N

VI. ATTACH A BRIEF, FACTUAL SUMMARY of project progress/results to show continued participation of subjects
is justified; or to provide a final report on project findings.

VII. ATTACH CURRENT CONSENT FORM (only if subject enrollment is continuing); and check the appropriate blank:
- ✓ 1. Form is unchanged since last approved
- ___ 2. Approval of revision requested herewith. (identify changes)

**Signature of Principal Investigator:** _____ **Date:** 4/3/13

IRB Action: ✓ Continuation approved. Approval Expires: 5/8/14
Disapproved
File closed
Signed _____ Date 4/9/13

Form date: April 16, 2008

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Project Title:    Anxiety Disorders Clinic: Assessment of Children and Adolescents

Performance Site:        Physical Address: Psychological Services Center, LSU, 31 Johnston Hall, Baton Rouge,
LA 70803. Mailing Address: Psychological Services Center, 236 Audubon Hall, Baton Rouge, LA 70803

Investigator:    The following investigator is available for questions Monday-Friday, 9:00 a.m.- 4:30 p.m.
Dr. Thompson Davis, III
Psychology Department, LSU
(225) 578-1500

Purpose of the Study:    The purpose of this research project is to assess and diagnose children and adolescents who are experiencing various difficulties, such as academic problems, difficulties paying attention, mood-related difficulties, and/or worries and fears.

Inclusion Criteria:        Children and adolescents 2-17 years of age.

Exclusion Criteria:        Children who do not meet the age requirements; non-English speakers; and/or children who have a comorbid condition that would severely limit their ability to complete an assessment.

Maximum Number of Subjects:    The maximum number of subjects will be 400.

Study Procedures/Description of the Study:        Participants will be asked to complete questionnaires and interviews with the investigators.

Benefits:        The benefit will be the thorough assessment and diagnosis of problems affecting the child or adolescent.  The participants understand that the examiners cannot guarantee the presence or absence of psychopathology.  Further, the final report will reflect the clinical opinions (based on the assessment data collected) of the primary investigator.

Risks/Discomforts:        Some participants may not feel comfortable answering questions about their difficulties. The purpose of asking particular questions will be explained, however, participants will also be told that they may refuse to answer questions—though this may compromise portions of the final report.

Right to Refuse:        Participation is voluntary and a child (or adolescent) will become part of the study only if both child and parent agree to the child's participation. At any time, either the subject or the parent may withdraw from the study without penalty or loss of any benefit to which they might otherwise be entitled.

Privacy:        Records with identifying information will be kept in a locked facility. Electronic data will be entered without identifying information. Results of the study may be published, but no names or identifying information will be included for publication. Subject identity will remain confidential unless disclosure is required by law (e.g., suspected or reported ongoing child abuse or neglect).  I understand that the investigators are required by law to report any reasonable suspicions.

Financial Information:    The cost for participation in this study is the same cost as a psychoeducational evaluation at the PSC ($500.00).  This includes the cost of administering achievement and intelligence tests, and assessing psychopathology via semi-structured interviews, school observations, and rating scales.  Participants who withdraw will pay a pro-rated fee based on the assessments given and the time

involved. Participants wishing to withdraw after learning the outcome of their assessment forfeit their evaluation fee.

Withdrawal:    Participants may withdraw from the research study at any time. Parents wishing to withdraw should contact the principal investigator or co-investigators in writing as soon as this decision has been made.

Removal:    Participants may be removed from the study without consent if they are believed to be a danger to themselves or others. Removal may also occur if the investigators lose contact with a family after attempts to reach them or if the investigators believe removal and assessment else where would be in the best clinical interest of the participants.

Alternatives:    Every effort will be made to use the most appropriate methods of assessment and diagnosis. Participants understand that clinical assessment and the tools used to that end are determined by the clinical judgment of the investigator. Participants desiring the use of specific assessment tools deemed unnecessary by the investigator will be referred out.

Unforeseeable Risks:    There may be unforeseeable risks to participants of this study as a result of participating, however, steps are taken to minimize any potential foreseeable risks and discomfort.

Study-associated injury or illness:    Though injuries are not anticipated, medical care will be summoned for   participants sustaining injury or illness as a result of the study. Participants should understand that even with precautions in place, should any injuries occur either during or as a result of participation neither LSU nor the researchers will be able to provide any compensation or medical care.

Study-related illness or injury:    In case of medical emergency and in case further psychological attention is needed, we have listed resources below:

> Medical Services
> 911 (for emergencies)
> Mental Health Services
> 911 (for emergencies)
> Psychological Services Center (225) 578-1494

New Findings:    Participants will be notified if newly published research pertaining to the assessment provided by this study become available.

Signatures:

The study has been discussed with me and all my questions have been answered. I may direct additional questions regarding study specifics to the investigators. If I have questions about subjects' rights or other concerns, I can contact Robert C. Mathews, Chairman, LSU Institutional Review Board, (225)578-8692. I agree to participate in the study described above and acknowledge the researchers' obligation to provide me with a copy of this consent form if signed by me.

_____          _____
Parent/guardian Signature                              Date

*Reader of the consent form, please sign the statement below if the consent form was read to the parent because he/she is unable to read:*

The parent/guardian has indicated to me that he/she is unable to read. I certify that I have read this consent form to the parent/guardian and explained that by completing the signature line above, he/she has agreed to participate and has given permission for the child to participate in the study.

_____     ,     _____
Signature of Reader                         Date

*Child and Adolescent Assent Form*

I, _____, agree to be in this study that looks at how I think and feel. I will be asked to answer questions about any fears, worries, emotions, or behaviors that I may have, as well as questions about how I get along with others (like my friends and family). I can decide to stop being in the study at any time without getting in trouble.

_____     _____     _____
Child/Adolescent Signature          Date                          Age

_____     _____
Witness Signature*                     Date

(*Witness must be present for the assent process, not just the signature by the minor.)

# VITA

Franziska Noack, a native of Mittweida, Germany, moved to the United States in 2004 after receiving her Abitur at the Städtische Gymnasium Mittweida.  After working with families and children for several years, she received her bachelor's degree in psychology at University of Houston-Clear Lake in 2012.  She subsequently entered the Clinical Psychology program at Louisiana State University and got married to Daniel LeSage.  Following their marriage, they decided to legally change their last name to NoackLeSage.  Franziska will receive her master's degree in May 2014 and continue her education toward a doctorate in Clinical Psychology at Louisiana State University.