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FLORIDA INTERNATIONAL UNIVERSITY

Miami, Florida

EVALUATION OF THE INTERNAL STRUCTURAL VALIDITY OF THE DIAGNOSTIC AND STATISTICAL MANUAL OF MENTAL DISORDERS (FOURTH EDITION) ANXIETY DISORDERS IN CHILDREN AND ADOLESCENTS

A dissertation submitted in partial fulfillment of the

requirements for the degree of

DOCTOR OF PHILOSOPHY

in

PSYCHOLOGY

by

Yasmin Rey

2010

To: Dean Kenneth Furton
College of Arts and Sciences

This dissertation, written by Yasmin Rey, and entitled Evaluation of the Internal Structural Validity of the Diagnostic and Statistical Manual of Mental Disorders (Fourth Edition) Anxiety Disorders in Children and Adolescents, having been approved in respect to style and intellectual content, is referred to you for judgment.

We have read this dissertation and recommend that it be approved.

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Charles Bleiker

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James Jaccard, Co-Major Professor

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Wendy K. Silverman, Co-Major Professor

Date of Defense: July 15, 2010

The dissertation of Yasmin Rey is approved.

_____
Dean Kenneth Furton
College of Arts and Sciences

_____
Interim Dean Kevin O'Shea
University Graduate School

Florida International University, 2010

DEDICATION

I dedicate this dissertation to my family and friends. It was their encouragement, support, and love, that made this dream a reality.

ACKNOWLEDGMENTS

I wish to thank all the members of my committee for their support. I would like to especially thank my two co-major professors, Dr. Wendy Silverman and Dr. James Jaccard for an invaluable learning experience as well as for their encouragement and support throughout my graduate career. I would also like to thank my friends at the Child Anxiety and Phobia Program for their cooperation and support.

ABSTRACT OF THE DISSERTATION

EVALUATION OF THE INTERNAL STRUCTURAL VALIDITY OF THE DIAGNOSTIC AND STATISTICAL MANUAL OF MENTAL DISORDERS (FOURTH EDITION) ANXIETY DISORDERS IN CHILDREN AND ADOLESCENTS

by

Yasmin Rey

Florida International University, 2010

Miami, Florida

Professor Wendy K. Silverman, Co-major Professor

Professor James Jaccard, Co-major Professor

The purpose of the present dissertation was to evaluate the internal validity of symptoms of four common anxiety disorders included in the Diagnostic and Statistical Manual of Mental Disorders fourth edition (text revision) (DSM-IV-TR; American Psychiatric Association, 2000), namely, separation anxiety disorder (SAD), social phobia (SOP), specific phobia (SP), and generalized anxiety disorder (GAD), in a sample of 625 youth (ages 6 to 17 years) referred to an anxiety disorders clinic and 479 parents. Confirmatory factor analyses (CFAs) were conducted on the dichotomous items of the SAD, SOP, SP, and GAD sections of the youth and parent versions of the Anxiety Disorders Interview Schedule for DSM-IV (ADIS-IV: C/P; Silverman & Albano, 1996) to test and compare a number of factor models including a factor model based on the DSM. Contrary to predictions, findings from CFAs showed that a correlated model with five factors of SAD, SOP, SP, GAD worry, and GAD somatic distress, provided the best fit of the youth data as well as the parent data. Multiple group CFAs supported the metric invariance of

the correlated five factor model across boys and girls. Thus, the present study's finding supports the internal validity of DSM-IV SAD, SOP, and SP, but raises doubt regarding the internal validity of GAD.

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Chapter I.

INTRODUCTION

The anxiety disorders included in the fourth edition of the Diagnostic and Statistical Manual (text revision) (DSM-IV-TR; American Psychiatric Association [APA], 2000) are considered one of the most prevalent psychiatric disorders among youth (Bernstein & Borchardt, 1991). A recent meta-analysis of 55 epidemiological studies revealed mean prevalence rates ranging from 11 to 12.3% (Costello, Egger, Copeland, Erkanli, & Angold, in press). Studies using clinical samples have reported prevalence rates ranging from 4% to 45% (e.g., Last, Perrin, Hersen, & Kazdin, 1992). The DSM-IV includes a major diagnostic category of "Anxiety Disorders" and a number of anxiety disorders subcategories. Of these anxiety disorders subcategories, the most prevalent among youth are separation anxiety disorder (SAD), social phobia (SOP), specific phobia (SP), and generalized anxiety disorder (GAD), with rates reported as 2.3% to 3.9%, 2.2% to 5.0%, 6.6% to 6.7%, and 1.7% to 1.9%, respectively (Costello et al., in press).

An assumption underlying the DSM classification of psychiatric disorders (including anxiety disorders) is that these disorders represent discrete entities with boundaries that separate one disorder from another. Although the anxiety disorders subcategories included under the major category of anxiety disorders in the DSM have overlapping features or symptoms, these subcategories are considered to be distinct from one another. Historically, the diagnostic categories included in the DSM were developed based on expert consensus in different areas of psychopathology. Relatively, little attention was paid to demonstrate empirically that the DSM diagnostic categories were

indeed distinct from one another.

Empirical demonstration of the distinctiveness of categories in any classification system, including the DSM, requires that the categories possess reliability and validity (see Saavedra & Silverman, 2002). There is considerable evidence supporting the reliability of the anxiety disorders subcategories. Evidence supporting the validity of the anxiety disorders subcategories has varied, with less research attention paid to internal validity relative to external validity (Saavedra & Silverman, 2002). External validity of a diagnostic category refers to whether the disorder can be distinguished along certain specific criteria, which include sociodemographic factors, clinical phenomenology, psychosocial factors, family genetic and environmental factors, biological factors, natural history, and response to treatment interventions (e.g., Cantwell, 1975). Internal validity refers to the testing of hypotheses regarding the internal structure of a diagnostic entity (e.g., are anxiety disorders distinct entities or a single entity?), which can help shed light on the conceptualization of a psychiatric disorder (Cantwell, 1996).

Research on the internal validity of DSM anxiety disorders generally supports the distinctiveness of these disorders (e.g., Chorpita, Moffitt, & Gray, 2005; De Ross, Gullone, & Chorpita, 2002; Spence, 1997; 1998), however, findings have been inconsistent (Higa-McMillan, Smith, Chorpita, & Hayashi, 2008; Lahey et al., 2008). Further, most past studies evaluated internal validity of the DSM anxiety disorders in community samples of youth and relied on rating scales to assess DSM anxiety symptoms. The generalizability of these findings to clinic samples of youth whose anxiety symptoms/disorders are assessed using a diagnostic interview schedule is unclear. In addition, most past studies used samples of Caucasian youth (e.g., Lahey et al., 2008;

Spence, 1997). The internal structure of DSM anxiety disorders in other ethnic and racial samples including Latino youth has not been investigated. Overall, given the inconsistent findings and limitations of past studies, continued research on internal validity of DSM anxiety disorders is needed.

Thus, this dissertation study evaluated the internal validity of DSM-IV SAD, SOP, SP, and GAD. The disorders were assessed using a semi-structured diagnostic interview in a sample of predominantly Latino youth referred to an anxiety disorders specialty clinic and their parents. The study used confirmatory factor analyses (CFAs) to test and compare several factor models of the internal structure of these DSM-IV anxiety disorder subcategories. The study also examined whether the internal structure of these DSM-IV anxiety disorders varied according to youth sex (youth sex in this study refers to the youth's biological sex, male or female).

This dissertation is divided into the following chapters. First, an overview of the research that documents reliability of DSM anxiety disorders is presented. Second, an overview of the research that documents external validity of DSM anxiety disorders is presented. This is followed by a review of the research conducted on internal validity of DSM anxiety disorders (chapter 2). Upon review of this literature, it will become evident that several issues regarding understanding of internal validity of DSM anxiety disorders require attention. The next section (chapter 3) discusses the methodology used to address the study's research questions. This is followed by a presentation of the dissertation findings (chapter 4). Results and implications for future research are discussed in the final section (chapter 5).

Chapter II.

LITERATURE REVIEW

The anxiety disorders included in the DSM-IV-TR (APA, 2000) are considered one of the most prevalent psychiatric disorders among youth (Bernstein & Borchardt, 1991). A recent meta- analysis reported mean prevalence rates ranging from 11 to 12.3% across community samples (Costello et al., in press). Studies have reported prevalence rates ranging from 4% to 45% in clinical samples (e.g., Last et al., 1992). The DSM-IV includes a major diagnostic category of "Anxiety Disorders" and a number of anxiety disorders subcategories. These subcategories are presented in Table 1. Separation anxiety disorder is the only anxiety disorder that is included in the section of the DSM dedicated to "Disorders Usually First Diagnosed in Infancy, Childhood, or Adolescence" (APA, 2000). Of these anxiety disorders subcategories, the most prevalent among youth are SAD, SOP, SP, and GAD, with rates reported as 2.3% to 3.9%, 2.2% to 5.0%, 6.6% to 6.7%, and 1.7% to 1.9%, respectively (Costello et al., in press).

An assumption underlying the DSM classification of psychiatric disorders, (including anxiety disorders), is that these disorders represent discrete entities with boundaries that separate one disorder from another. Although the anxiety disorders subcategories included under the major category of anxiety disorders in the DSM have overlapping features or symptoms, these subcategories are considered to be distinct from one another. Historically, the diagnostic categories included in the DSM were developed based on expert consensus in different areas of psychopathology. Thus, little attention was paid to demonstrate empirically that these diagnostic categories included in the DSM were indeed distinct from one another. With successive versions of the DSM (i.e., DSM-

III, DSM-III-R, DSM-IV), the diagnostic categories included were created or modified based not only on expert opinion, but also on research reviews, secondary data analyses, and extensive field trials (APA, 2000).

Empirical demonstration of the distinctiveness of categories in any classification system, including the DSM, requires that the categories possess reliability and validity (see Saavedra & Silverman, 2002). As noted, there is considerable evidence supporting the reliability of the anxiety disorders subcategories included in more recent versions of the DSM (i.e., DSM-III, DSM-III-R, DSM-IV). However, evidence supporting the validity of the anxiety disorders subcategories has varied, with less research attention paid to internal validity relative to external validity (Saavedra & Silverman, 2002). The research on the reliability, external validity, and internal validity of the DSM anxiety disorders is summarized below.

Research on Reliability of DSM Anxiety Disorders in Youth

Test-Retest Reliability. There is ample research evidence confirming the test-retest reliability of specific DSM anxiety disorders in youth. Table 2 presents a summary of studies that reported test-retest reliability of DSM anxiety disorders in community and clinical samples of youth (ages 6 to 18 years) assessed using semi-structured or structured diagnostic interview schedules (Ambrosini, 2000; Angold & Costello, 1995; Reich, 2000; Shaffer, Fisher, Lucas, & Dulcan, 2000; Silverman, Saavedra, & Pina, 2001). These studies reported test- retest reliability (kappa) coefficients for the most common DSM-III-R and DSM-IV anxiety disorders found in youth, namely, SAD, SOP, SP, GAD, and overanxious disorder (OAD) (see Table 2). Anxiety disorders such as panic disorder (PD) with or without agoraphobia (AG), post-traumatic stress disorder (PTSD), or obsessive

compulsive disorder (OCD) are not reported due to lower base rates of these disorders in youth relative to other anxiety disorders (e.g., Ambrosini, 2000; Shaffer et al., 2000; Silverman et al., 2001).

As table 2 shows, two studies reported reliability of DSM anxiety disorders based only on child interview data (Angold & Costello, 2000; Reich, 2000); one study reported reliability based on combined child and parent interview data only (Ambrosini, 2000); and two studies reported reliability based on child, parent, and combined interview data (Shaffer et al., 2000; Silverman et al., 2001). From all of these studies, test-retest reliability (kappa) coefficients based on child interview were generally in the good to excellent range (k = .60 to .80), with the exception of SOP (k = .25) and SAD (k = .46) diagnoses derived using the DISC-IV (Shaffer et al., 2000), and OAD (k = .55) derived using the DICA (Reich, 2000). Reliability coefficients based on parent interview data were in the good to excellent range (k = .65 to .88), with the exception of SOP (k = .54) and SAD (k =.58) diagnoses derived using the DISC-IV. Reliability coefficients for anxiety disorders based on combined child and parent interview data were also in the good to excellent range (k = .78 to .92), with the exception of SOP, SAD, and GAD diagnoses derived using the DISC-IV (k = .48, .55, and .58, respectively) (Shaffer et al., 2000). Overall, the findings show that DSM SAD, SOP, SP, GAD, and OAD can be reliably diagnosed among youth across time.

Interrater Reliability. There is also research evidence confirming the interrater reliability of specific DSM anxiety disorders diagnoses in youth. Silverman and Nelles (1988), for example, examined the interrater reliability of DSM-III-R SP, School Phobia (a specific type of SP), and OAD assessed using the Anxiety Disorders Interview

Schedule for Children: Child and Parent Versions (ADIS-C/P) in a sample of 51 clinic referred youth (ages 6 to 18 years) and their parents. Based on child interview data, interrater reliability (kappa) coefficients were found to be in the excellent range for school phobia and SP (k = 1.00) and in the poor range for OAD (k = .35). Using parent interview data, reliability coefficients were in the fair to good range for school phobia, SP, and OAD (k = .46, .64, and .59 respectively). Using combined child and parent reports, reliability coefficients were in the excellent range for school phobia and SP (k = 1.00) and in the fair range for OAD (k = .54).

Rapee, Barrett, Dadds, and Evans (1996) examined the interrater reliability of DSM-III-R SAD, SOP, SP, and OAD assessed using the ADIS: C/P (Silverman & Nelles, 1988) in a sample of 161 clinic referred youth (ages 7 to 14 years) and their parents. Based on child interview data, interrater reliability (kappa) coefficients for primary diagnoses were in the good to excellent range for SAD and SOP (k = .70 and .81, respectively) and in the fair range for OAD and SP (k = .45 and .59, respectively). For diagnoses found anywhere in the youth's diagnostic profile, reliability coefficients were in the good to excellent range for SAD, SOP, SP, and OAD (k = .76 to .81). Based on parent interview data, reliability coefficients for primary diagnoses were in the good range for SAD, OAD, and SOP (k = .62 to .66) and in the fair range for SP (k = .52). For diagnoses found anywhere in the youth's profile, reliability coefficients were in the good to excellent range for SAD, OAD, and SOP (k = .78 to .87) and in the poor range for SP (k = .33). Based on combined youth and parent data, reliability coefficients for primary diagnoses were in the good to excellent range for SAD, OAD, SOP, and SP (k = .63 to .82). For diagnoses found anywhere in the youth's profile, reliability coefficients were in

the good to excellent range for SAD, SOP, SP, and OAD (k = .59 to .77). Overall, the findings from these studies show that the DSM anxiety disorders can be reliably diagnosed in youth across different interviewers.

Summary. The research evidence shows that specific DSM anxiety disorders can be reliably diagnosed in youth. There is ample research evidence confirming the test retest reliability of the specific DSM anxiety disorders diagnoses in youth. There is also research evidence confirming the interrater reliability of diagnoses of specific DSM anxiety disorders in youth. Both retest reliability and interrater reliability estimates have been reported for the most common anxiety disorders, namely, SAD, SOP, SP, OAD, and GAD. Reliability estimates for other anxiety disorders (i.e., PD with or without AG, PTSD, or OCD) have not been reported. This is likely due in part to relatively low base rates of these disorders in youth relative to other anxiety disorders.

Research on External Validity of DSM Anxiety Disorders in Youth

According to models proposed by Robins and Guze (1970), Cantwell (1975), and Blashfield and Draguns (1976), external validity of a diagnostic category refers to whether the disorder can be distinguished along certain specific criteria. These criteria include sociodemographic factors, clinical phenomenology, psychosocial factors, family genetic and environmental factors, biological factors, natural history, and response to treatment interventions. There is considerable research evidence demonstrating that anxiety disorders included in the more recent versions of the DSM (i.e., DSM-III, DSM-III-R and DSM-IV) possess external validity (see Saavedra & Silverman, 2002 for review). Most of the research attention has been paid to external validation of anxiety disorders along sociodemographic factors and clinical phenomenology than other

validation criteria (e.g., biological factors, psychosocial, and natural history). This research is summarized below.

Sociodemographics. Research studies have shown significant differences across the DSM anxiety disorder subcategories along factors such as youth age of intake, youth sex, socioeconomic status (SES), and ethnicity. Last, Hersen, Kazdin, Finkelstein, and Strauss (1987), for example, found that SAD cases were younger at intake (mean age = 9.1 years) than OAD cases (mean age = 13.4 years) in a sample of 69 youth (ages 5 to 18 years) diagnosed with anxiety disorders. Last, Francis, Hersen, Kazdin, and Strauss (1987) found that SAD cases were also younger at intake (mean age = 9 years) than SP (of school) cases (mean age = 14 years) in a sample of 67 youth diagnosed with anxiety disorders. Strauss and Last (1993) found that SP cases were younger at intake (mean age = 11 years) than SOP cases (mean age = 15 years) in a sample of 67 youth (ages 6 to 17 years) diagnosed with anxiety disorders.

In terms of sex differences, Last et al. (1987) found that SAD cases were more likely to be girls (69%) than boys (31%), and SP (school) cases were more likely to be boys (63%) than girls (37%). In terms of SES, Last et al., (1987) found that SAD cases were more likely to be youth from families of lower SES than SP cases who were more likely to be youth from families of middle to upper SES. In terms of ethnicity, Ginsburg and Silverman (1996) found that SAD cases were more likely to be Latino youth (20.2%) than European American youth (10.5%) in a sample of 242 youth (6 to 17 years) diagnosed with anxiety disorders.

Clinical Phenomenology. Studies have shown significant differences across DSM anxiety disorders subcategories along factors such as youth age of onset, clinical

severity, and comorbidity. For example, SOP cases have been found to have an older age of onset (11.3 to 12.3 years) than SP cases (7.8 to 8.4 years) in samples of youth diagnosed with anxiety disorders (Last et al., 1992; Strauss & Last, 1993). Social phobia cases have also been found to have higher levels of symptom severity and impairment than SP cases (Last et al., 1992). SOP cases (55.7%) also have been found to have more lifetime comorbid depressive disorder diagnoses than SP cases (32.5%) (Last et al., 1992).

Statistically significant differences across anxiety disorder subcategories in terms of clinical phenomenology also have been found using data from questionnaire measures. Last, Francis, and Strauss (1989), for example, found that SAD, OAD, and SP cases could be distinguished qualitatively using an item analysis based on the most commonly reported fears on the Revised Fear Survey Schedule for Children (FSSC-R; Ollendick, 1983) in a sample of 111 youth (ages 5 to 18 years) diagnosed with anxiety disorders. Weems, Silverman, Saavedra, Pina, and Lumpkin (1999) found that different types of SP cases (e.g., dark/sleeping alone, animals, shots/doctors) and SOP cases could be distinguished qualitatively and quantitatively using items of the child and parent versions of the FSSC-R in 120 youth (ages 6 to 17 years) diagnosed with anxiety disorders and their parents. Specifically, item analysis and discriminant function analyses on FSSC-R items completed by youth were found to differentiate a number of different SP cases but not SOP cases. Item analysis and discriminant function analyses on FSSC-R items completed by parents were found to differentiate a number of different SP and SOP cases.

Statistically significant differences across the DSM anxiety disorder subcategories have been found using the Screen for Children's Anxiety and Related Emotional Disorders (SCARED; Birmaher et al., 1997; 1999). Birmaher et al. (1997), for example, found that PD, GAD, SAD, and SOP cases could be distinguished based on items of the child and parent versions of the SCARED in a sample of 341 youth (ages 9 to 18 years) diagnosed with anxiety and depressive disorders and their parents. Specifically, scores on the Panic/Somatic (P/S) subscale of the SCARED (child and parent versions) were significantly higher for PD cases than other anxiety disorder cases. Scores on the General Anxiety (GA) subscale of the SCARED (child and parent versions) were significantly higher for GAD cases than other anxiety disorder cases; and scores on the Separation Anxiety (SA) subscale of the SCARED were significantly higher for SAD cases than other anxiety disorder cases. Scores on the SOP and SP (of school) subscales of the parent version of the SCARED were significantly higher for SOP and SP cases, respectively, than other anxiety disorder cases.

In a replication study using an independent sample of 190 youth (ages 9 to 19 years), Birmaher et al. (1999) found further evidence that PD, GAD, SAD, and SOP cases could be distinguished using SCARED items. Specifically, parent and child scores on the P/S factor of the SCARED were significantly higher for PD cases than other anxiety disorder cases. Youth scores on the GA and SOP subscales were significantly higher for GAD and SOP cases, respectively, than other anxiety disorder cases. Parent scores on the SA subscale were significantly higher for SAD cases from other anxiety disorder cases.

Psychosocial Factors. Research studies have shown a significant relation between psychosocial factors such as parenting styles and parent-child attachment styles and the presence of anxiety disorders in children and adolescents (e.g., Barrett, Fox, & Farrell, 2005; Siqueland, Kendall, & Steinberg, 1996). With respect to parenting styles, studies have found a relation between parental rejection and parental control and the presence of anxiety disorders in youth (Barrett et al., 2005; Barrett, Shortt, & Healy, 2002; Hudson & Rapee, 2002; Siqueland et al., 1996). Parental rejection refers to lack of parental involvement in the youth's life, parental criticism, and lack of warmth and acceptance toward the child (e.g., McLeod, Wood, & Weisz, 2007; Rapee, 1997; Wood, McLeod, Sigman, Hwang, & Chu, 2003). Parental control refers to parental overprotection of the child and discouragement of child autonomy (McLeod et al., 2007; Rapee, 1997; Wood et al., 2003). Studies that have examined the relation between these parenting styles and anxiety have generally shown that parents of youth diagnosed with any anxiety disorder display more parental control and parental rejection relative to parents of youth diagnosed with other disorders and non-referred youth (Barrett et al., 2002; Barrett et al., 2005; Hudson & Rapee, 2001; 2002; Siqueland et al., 1996). It remains unclear whether specific anxiety disorders subcategories can be distinguished along these dimensions of parenting.

With respect to parent-child attachment styles, the few studies conducted have found a relation between insecure attachments between youth and mothers and the presence of anxiety disorders in youth (e.g., Manassis, Bradley, Goldberg, Hood, & Swinson, 1994; Mannassis, Bradley, Goldberg, Hood, & Swinson, 1995; Warren, Huston, Egeland, & Sroufe, 1997). Manassis et al. (1994), for example, examined mother-child

attachment as well as adult attachment in a sample of 18 mothers diagnosed with anxiety disorders and 20 children, ages 18 to 59 months. Results showed that the mothers in the sample all had insecure adult attachments, and 80% also had insecure mother child attachments. In addition, 3 of 16 children who had insecure attachments with their mothers also met diagnostic criteria for DSM III diagnoses of either SAD (n = 2) or avoidant disorder (n = 1).

Warren et al. (1997) examined the presence of DSM-III-R anxiety disorders in a sample of 172 youth ages 17 years, who participated in a longitudinal study that examined mother child attachment styles when these youth were 1 year old (Ainsworth, Blehar, Waters & Wall, 1978). Results showed that 26 youth were diagnosed with a past or current anxiety disorder, and a greater number of youth diagnosed with an anxiety disorder were also classed as having insecure attachments relative to youth with other psychiatric disorders or youth with no diagnosis. Thus, findings from Manassis et al. (1994) and Warren et al. (1997) provide some evidence for a relation between mother child attachment styles and the presence of anxiety disorders. However, there is no evidence that specific subcategories of anxiety disorders can be distinguished according to mother child attachment styles.

Genetic and Environmental Factors. Family studies indicate that anxiety runs in families. For example, top down studies that examined youth of parents diagnosed with anxiety disorders have generally found that these youth are more likely to be diagnosed with an anxiety disorder themselves relative to youth whose parents have been diagnosed with other psychiatric disorders or who have no diagnosis (e.g., Beidel & Turner, 1997**;** Biederman, Rosenbaum, Bolduc, Faraone, & Hirshfeld, 1991; Mancini,

Van Ameringen, Szatmari, Fugere, & Boyle, 1996; Turner, Beidel, & Costello, 1987). These studies have not shown specificity in the relation between anxiety disorders in youth and anxiety disorders in their parents.

Similar to top down studies, bottom up studies that examined parents of youth diagnosed with anxiety disorders have generally found that these parents are more likely to be diagnosed with an anxiety disorder themselves relative to parents of youth who have been diagnosed with other psychiatric disorders or who have no diagnosis (e.g., Last, Hersen, Kazdin, Orvaschel, & Perrin, 1991; Messer & Beidel, 1994). These studies also have not found specificity in the relation between anxiety disorders in parents and anxiety disorders in their offspring. The only exception is Last et al. (1991), who reported a trend for OCD to be more prevalent in relatives of youth diagnosed with this disorder (n = 47; 6.7%) than relatives of youth diagnosed with another anxiety disorder (n = 227; 1.4%). There was also a trend for PD to be more prevalent in relatives of youth diagnosed with this disorder (n = 39; 10.8%) than relatives of youth diagnosed with another anxiety disorder (n = 235; 3.9%) (Last et al., 1991).

In addition to family studies, twin studies have revealed that anxiety disorders are influenced by genetic as well as shared and non-shared environmental factors (Gregory & Eley, in press). The extent to which genetic and environmental factors influence anxiety disorders varies according to anxiety disorder subcategory. Research studies have found that SAD symptoms are influenced by both genetic and environmental factors (shared and non shared) in samples of youth and adults (Feigon, Waldman, Levy & Hay, 2001; Silove, Manicavasagar, O'Connel, & Morris-Yates, 1995). Other twin studies have shown that shared environmental factors may not influence the etiology of OAD

symptoms in samples of youth (e.g., Eaves et al., 1997). However, one twin study found that shared environmental factors influence GAD, but not SAD in a sample of youth (Ehringer, Rhee, Young, Corley & Hewitt, 2006).

With respect to genetic influences on specific anxiety disorders subcategories, a number of studies using a large sample of adult female twins (mean age = 30 years) have shown a modest genetic influence for GAD, phobias (i.e., SOP, SP, AG), and PD, with 30% to 44% of the variance in these disorders attributed to genetic influences (Kendler, Neale, Kessler, Heath, & Eaves, 1992a, b; Kendler, Neale, Kessler, Heath, & Eaves, 1993; Kendler et al., 1995). A high genetic influence has been found for SAD and SP, with 73% and 60% of the variance in these disorders attributed to genetic influences in a sample of 4662 twin pairs ages 6 years old (Bolton et al., 2006).

With respect to environmental influences, non-shared environmental factors that have been found to influence anxiety disorders in youth include negative school experiences, parent-child relationships, and neonatal life events (Ashbury, Dunn, & Plomin, 2006). Shared environmental factors such as maternal psychopathology and parenting styles also have been found to relate to the presence of anxiety disorders in youth (Eley, 1999; Gregory & Eley, in press). However, these environmental influences have been shown to be related to the presence of any anxiety disorder and have not shown specificity according to anxiety disorder subcategories.

Natural History. With respect to external validity, the assumption is that psychiatric disorders should demonstrate homotypic continuity (or stability of a specific diagnosis across time) (Kovacs & Devlin, 1998). Although a couple of studies have found that anxiety disorders remit over time (Foley, Pickles, Maes, Silberg, & Eaves,

2004; Last, Perrin, Hersen, & Kazdin, 1996), the majority of the research conducted to date suggests that these disorders if left untreated do not remit over time (Bittner et al., 2007; Costello, Mustillo, Erkanli, Keeler, & Angold, 2003; Flament, Koby, Rapoport, & Berg, 1990; Keller et al., 1992; Newman et al., 1996; Pine, Cohen, Gurley, Brook, & Ma, 1998).

When it comes to homotypic continuity of specific anxiety subcategories (e.g., does SP diagnosed at one time point, predict SP at a later time point?), the research findings are mixed. Flament et al., (1990) for example, examined the course of DSM-III OCD across time in a sample of 48 youth ages 10 to 18 years. Of 25 youth diagnosed with OCD, 17 (68%) youth still had a diagnosis of OCD 2 to 7 years later. Pine et al. (1998) examined the course of DSM-III anxiety and depressive disorders from adolescence to adulthood using an epidemiological sample of 776 youth, ages 9 to 18 years at intake. Youth were administered a semi-structured interview to assess the presence of these disorders at three time points. With respect to the anxiety disorders examined (i.e., SP, SOP, OAD), logistic regression analyses showed significant homotypic continuity for SP and SOP. Thus, youth diagnosed with these anxiety disorders in adolescence still had the diagnosis in adulthood. Homotypic continuity was not found for OAD.

Costello et al. (2003) examined the course of DSM-IV psychiatric disorders (e.g., anxiety disorders, depression, substance abuse, attention deficit hyperactivity disorder [ADHD]) using a community sample of 1420 youth ages 9 to 13 years at intake. Youth were administered a structured interview schedule to assess for presence of DSM-IV disorders every year until youth were age 16 years. With respect to anxiety disorders,

logistic regression analyses showed significant homotypic continuity for all anxiety disorder subcategories (SAD, GAD, SOP, PD, AG), with the exception of SP.

Bittner et al. (2007) examined the course of a number of DSM-III-R and DSM-IV anxiety disorders from childhood to adolescence using data from the Great Smoky Mountains Study (*n* = 906; ages 9, 11, and 13 years at intake). Youth were administered a structured interview schedule to assess for presence of these disorders at ages 9, 11, and 13 years and then re-administered the interview at age 19 years. Results of logistic regression analyses showed significant homotypic continuity for all anxiety disorders examined (i.e., SAD, OAD, and SOP), with the exception of GAD. Overall, studies that have examined the course of specific DSM anxiety disorders have found that these disorders do not remit over time. These studies also show homotypic continuity for some anxiety disorders subcategories such as OCD, SOP, SAD, PD, and AG. Findings, however, are mixed when it comes to homotypic continuity of SP, OAD, and GAD.

Biological Factors. There is research evidence suggesting that biological factors can distinguish youth with anxiety disorders from youth with other psychiatric disorders or no disorder (see Salle & March, 2001). When it comes to specific anxiety disorders, the majority of the research has focused on PD (Clark, 1986; Mattis & Ollendick, 1997) and OCD (e.g., Barr, Goodman, Price, McDougle, & Charney, 1992).

With respect to PD, biological factors have been implicated in the manifestation of panic attacks. According to Clark (1986), panic attacks result from a "catastrophic misinterpretation of certain bodily sensations" (p. 462). Sensations such as shortness of breath, heart palpitations, loss of control, and shakiness, are perceived as dangerous, which then results in a panic attack and eventually may develop into PD. These bodily

sensations appear to be reported more frequently by patients who suffer from panic attacks than other patients or normal controls (Clark, 1986). Given that body sensations are likely to be noticed when changes in bodily processes occur (Pennebaker, 1982), it has been hypothesized that bodily sensations are reported more frequently by panic patients than others because such patients experience more (or more intense) changes in bodily processes (Clark, 1986). It has also been suggested that patients who suffer from panic attacks have a decreased efficiency of certain autoreceptors in the brain (Charney, Beninger, & Breier 1984). In response to a perceived threat, individuals with this decreased efficiency of α_2 autoreceptors will experience large surges in noradrenalin and sympathetic nervous system activation (Clark, 1986). Such surges also may be more likely to be catastrophically misinterpreted (Clark, 1986).

With respect to OCD, several investigators view OCD as a neuropsychiatric disorder relative to the other anxiety disorder subcategories (see Barr et al, 1992; Sallee & March, 2001). In support of this view, Rauch et al. (1994), for example, found abnormalities in circuits implicating the cortex and basal ganglia in a clinic referred sample of adults (N = 8; mean age = 36 years) diagnosed with OCD. There is also evidence that these circuits respond to either pharmocological treatment (i.e., fluoxetine) or behavior therapy in adults diagnosed with OCD (n = 10) compared to controls (n = 4) (Baxter, Schwartz, Bergmen, & Szuba, 1992). Abnormalities in neuroendocrine and neurotransmitter activity have also been found in youth diagnosed with OCD relative to youth with other disorders or no disorders (Swedo & Rapoport, 1990). Differences in height, for example, have been found in adolescents diagnosed with OCD compared to adolescents diagnosed with other psychiatric disorders, suggesting neuroendocrine

dysfunctions in adolescents diagnosed with OCD (Hamburger, Swedo, Whitaker, Davies, & Rapoport, 1989).

Treatment response. There is general consensus that exposure based cognitive behavioral therapies (CBT) are the preferred methods for treating anxiety disorders in youth (see Silverman, Pina, & Viswesvaran, 2008). There is also some evidence from two randomized controlled trials that supports the use of selective serotonin reuptake inhibitors (SSRIs), or a combination of SSRIs and CBT to treat anxiety disorders such as SAD, GAD, SOP, and OCD in youth (The Pediatric OCD Treatment Study [POTS] Team, 2008; Walkup et al., 2008). When it comes to specificity of treatment response by specific anxiety disorder subcategories, however, the clinical trials that have been conducted to date have not found that different types of anxiety disorder subcategories evidence different responses to CBT (e.g., Kendall, 1994; Kendall et al., 1997; Silverman et al., 1999a, 1999b) nor to SSRIs or a combination of SSRIs and CBT (POTS Team, 2008; Walkup et al., 2008).

Summary. Overall, there is considerable research evidence demonstrating that anxiety disorders included in the more recent versions of the DSM (i.e., DSM-III, DSM-III-R and DSM-IV) possess external validity (Saavedra & Silverman, 2002). As noted, however there is more research evidence showing that specific anxiety disorders can be distinguished along factors such as sociodemographics (i.e., age, sex, ethnicity) and clinic phenomenology than other factors (i.e, biological factors, psychosocial factors, genetics).

Research on Internal Validity of DSM Anxiety Disorders in Youth

Less research attention has been paid to the demonstration of internal validity of DSM anxiety disorders than to demonstration of external validity of these disorders

(Saavedra & Silverman, 2002). Internal validity refers to the testing of hypotheses regarding the internal structure of a diagnostic entity (e.g., are anxiety disorders distinct entities or a single entity?), which can help shed light on the conceptualization of a psychiatric disorder (Cantwell, 1996). As noted, most of the extant research on internal validity of DSM anxiety disorders has been limited to data gathered mainly by rating scales in non-clinical samples of predominantly Caucasian youth.

Spence (1997) evaluated the internal validity of symptoms of DSM-IV anxiety disorders using data from two independent community samples of 698 children (ages 8 to 12 years). CFAs were conducted on youth-completed data gathered using the Spence Children Anxiety Scale (SCAS) to test and compare four different factor models: (1) a six uncorrelated factor model in which anxiety symptoms loaded onto six uncorrelated factors proposed by the DSM (i.e., factors reflecting SAD, SOP, physical injury fears [akin to SP], GAD, PD with AG, and OCD); (2) a six correlated factor model, similar to the first model, but the factors were correlated with each other; (3) a single factor model in which DSM anxiety symptoms loaded onto a single factor of anxiety (a reflection of the pervasiveness of comorbidity even more than the previous model); and (4) a higher order model with six correlated factors loading onto a higher order factor of anxiety. Results from both child samples indicated that the six correlated factor model fit significantly better than the single factor model and six uncorrelated factor model. The higher order model also was found to be a good fit to the data. These findings provided support for the DSM-IV's conceptualization of anxiety disorders as distinct entities, but also as related entities due to the varying degrees of comorbidity found across the anxiety disorders in youth (e.g., Anderson, 1994).

Spence (1997) also examined whether the internal structure of anxiety disorders varied according to youth sex and age. Metric invariance tests were conducted to examine whether parameters of the higher order model were invariant across youth sex and age. Specifically, multiple groups CFAs were conducted to test and compare a series of nested models. The first model tested had no equality constraints across groups in order to establish a common model form in the two groups (i.e., boys and girls; older and younger children). Subsequent models were then tested that had equality constraints sequentially and additively imposed on the first order factor loadings, higher order factor loadings, and errors. Spence's (1997) results showed support for metric invariance of the higher order model for boys and girls. However, metric invariance of the higher order model was not supported for youth age. Spence (1997) reported that the correlations among the six first order factors (i.e., SAD, SOP, SP, GAD, PD with AG, and OCD) were higher for younger (8 to 10 years) than older children (11 to 12 years), suggesting that these anxiety disorders might be more distinct from each other with increasing age.

Spence (1998) conducted a replication of the Spence (1997) study in an independent community sample of 584 children (ages 9 to 12 years). Consistent with Spence (1997), results of CFAs conducted on the youth SCAS data showed that the six correlated factor model fit significantly better than the single factor model and six uncorrelated factor model. The higher order model also was found to be a good fit to the data. These findings were replicated in another community sample of 875 adolescents (ages 13 to 14 years) (Spence, Barrett, & Turner, 2003). The six correlated factor model was also found to fit better than the single factor model and the six uncorrelated factor model based on a CFA of the parent completed SCAS data in 754 parents of anxious

youth, as well as youth from the community, ages 6 to 18 years (Nauta et al., 2004). Nauta et al. (2004) further reported metric invariance of the six correlated factor model according to both youth sex and youth age (6 to 11 years vs. 12 to 18 years).

De Ross et al. (2002) evaluated the internal validity of symptoms of DSM-IV anxiety disorders and major depressive disorder (MDD) using a revised version of the SCAS, the Revised Children's Anxiety and Depression Scale (RCADS; Chorpita et al., 2000) in a community sample of 405 youth (ages 8 to 18 years). The RCADS is a child-completed rating scale that includes items that assess symptoms of DSM-IV MDD and items more representative of DSM-IV GAD than items included in the SCAS. Excluded from the RCADs were SCAS items that assessed for fear of physical injury and AG because these items were found to be poor indicators of the proposed factors examined in previous CFA SCAS studies (e.g., Spence, 1997; 1998). De Ross et al. (2002) conducted CFAs on the child RCADS data to test and compare two factor models: (1) a six correlated factor model in which symptoms loaded onto six correlated factors proposed by the DSM (i.e., factors reflecting SAD, SOP, GAD, PD, OCD, and MDD); and (2) a single factor model. As in past SCAS studies (e.g., Spence, 1997; 1998), results showed that the six correlated factor model fit significantly better than the single factor model.

The findings by De Ross et al. (2002) were replicated in a clinical sample of 513 youth (ages 8 to 18 years) (Chorpita et al., 2005) Specifically, Chorpita et al. (2005) conducted CFAs on child RCADS data to test the same six correlated factor model and single factor model tested in De Ross et al. (2002) as well as a two correlated factor model in which symptoms loaded onto correlated two factors of anxiety and depression. Chorpita et al. (2005) found that the six correlated factor model fit significantly better

than the single factor model as well as the correlated two factor model.

Ebesutani, Bernstein, and Chorpita (2010) conducted CFAs on a parent completed version of the RCADS in a sample of parents of 490 youth (ages 7 to 19 years) referred to two mental health clinics (one in Hawaii and one in Massachusetts). Similar to De Ross et al. (2002) and Chorpita et al. (2005), Ebesutani et al. (2010) tested a six correlated factor model and a single factor model. Two additional models were also tested: (1) a five correlated factor model in which symptoms loaded onto five correlated factors reflecting SAD, SOP, PD, OCD, and MDD/GAD; (2) a two correlated factor model in which symptoms loaded onto two correlated factors of anxiety and depression. Similar to past studies using child RCADS data (Chorpita et al., 2005; De Ross et al., 2002), CFAs on parent RCADS data showed that the six correlated factor model fit significantly better than the five factor, two factor, and single factor model.

Lahey et al. (2008) conducted a comprehensive evaluation of the internal validity of symptoms of a number of DSM-IV disorders of childhood and adolescence, including anxiety disorders, in a community sample of 4049 twin youths (ages 6 to 17 years) and their parents. Confirmatory factor analyses were conducted on items of the Child Assessment of Psychopathology Scale (CAPS; Lahey et al. 2004), a new scale administered by an interviewer separately to youth and their parents, which assesses symptoms of DSM-IV disorders in youth. Items on the CAPS are based on the fourth version of the Diagnostic Interview Schedule for Children (DISC-IV; Shaffer et al., 1996) modified from a “yes” or “no” response format to a four point rating scale (*Not At All to Very Much*). In contrast to past studies that conducted CFAs on data based on only one informant (e.g., youth only or parent only), Lahey et al., (2008) conducted separate CFAs

on both youth completed and parent completed data to test and compare a factor model based on the DSM and a number of alternative factor models that emerged in previous exploratory factor analyses (EFAs) conducted on CAPS data obtained from youths and parents, respectively (Lahey et al., 2004).

For the parent CAPS data, two separate CFAs were conducted on CAPS items that assess symptoms of internalizing disorders (i.e., SAD, SOP, SP, GAD, AG, OCD, and MDD) and symptoms of externalizing disorders (i.e., ADHD, oppositional defiant disorder [ODD], and conduct disorder [CD]). Relevant to the present dissertation study are the results that pertain to the internalizing disorders. Seven factor models were tested and compared: (1) a correlated DSM model with seven factors relating to (a) MDD, (b) GAD, (c) SOP, (d) SP, (e) AG, (f) SAD, (g) OCD; (2) a correlated model with six factors relating to (a) GAD and MDD, (b) SOP, (c) SP, (d) AG, (e) SAD, (f) OCD; (3) a correlated model with five factors relating to (a) GAD and MDD, (b) SP and AG, (c) SOP, (d) SAD, (e) OCD; (4) a correlated model with four factors relating to (a) MDD and GAD, (b) SP, AG, and SAD, (c) SOP, (d) OCD; (5) a correlated model with three factors relating to (a) MDD and GAD, (b) SP, AG, SAD, and OCD, and (c) SOP; (6) a correlated model with two factors relating to (a) MDD, GAD, and SOP and (b) SP, AG, OCD; and (7) a single factor model.

For the youth CAPS data, CFAs were conducted on CAPS items that assess symptoms of internalizing disorders and symptoms of CD to test and compare eight models (CD symptoms were the only set of externalizing symptoms that were assessed using the youth CAPS). The eight models were: (1) a correlated eight factor model that distinguished between CD and the same seven factors of anxiety and depression as in the

correlated seven factor model for parents (model 1); (2) a correlated seven factor model that distinguished between CD and the same six factors of anxiety and depression as in the six factor model for parents (model 2); (3) a correlated six factor model that distinguished between CD and the same five factors of anxiety and depression as in the five factor model for parents (model 3); (4) a correlated five factor model that distinguished between CD and the same four factors of anxiety and depression as in the correlated four factor model for parents (model 4); (5) a correlated four factor model that distinguished between CD and the same three factors of anxiety and depression as in the correlated three factor model for parents (model 5); (6) a correlated three factor model that distinguished between CD and the same two factors of anxiety and depression as in the correlated two factor model for parents (model 6); (7) a correlated two factor model that distinguishes between CD and the same single factor of anxiety and depression as the single factor model for parents (model 7) and; (8) a single factor model.

For the parent CAPS data, Lahey et al. (2008) found that model (3) with five correlated factors fit significantly better than other factor models, including the seven correlated factor DSM model (model 1). For the child CAPS data, Lahey et al. (2008) found that at model (3) with six correlated factors fit significantly better than other factor models, including the eight correlated factor DSM model (model 1).

Thus, for both parent and youth CAPS data, the best fitting factor model was a model that distinguished among DSM-IV SOP, SAD, OCD, and CD (for youth data only), but did not distinguish among MDD and GAD or SP and AG. In contrast to findings from past studies that evaluated internal validity of symptoms of DSM-IV anxiety disorders and MDD using either the SCAS or RCADS (e.g., De Ross et al., 2002;

Spence, 1997; 1998), The findings of Lahey et al. (2008) findings did not support the DSM's conceptualization of disorders using the CAPS as reported by either youth or their parents.

Lahey et al. (2008) also examined whether the internal structure of DSM-IV disorders in youth varied according to youth sex and age. Metric invariance tests of the best fitting factor models for both youth and parents were conducted to examine whether parameters of the models were invariant across youth sex and age (7 to 11 years vs. 12 to 17 years). Multiple group CFAs were conducted separately for youth and parent data to test and compare a model with no equality constraints on the parameters across the two groups (i.e., boys and girls; older and younger youth) to a model with equality constrains on the factor loadings and factor correlations across these two groups. Lahey et al.'s (2008) findings did not support invariance of factor loadings and correlations across youth sex or youth age.

Higa-McMillan et al. (2008) is the only study that used data from a semi-structured diagnostic interview, the Anxiety Disorders Interview Schedule for DSM-IV: Child Version (ADIS-IV: C, Silverman & Albano, 1996), to examine the internal validity of symptoms of DSM-IV anxiety disorders and MDD. Participants included 289 youth, ages 6 to 18 years, referred to a mental health clinic. Prior to conducting CFAs, EFAs were conducted on the dichotomous (*yes/no*) GAD, SOP, and MDD ADIS-IV: C items to determine the internal structure these symptoms. Using the same data used for the EFAs, CFAs were conducted to test the factor models that emerged from the EFAs. Unlike the EFAs, the CFAs were conducted on dimensional (not dichotomous) factor indicators comprised of two or three dichotomous items per indicator, for a total of two or three

indicators per factor.

Five factor models were tested and compared: (1) a model with four correlated factors relating to (a) MDD, (b) SOP, (c) GAD Worry items, and (d) GAD Somatic items; (2) a DSM model with three correlated factors relating to (a) MDD, (b) GAD, and (c) SOP; (3) a model with two correlated factors relating to (a) MDD (b) SOP and GAD; (4) an alternative model with two correlated factors relating to (a) SOP (b) GAD and MDD; and (5) a single factor model. Results of CFAs showed that both the three and four correlated models provided a good fit to the data, but the four correlated model fit significantly better than the three, two, and single factor model. Thus, support was found for the internal validity of DSM-IV SOP and MDD; however, the evidence suggested that GAD Worry and GAD Somatic symptoms are viewed as distinct, but related entities rather than one diagnostic entity (Higa-McMillan et al. 2008).

Summary and Limitations

The studies that have been conducted to date (Chorpita et al., 2005; De Ross et al. 2002; Ebesutani et al., 2010; Higa-McMillan et al., 2008; Lahey et al. 2008; Nauta et al., 2004; Spence, 1997; 1998; Spence et al., 2003) represent important contributions to the research literature on the internal validity of DSM-IV anxiety disorders in youth. With the exception of Higa-McMillan et al. (2008) and Lahey et al. (2008), all these studies found support for the DSM's conceptualization of anxiety disorders as distinct but related entities. However, given that findings have been inconsistent across all of these studies, more research is needed that further evaluates internal validity of DSM-IV anxiety disorders in youth and that addresses some of the major limitations of past research. These limitations, which pertain to measurement, analysis, and sample characteristics, are

discussed briefly below.

Measurement Approach. With the exception of Higa-McMillan et al. (2008), past studies that evaluated internal validity of anxiety disorders used youth completed and/or parent completed rating scales to assess symptoms of DSM-IV anxiety disorders (e.g., De Ross et al., 2002; Lahey et al., 2008; Nauta et al., 2004; Spence, 1997; 1998; Spence et al., 2003). Brown and Barlow (2005) have noted, that rating scales, unlike diagnostic interviews, do not make apparent the relations among the clinical features of a specific disorder. For example, fear of elevators as an indicator of SP could also be interpreted by the rater as an indicator of AG when using a rating scale. Examination of the internal structure of these symptoms could thus yield inaccurate factor structures (e.g., a factor that combines both SP and AG, similar to findings by Lahey et al. 2008).

Further, rating scales typically assess for intensity of symptoms (e.g., Lahey et al., 2008; Spence, 1997). They do not assess for presence and absence of symptoms, as do diagnostic interview schedules. Assessing for presence and absence of symptoms is more congruent with the presence/absence (or yes/no) categorical approach of the DSM.

Given that only one study (i.e., Higa-McMillan et al., 2008) used a diagnostic interview to evaluate internal validity of anxiety disorders, more research using diagnostic interviews to evaluate internal validity of DSM-IV anxiety disorders is warranted. This would have the additional advantage of being more parallel to the actual yes/no categorical approach that is inherent to the DSM.

Analytical Approach. Because the items of rating scales used in past CFA studies are categorical (ordinal), the fit of the different factor models require evaluation using estimators that are appropriate for use with categorical data, namely, unweighted

least squares, weighted least squares (WLS), or robust WLS (Brown, 2006). Except for Lahey et al. (2008) and Spence (1997), past studies that evaluated internal validity of DSM anxiety disorders assessed by rating scales conducted CFAs with estimators that were not appropriate for use with categorical ordinal data (e.g., maximum likelihood estimation [ML]; robust ML) (i.e., De Ross et al., 2002; Nauta et al., 2004; Spence, 1998; Spence et al., 2003) or did not report the type of estimator used in the CFAs (i.e., Chorpita et al., 2005; Ebesutani et al., 2010). Conducting CFAs with estimators that are not appropriate for categorical data has the potential of yielding test statistics and standard errors that are not accurate (Brown, 2006).

Although items on the ADIS:C are categorical (dichotomous), Higa-McMillan et al. (2008) conducted CFAs using ML on item parcels, or dimensional indicators comprised of two or three dichotomous items per factor. Although appropriate techniques were used to handle non-normality of the dichotomous data in Higa-McMillan et al. (2008) (i.e., item parceling), not all the items that comprise the GAD and SOP sections of the ADIS-IV: C were represented in the CFAs. Thus, the internal structure of the full range of dichotomous items comprising the GAD and SOP sections of the ADIS-IV: C is unknown. Furthermore, Higa-McMillan et al. (2008) conducted CFAs on the same youth data that was used for the EFAs, despite recommendations that factor models that emerge from EFAs be validated and tested with CFAs using an independent sample (e.g., Fabrigar, Wegener, MacCallum, & Strahan, 1999). Thus, research is needed to further examine the internal structure of symptoms of DSM-IV anxiety disorders using CFAs techniques with estimators appropriate for use with categorical data gathered by diagnostic interviews in independent samples of clinic referred youth.

Sampling Approach. The majority of past studies that evaluated internal validity of symptoms of DSM anxiety disorders used samples of youth drawn from the community (e.g., De Ross et al., 2002; Lahey et al., 2008; Spence, 1997; 1998; Spence et al., 2003). Only a few studies (e.g., Chorpita et al. 2005; Ebesutani et al., 2010; Higa-McMillan et al. 2008) used samples of youth or parents of youth referred to mental health clinics for a range of difficulties (e.g., anxiety, depression, behavioral problems). Thus, it is unclear whether findings from these studies would generalize to clinic samples of youth referred specifically for anxiety. Given that only one study used a sample of parents of youth diagnosed with anxiety disorders (i.e., Nauta et al., 2004), more research is need to examine the internal structure of symptoms of DSM anxiety disorders in samples of anxious youth in addition to the parents of these youth.

Further, the majority of past studies that evaluated the internal validity of symptoms of DSM anxiety disorders (e.g., Nauta et al., 2004; Spence, 1997; 1998) used predominantly Caucasian samples of youth. Only a few studies evaluated internal validity of DSM anxiety disorders using multiethnic samples (Chorpita et al., 2005; Ebesutani et al., 2010; Higa-McMillan et al., 2008). Moreover, Latinos was the one group that was minimally represented in the few studies that used multiethnic samples (e.g., approximately 1% to 5 % of Latinos across studies).

The paucity of research on the internal validity of DSM-IV anxiety disorders in samples of predominantly Latino youth is unfortunate for a couple of reasons. One, Latinos comprise the largest minority population in the US (approximately 45.5 million) and 35% of the Latino population in the US are under 18 years of age (23% of the European American population are under 18) (US Census Bureau, 2007). Two, Latino

youth present with higher rates of anxiety disorders than European American youth (Ginsburg & Silverman, 1996; Roberts, Ramsay-Roberts, & Xing, 2006). Thus, it is important to determine whether the structure of anxiety disorders found with samples of predominantly Caucasian youth is also found using a sample of predominantly Latino youth.

The Present Study

The present dissertation study evaluated the internal validity of symptoms of four common DSM-IV anxiety disorders in youth, namely, SAD, SOP, SP, and GAD assessed using both the child and parent versions of the ADIS-IV in a sample of youth referred to an anxiety disorders clinic and their parents. The present dissertation extends previous research in several ways. First, the dissertation evaluated internal validity of anxiety disorders using both child and parent interview data, whereas previous research used interview data gathered only from youth (Higa McMillan et al. 2008). Second, the dissertation evaluated internal validity of symptoms of DSM-IV anxiety disorders not evaluated in previous research using interview data (i.e., SAD, SP) (Higa-McMillan et al., 2008). Third, internal validity was evaluated using all dichotomous items included in the SAD, SOP, SP, and GAD sections of the ADIS-IV: C/P using specialized CFA procedures for testing dichotomous data (Muthen, 2004). The fourth way the dissertation extends past research is the inclusion of a predominantly Latino sample of youth, as Latinos were minimally represented in previous studies that evaluated internal validity of anxiety symptoms (e.g., Spence, 1997).

In this dissertation study, CFAs were conducted on the dichotomous (*yes/no*) items comprising the ADIS-IV: C/P sections of SAD, SOP, SP, and GAD to test and

compare six different factor models based on models tested in past research (e.g., Higa-McMillan et al., 2008; Lahey et al., 2008; Spence, 1997). These models are presented in figure 1. As figure 1 shows, model a is a single factor model, which posits that SAD, SOP, SP, and GAD are not discrete categories, but reflect a single factor of anxiety (a reflection of the comorbidity found among anxiety disorders). Model b is a correlated two factor model, which posits that GAD and SOP are distinct from but related to SP and SAD. Model c is a correlated three factor model, which posits that GAD and SOP are two distinct but related factors that are distinct, but related to a third factor comprised of SP and SAD. Model d is an uncorrelated four factor model, which posits that the four disorders are distinct and unrelated. Model e is a correlated four factor model, which posits that though distinct, the disorders are related (a reflection of varying degrees of comorbidity among the anxiety disorders). Model f is a correlated five factor model, which posits that SAD, SOP, SP, GAD Worry, and GAD Somatic symptoms are distinct but related entities. Given that the majority of studies that evaluated internal validity of anxiety found support for a correlated model based on the DSM, it was predicted that the correlated four factor model would best fit the data. Given also that similar factor structures have been found across youth and parent reports (e.g., Lahey et al., 2008) it was predicted that the same factor structure would be found for youth and parent data.

The dissertation study also evaluated whether the internal structure of anxiety disorders as assessed by the ADIS-IV: C/P varied according to youth sex. Of all the studies that used rating scales to evaluate the internal validity of symptoms of anxiety disorders in youth, only three studies (Lahey et al. 2008; Nauta et al., 2004; Spence, 1997) conducted tests of metric invariance to evaluate whether the internal structure of

anxiety varied according to youth characteristics (i.e., age and sex). As summarized above, these studies did not yield consistent findings. Spence (1997), found support for metric invariance by youth sex but not by youth age. Nauta et al. (2004) found support for metric invariance by youth sex as well as age. Lahey et al. (2008) did not find support for metric invariance by youth sex or youth age. Finally, the only study to use an interview schedule to evaluate internal validity of symptoms of anxiety disorders (i.e., Higa-McMillan et al., 2008) did not conduct tests of metric invariance across youth sex or age. It is therefore unclear whether the internal structure of DSM-IV anxiety disorders using interview data varies across these youth characteristics.

Thus, in this study, tests of metric invariance of the best fitting factor models for both youth and parents were conducted to examine whether parameters of the models were invariant across youth sex. It is important to note that given the mean age of the sample in the present study was 9.81 years (*SD* = 2.37), the sample size for older youth (ages 12 to 17 years) was not large enough (*n* = 152) to allow for an examination of metric invariance across youth age as done in past studies (Lahey et al., 2008; Nauta et al., 2004; Spence, 1997). Given that no study has examined whether the internal structure of anxiety varies according to youth sex using interview data, it was premature to formulate any predictions.

Chapter III.

METHOD

Participants

Participants consisted of 625 youths and 479 parents (mainly mothers) who presented to the Child Anxiety and Phobia Program (CAPP) located in Florida International University. Youths ages ranged from 6 to 17 years (M = 9.81 SD = 2.37) and 302 (48.3 %) of youths were girls. All youth were referred to CAPP due to difficulties with excessive fear and/or anxiety. The families were referred to the clinic by pediatricians, school psychologists, or other mental health professionals. The main criterion for inclusion of participants in the study was the presence of any DSM-IV phobic or anxiety disorder in their diagnostic profile, based on both youth and parent interview schedules. Exclusion criteria were developmental delays (e.g., mental retardation, pervasive developmental disorders) or severe psychopathology (e.g., schizophrenia or other psychotic disorders).

Of the 625 youth, 581 (93%) had a primary anxiety disorder diagnosis and the remaining 45 (7%) had a comorbid anxiety disorder diagnosis(es) in their diagnostic profile. In terms of primary diagnoses based on youth and parent combined reports, 32.3% met criteria for SAD, 19.3% met criteria for SOP, 17.8% met criteria for GAD, 16.4% met criteria for SP, 3.7% met criteria for ADHD (either inattentive or combined types), 2.9% met criteria for selective mutism, 2.6% met criteria for PD with or without AG, 2.1% met criteria for depressive disorders (i.e., dysthymia, major depressive disorder), 1.3% met criteria for ODD, 1% met criteria for OCD, and 0.6% met criteria for PTSD. Eighty percent of youth had at least one comorbid diagnosis.

In terms of ethnicity, 130 (20.8%) youth were European American, 495 (79.2%) were Latino. Eighty-five percent of Latino youth were born in the US; and the remaining 15% were born in Caribbean, Central American, or South American countries (e.g., Cuba, Puerto Rico, Nicaragua, Mexico, Venezuela, Peru, Colombia). Of the 85% of youth born in the US, 24% were of Cuban descent; 17% were of Cuban American descent; 14% were descendants of other Caribbean, Central American, or South American countries; 16% were of mixed Latino descent (e.g., mother born in Mexico, father born in Cuba); 16% were descendants of Latino and European American parents; and 13% were descendants of Latino parents born in the US.

In terms of family income, 17% families reported annual incomes of $20,999 or less; 26% families reported incomes between $21,000 and $40,999; and 57% reported incomes over $41,000. With respect to parents' level of education, 3% of mothers and 7% fathers did not complete high school; 15% mothers and 18% fathers completed high school; 19% mothers and 15% fathers had some college education; 41% mothers and 36% fathers had a four-year college education; 15% mothers and 17% fathers had an advanced degree (e.g., masters degree, doctorate, or professional degree); and 7% mothers and 7% fathers did not report their level of education. In terms of marital status, 72% of parents were married; 3% were single, 16% were divorced, 4% were separated, 1% were widowed, and 4% were unmarried but living with their partner.

Measures

Anxiety Disorders Interview Schedule for DSM-IV: Child and Parent Versions *(*ADIS-IV: C/P*;* Silverman & Albano, 1996). The ADIS-IV: C/P is a semi-structured diagnostic interview that contains questions designed to assess the presence of

anxiety disorders and other major disorders (e.g., major depressive disorder, attention deficit hyperactivity disorder) in youth according to DSM-IV criteria (American Psychiatric Association, 1994). The ADIS-IV: C/P yields DSM-IV diagnoses based on separate youth and parent reports, as well as composite diagnoses based on combined youth and parent reports.

Silverman et al. (2001) reported retest reliability estimates for youth reported GAD, SAD, SOP, and SP in the good to excellent range ($\kappa = 0.63$, 0.78, 0.71, and 0.80, respectively) using a 7 to 14 days test-retest interval. Retest reliability estimates for parent reported GAD, SAD, SOP, and SP were also in the good to excellent range ($\kappa = 0.72$, 0.88, 0.86, and 0.65, respectively). Inter-rater reliability estimates for SAD, SOP, SP, and GAD have been found in the excellent range ($\kappa = 0.71$ to 0.77; see Grills & Ollendick, 2003). With respect to concurrent validity, Wood, Piacentini, Bergman, McCracken, and Barrios (2002) found significant correlations between ADIS: C/P derived diagnoses of SOP, SAD, and PD and the Multidimensional Anxiety Scale for Children (MASC; March, Parker, Sullivan, Stallings, & Conners, 1997) factor scores that corresponded to those disorders (with the exception of GAD).

Feelings Thermometer of the ADIS-IV: C/P. The Feelings Thermometer is a pictorial rating scale used by the child and parent that assesses the level of severity of the youth's fear and/or avoidance of specific situations for those anxiety disorders diagnoses in which fear and/or avoidance occurs (e.g., SOP, SP). The Feelings Thermometer also allows for the attainment of ratings from youth and parents on the youth's level of distress and/or interference in functioning related to each diagnosis obtained using the ADIS-IV:C/P. Youth and parents are asked to rate level of severity of fear and/or

interference on a 0 (*none*) to 8 (*very much*) point scale. To determine a final diagnosis on the youth and/or parent interview, the interference rating for each diagnosis must be 4 or greater (on the 9-point scale). In cases of multiple diagnoses, the diagnosis with the highest interference rating is considered the primary diagnosis; all other diagnoses were considered secondary comorbid diagnoses.

Symptom Indicators. Table 3 presents a list of items comprising the SAD, SOP, SP, and GAD sections of the ADIS-IV: C/P that were included in the CFAs as symptom indicators. For SAD, each item (e.g., distress when parent gone, reluctance/fear to be alone) was considered present if the youth or parents responded "yes" to the corresponding questions on the ADIS-IV: C/P that were related to each of the 8 symptoms delineated in the DSM-IV section of SAD. For SOP, each situation feared by the youth due to possible scrutiny by others (e.g., answering questions in class, inviting a friend over) was considered present if youth or parents responded "yes" to the presence of fear for each situation, rated the severity of the youth's fear as clinically significant ($\geq$ 4 on the Feelings Thermometer), and responded "yes" to the feared situation being avoided or endured with distress by the youth.

For SP, each category of feared objects or situations (e.g., natural environment, blood injection injury) was considered present if the youth or parents responded "yes" to the presence of any feared object/situation in that category, rated the severity of the youth's fear as clinically significant ($\geq$ 4 on the Feelings Thermometer), and responded "yes" to the feared object/situation being avoided or endured with distress by the youth. For GAD, each area of worry (e.g., school, performance, perfectionism) was considered present if either the youth or parent responded *yes* to the presence of worry, rated the

severity of the youth's worry as clinically significant ($\geq$ 4 on the Feelings Thermometer), and responded "yes" to the youth's worry being hard to stop. For the GAD somatic items, each symptom was considered present if the youth or parent respected "yes" to the presence of the symptom.

Diagnosticians

All interviews were conducted by graduate students in psychology. Diagnosticians received training in administering the ADIS-IV: C/P through didactic training sessions and by sitting in and observing the weekly staff meetings in which cases were presented and final diagnoses formulated. In addition, each diagnostician was required to observe five separate youth-parent interviews and match five consecutive diagnostic profiles (both primary and additional) with a trained diagnostician. Each diagnostician also was required to conduct an interview under observation and match diagnoses derived by a trained diagnostician on the same youth client case.

Procedure

Parents and youth first provided informed consent/assent. One diagnostician was assigned to each case. The administration order of the youth and parent interviews was randomly determined. Diagnosticians began administration of the interview schedules by explaining the interview procedures (e.g., yes/no responses, the 0-8 feelings thermometer) (Albano & Silverman, 1996). Each diagnostic/disorder module was administered in the order that it appears in the ADIS-IV: C/P. Diagnosticians were not permitted to discuss with either the youth or parent any information provided by the other source. This was done to avoid one source biasing the other's responses.

Data Analytic Plan

Confirmatory factor analyses were conducted separately for youth and parent interview data to test the fit of six different factor models: (1) a single factor model; (2) a correlated two factor model; (3) a correlated three factor model; (4) an uncorrelated four factor model; (5) a correlated four factor model; and (6) a correlated five factor model. Because the items comprising the diagnostic categories of the ADIS-IV: C/P are dichotomous (yes/no), the fit of the different factor models was evaluated using the robust weighted least squares algorithm (WLSMV) in MPlus 5.2 (Muthen & Muthen, 2007). The degrees of freedom for a given model were estimated empirically using the strategy discussed in Muthen (2004).

Confirmatory factor analyses conducted with categorical indicators differ from CFAs conducted with continuous indicators. Categorical variable methodology is one approach to CFAs with dichotomous items (Muthen & Asparouhov, 2002). Within this framework, observed dichotomous symptoms are thought to be impacted by an underlying latent factor (e.g, Anxiety). Mediating the relationship between the underlying latent factor and any observed dichotomous symptom indicator is an underlying continuous response variable that reflects the tendency to report the symptom of interest. Specifically, this underlying continuous variable reflects the amount of the underlying construct (e.g., Anxiety) that is required to respond in a certain category of the observed dichotomous indicator. The underlying latent continuous response variables are related to the observed dichotomous indicators by means of threshold parameters. In the case of dichotomous indicators ($x = 0, 1$), the threshold is the point on the latent continuous response variable where $x = 1$ if the threshold is exceeded and where $x = 0$ if the

threshold is not exceeded. Thresholds are an important part of the mean structure of a CFA model with categorical indicators, along with factor loadings, and error variances.

To examine the fit of each of the six factor models, a range of global fit indices were used, which included indices of absolute fit, relative fit, and fit with a penalty function for lack of parsimony (Bollen & Long, 1993). The chi-square test of model fit was used as an index of absolute fit. This index should be statistically nonsignificant. However, obtaining a nonsignificant chi square is not likely with large sample sizes (e.g., Kline, 1998; Marsh, Balla, & McDonald, 1988). Thus, other indices were included that are less dependent on sample size than the chi square test. These indices include the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), and the Root Mean Square Error of Approximation (RMSEA). The CFI and TLI are indices of relative fit that range from 0 to 1. Factor models that yield CFI and TLI values close to .95 or greater are considered to be a good fit to the data (Hu & Bentler, 1999), and values of .90 or greater are considered to be an acceptable fit of the data (Bentler, 1990; Carle, Millsap, & Cole, 2007; Chorpita et al., 2005; Higa-McMillan et al., 2008). The RMSEA is an index with a penalty function for lack of parsimony. Factor models yielding RMSEA values of .05 or less are considered to be a good fit to the data and values less than .08 are considered acceptable (Browne & Cudeck 1993).

In addition to the global fit indices, more focused tests of fit were pursued. These included examination of Heywood cases and modification indices (MIs). Heywood cases (or offending estimates) are parameter estimates that have out of range values, such as factor correlations that exceed 1.00, negative factor variances, or negative error variances (Brown, 2006). Modification indices indicate the presence of fixed or constrained

parameters in a model that, if freely estimated, would improve the fit of the model. Specifically, MIs reflect an approximation of how much the overall chi square of model fit would be reduced if such parameters were freely estimated. The value of the MI is viewed as the difference in the chi square between two models, where in one model the parameter is fixed and in the other model the parameter is freely estimated. Because MIs are viewed as a chi-square difference with a single degree of freedom, MIs of 3.84 or greater suggests that the overall fit of the model could be significantly improved at $p < .05$ if the parameter was freely estimated. However, this value is typically rounded to 4.00 (Jaccard & Wan, 1996).

Similar to the overall chi square of model fit, MIs are sensitive to sample size (Brown, 2006). With large samples sizes, a large MI value may indicate that a given parameter should be freely estimated even though the magnitude of the parameter, if it was freely estimated, is trivial. Thus, MIs also have an associated expected parameter change (EPC) value that reflects an approximation of how much a given parameter is expected to change if freely estimated. With large samples sizes, it is recommended that the size and direction of EPC values be considered along with MIs to determine whether freely estimating a parameter yields a parameter estimate that is non-trivial in magnitude and is theoretically justified (Brown, 2006). Given the large sample size of the present study, in addition to examination of MIs, this study also considered EPC values associated with each MI before any suggested parameters were allowed to be freed to improve model fit. For factor loadings, a path from the latent construct to the indicators was only freed if the EPC associated with the standardized path was 0.60 or greater. This reflects a scenario where the latent variable accounts for at least 36% of the variance in

the observed measure.

The factor models were statistically compared against each other using procedures for testing nested models. When using WLSMV estimation, employing the typical procedure of taking the difference between the chi-square values and the difference in the degrees of freedom for each model being tested was not appropriate as the difference in chi-squares is not chi-square distributed. Thus, factor models were statistically compared against each other using a specialized chi-square difference test for use with WLSMV estimation as described in Muthen (2004). This specialized difference test compares a more restrictive model (e.g., three factor model) to a less restrictive model (e.g., four factor model). A statistically significant chi-square difference indicates that the less restrictive factor model fits statistically significantly better than the more restrictive factor model.

To examine metric invariance of the best fitting factor model across youth sex, separate multiple groups CFAs of categorical variables were conducted on the youth and parent data to test the invariance of factor loadings, thresholds, and errors across boys and girls (Millsap & Yun-Tein, 2004). Robust weighted least squares (WLSMV) estimation was used as well as the theta parameterization in Mplus 5.2 (Muthen & Muthen, 2007). First, an equal form model was tested by (1) fixing the first symptom indicator for each factor to one in both groups, (2) constraining all thresholds to equality across groups; (3) fixing factor means for boys at zero; and (4) fixing residual variances to one in boys and permitting variances to be free for girls. Second, a factor invariant model was tested, which retained the constraints of the equal form model and also constrained the factor loadings to be equal across groups. Third, an error invariance model was tested, which

retained the constraints of the factor invariant model and also constrained residual variances to equality across groups.

The fit of the equal form, factor invariance, and error invariance models were examined using the same global and local fit indices used to examine the six factor models tested using the full sample (i.e., chi square, CFA, TLI, RMSEA, Heywood cases, MIs). Furthermore, a difference test using specialized procedures for nested model testing with WLSMV algorithms (Muthen 2004) was then used to compare the factor invariance model to the equal form model. If the difference is statistically non-significant, invariance of factor loadings across sex was supported. A difference test was then conducted to compare the error invariance model to the factor invariance model and if the difference is statistically non-significant, invariance of errors across youth sex is supported. Given that more complex models generally provide a statistically significantly better fit with large sample sizes, metric invariance was also evaluated using the CFI, which is not sample size dependent (Cheung & Rensvold, 2002). Specifically, the factor invariance model was compared to the equal form model by taking the difference in CFI values across these models. The same was done to compare the error invariance model to the factor invariance model. A difference in CFI values of -.01 indicates that the null hypothesis of invariance should not be rejected (Cheung & Rensvold, 2002).

Chapter IV.

RESULTS

Missing Data

Less than 12% of youth and parent cases had missing data on a single variable, and 13% of youth cases and 16% of parent cases had at least one missing value. Missing data were examined to determine whether there was systematic bias in the patterning of missing data. Missing data bias was assessed by computing a dummy variable reflecting the presence or absence of missing data for each indicator in the CFA and then this dummy variable was correlated with all other indicators as well as an array of demographic variables. No meaningful or significant bias was observed in any instance. Given the absence of systemic bias in the patterning of missing data, Full Information Maximum Likelihood (FIML) was used in the present study as the missing data estimation approach (Wothke, 2000). It is important to note that the use of FIML and multiple imputation methods, such as those based on EM, assume normality (Enders, 2010), which is not the case for dichotomous indicators. FIML has been shown to be quite robust to violations of normality, however (Enders, 2010). The present study used a specialized variant of FIML from MPLUS that is tailored to the analysis of categorical indicators (Muthen, 2004).

CFAs Based on Youth Interview Data

The first model tested was a single factor model in which a single latent variable of global anxiety was assumed to underlie all of the anxiety symptom indicators. The rescaled chi-square index for the single factor model was 862.464 (df =149, $p < .001$), the CFI was .62, the TLI was .71 and the RMSEA was .09. Thus, all fit indices indicated that

the single factor model yielded a poor fit to the youth data. These findings suggest that symptoms comprising SAD, SOP, SP, and GAD do not reflect a single latent factor of anxiety.

The second model tested was a correlated two factor model, which posits that GAD and SOP are distinct from but related to SP and SAD. The rescaled chi square index was 488.936 (df =146, $p < .001$), the CFI was .82, the TLI was .86, and the RMSEA was .06. Thus, with the exception of the RMSEA (which indicated satisfactory model fit), all other indices indicate that the correlated two factor model yielded a poor fit to the youth data.

The third model tested was a correlated three factor model, which posits that GAD and SOP are two distinct but related factors that are distinct, but related to a third factor comprised of SP and SAD. The rescaled chi square index was 339.475 (df =145, $p < .001$), the CFI was .90, the TLI was .92, and the RMSEA was .05. Although the chi square index was statistically significant, TLI and CFI values indicated acceptable fit of the data and the RMSEA indicated a good fit of the youth data.

The fourth model tested was an uncorrelated four factor model, which posits that SAD, SOP, SP, and GAD are distinct and unrelated. The rescaled chi square index was 609.209 (df = 119, $p < .001$), the CFI was .74, the TLI was .75, and the RMSEA was .08. Thus, all fit indices indicated that the uncorrelated four factor model yielded a poor fit of the youth data. These findings suggest that SAD, GAD, SOP, and SP are not distinct and unrelated to each other.

The fifth model tested was the same four factor model but it allowed the factors to be correlated. The rescaled chi-square index was 333.581 (df = 149, $p < .001$), the CFI

was .90, the TLI was .93, and the RMSEA was .05. Although the chi-square index was statistically significant, CFI and TLI values indicated an acceptable model fit and the RMSEA indicated good model fit. These findings suggest that SAD, SOP, SP, and GAD are correlated but also possess enough unique variance to be considered distinct from each other.

The sixth model tested was a correlated five factor model, which posits that SAD, SOP, SP, GAD Worry, and GAD Somatic symptoms are distinct but related entities. The rescaled chi-square index was 318.170 (df = 149, $p < .001$), the CFI was .91, the TLI was .93, and the RMSEA was .04. Although the chi-square index was statistically significant, CFI and TLI values indicated acceptable model fit; and the RMSEA indicated good model fit of the youth data.

Results of specialized nested testing with WLSMV algorithms revealed that the correlated five factor model fit statistically significantly better than the single factor model (χ^2_{diff} [6] = 422.482, $p < .001$), two factor model (χ^2_{diff} [6] = 162.890, $p < .001$), three factor model (χ^2_{diff} [4] = 34.768, $p < .001$), four uncorrelated factor model (χ^2_{diff} [6] = 220.270, $p < .001$), and four correlated factor model (χ^2_{diff} [3] = 27.284, $p < .001$). Therefore, the five correlated factor model fit statistically significantly better than all other factor models tested for the youth data.

Examination of MIs for the five factor model indicated the presence of points of strain in the model. The largest MI was 17.591, suggesting that a path could be added from the indicator Health of Self (originally loading on the GAD Worry factor) to the SOP factor, to significantly improve model fit. However, that path was not theoretically coherent. Thus, that suggested path was not added. The second largest MI was 14.835,

suggesting that a path could be added from the indicator Health of Self (originally loading on the GAD Worry factor) to the SAD factor, to significantly improve model fit. However, the EPC value associated with this fixed path indicated that its estimation would result in a factor loading of .37 on the SAD factor. This was judged to be too small a loading to be of consequence (less than .60). In addition, the TLI and CFI changed negligibly when the path was freed up, again suggesting adding the path is of minor consequence. As a result, this path was not added. The third largest MI was 10.161, suggesting that a path could be added from the indicator Social/Interpersonal Worries (originally loading on the GAD Worry factor) to the SOP factor, to significantly improve model fit. However the EPC value associated with this fixed path indicated that its estimation would result in a factor loading of .46 on the SOP factor. This was judged to be too small a loading to be of consequence (less than .60). In addition, the TLI and CFI changed negligibly when the path was freed up, again suggesting adding the path is of minor consequence. As a result, this path was not added. No other sizeable MI's that were theoretically coherent were identified.

CFAs Based on Parent Interview Data

For the single factor model, the rescaled chi square index was 1085.359 (df =156, $p < .001$), the CFI was .53, the TLI was .61, and the RMSEA was .11. Thus, the single factor model yielded a poor fit to the parent data. For the correlated two factor model, the rescaled chi square index was 703.460 (df =151, $p < .001$), the CFI was .72, the TLI was .76, and the RMSEA was .09. Thus, the two factor model also yielded a poor fit to the parent data. For the correlated three factor model, the rescaled chi square index was 347.584 (df =152, $p < .001$), the CFI was .90, the TLI was .92, and the RMSEA was .05.

Although the chi square index was statistically significant, CFI and TLI values for the three factor model indicated acceptable model fit, and the RMSEA indicated good model fit for the parent data.

For the uncorrelated four factor model, the rescaled chi square index was 402.571 (df = 129, $p < .001$), the CFI was .86, the TLI was .86, and the RMSEA was .07. Thus, with the exception of the RMSEA (which indicated satisfactory model fit), all other indices indicate that the uncorrelated four factor model yielded a poor fit to the parent data. For the four correlated factor model, the rescaled chi square index was 343.086 (df = 154, $p < .001$), the CFI was .90, the TLI was .92, and the RMSEA was .05. Although the chi square was statistically significant, CFI and TLI values indicated acceptable model fit, and the RMSEA value indicated good model fit of the parent data. For the correlated five factor model, the rescaled chi square index was 330.858 (df = 156, $p < .001$), the CFI was .91, the TLI was .93, and the RMSEA was .05. Although the chi square was statistically significant, CFI and TLI values indicated acceptable model fit; and the RMSEA indicated good model fit for the parent data. Thus, similar to findings using youth data, the single factor, correlated two factor, and uncorrelated four factor model generally yielded a poor fit of the parent data, whereas the correlated three, four, and five factor models yielded an acceptable to good fit of the parent data.

Results of specialized nested testing with WLSMV algorithms revealed that the correlated five factor model fit statistically significantly better than the single factor model (χ^2_{diff} [6] = 476.010, $p < .001$), two factor model (χ^2_{diff} [6] = 272.473, $p < .001$), three factor model (χ^2_{diff} [5] = 33.649, $p < .001$), four uncorrelated factor model (χ^2_{diff} [6] = 78.496, $p < .001$), and four correlated factor model (χ^2_{diff} [3] = 23.060, $p < .001$).

Therefore, similar to the youth data, the five correlated factor model fit statistically significantly better than all other factor models tested for the parent data.

Examination of MIs for the five factor model indicated the presence of points of strain in the model. The largest MI was 22.352, suggesting that a path could be added from the indicator Health of Self (originally loading on the GAD factor) to the SAD factor, to significantly improve model fit. However, the EPC value associated with this fixed path indicated that its estimation would result in a factor loading of .53 on the SAD factor. This was judged to be too small a loading to be of consequence (less than .60). In addition, the TLI and CFI changed negligibly when the path was freed up, again suggesting adding the path is of minor consequence. As a result, this path was not added. The second largest MI was 20.735, suggesting that a path could be added from the indicator Social/Interpersonal Worry (originally loading on the GAD Worry factor) to the SAD factor, to significantly improve model fit. However, the EPC value associated with this fixed path indicated that its estimation would result in a factor loading of .37 on the SAD factor. This was judged to be too small a loading to be of consequence (less than .60). In addition, the TLI and CFI changed negligibly when the path was freed up, again suggesting adding the path is of minor consequence. As a result, this path was not added. The third largest MI was 11.116, suggesting that a path could be added from the indicator Social/Interpersonal Worry (originally loading on the GAD Worry factor) to the SAD factor, to significantly improve model fit. However, that path was not theoretically coherent. Thus, that suggested path was not added. No other sizeable MI's that were theoretically coherent were identified.

Table 4 presents the relevant standardized factor loadings, thresholds, and residual variances for the correlated five factor model for the youth data and the parent data. As table 4 shows, the standardized factor loadings for the youth data were all statistically significant and large in magnitude, ranging from .61 to .86 for the SAD factor, .50 to .83 for the SOP factor, .35 to .63 for the SP factor, .55 to .79 for the GAD worry factor, and .63 to .92 for the GAD somatic factor. The only statistically non significant factor loadings was Fear of Animals in the SP factor (0.35, $p = 0.14$, ns). Thresholds ranged from .02 to .73 for the SAD factor, .81 to 1.93 for the SOP factor, .93 to 1.40 for the SP factor, .70 to 1.37 for the GAD worry factor, and -.03 to .78 for the GAD somatic factor. For the parent data, standardized factor loadings were statistically significant and large in magnitude ranging from .66 to .86 for the SAD factor, .42 to .87 for the SOP factor, .33 to .93 for the SP factor, .54 to .78 for the GAD worry factor, and .65 to .91 for the GAD somatic factor. Similar to youths, the only statistically non significant factor loading for the parent data was Fear of Animals in the SP factor (0.33; $p = 0.13$, ns). Thresholds ranged from -.01 to 1.03 for the SAD factor, .36 to 1.88 for the SOP factor, .55 to 1.33 for the SP factor, .47 to 1.19 for the GAD worry factor, and .02 to .63 for the GAD somatic factor.

Table 5 presents the estimated correlations between the latent factors of SAD, SOP, SP, GAD worry, and GAD somatic distress for the youth and parent data, respectively**.** For the youth data, with the exception of the correlation between SOP and SP ($r = .09$, ns), the correlations among the latent factors were all statistically significant (r's ranged from .14 to .75). However, correlations among the latent factors were not excessively high, thereby suggesting the discriminant validity of the constructs (see Table

5). For the parent data, the majority of the correlations among the latent factors were statistically significant (*r*'s ranged from .23 to .71). Correlations between the latent factors of SAD and SOP, SOP and SP, and SP and GAD somatic factor were all statistically non significant (r = -.07, .01, and .05, respectively). Correlations among the latent factors for the parent data were also were not excessively high, suggesting the discriminant validity of the constructs (see Table 5). The highest correlations for both the youth and parent data were among the latent factors of GAD worry and GAD somatic distress (r = .75 for youth data; r = .71 for parent data), however, the correlations were not excessively high enough to suggest that the two factors should be collapsed into one factor among youths and parents.

Metric Invariance of Five Factor Model by Youth Sex

Youth Interview Data. The first model tested was an equal form model to establish a common model form across boys and girls. The overall rescaled chi-square test of model fit was 271.449 (df =168, $p < .0001$), the CFI was .92, the TLI was .93, and the RMSEA was .04. Thus, although the chi square test was statistically significant, CFI and TLI values indicated acceptable model fit, and the RMSEA indicated good model fit. More focused tests of fit revealed no sizeable modification indices of theoretical significance or any Heywood cases.

The second model tested was a factor invariance model, which was equivalent to the equal form model but with the constraint that the factor loadings for indicators of a latent variable in one group (i.e., boys) had to be equal in value to the corresponding factor loadings in the other group (i.e., girls). The overall rescaled chi square test of model fit was 261.328 (df = 164, $p < .0001$), the CFI was .92, the TLI was .93, and the

RMSEA was .04. Although the chi square was statistically significant, CFI and TLI values indicated acceptable model fit, and the RMSEA indicated good model fit. More focused tests of fit revealed no sizeable modification indices of theoretical significance, nor were any Heywood cases. Specialized nested chi-square test comparing this model to the equal form model yielded a statistically non significant chi-square difference (χ^2_{diff} [22] = 24.598, p = .32), a result that is consistent with factor loading invariance across boys and girls. The difference in CFI values across the equal form and factorial invariance models was -.01, which also is consistent with factor invariance across groups.

The final model tested was an error invariance model, which was equivalent to the factor invariance model, but with the added constraint that the residual variance for an indicator of a latent variable in one group had to be equal in value to the corresponding residual variance in the other groups. The overall rescaled chi square test of model fit was 257.235 (df = 162, $p < .0001$), the CFI was .92, the TLI was .93, and the RMSEA was .04. Although the chi square was statistically significant, CFI and TLI values indicated acceptable mode fit, and the RMSEA indicated good model fit. More focused tests of fit revealed no sizeable modification indices of theoretical significance, nor were any Heywood cases. Specialized nested chi square test comparing this model to the factor invariance model yielded a statistically significant chi square difference (χ^2_{diff} [30] = 45.119, $p < .05$), which indicates that residual variances are not invariant across boys and girls. However, the absolute difference in CFI values across the factorial invariance and error invariance model was only .002, which is consistent with error invariance across groups.

Table 6 presents the estimated correlations among the latent factors of SAD, SOP, SP, GAD worry, GAD somatic for the youth data, for boys and girls, respectively. For girls, correlations (*r*) among the latent factors ranged from .03 to .72. Boys also showed a similar range of correlations (*r*), with correlations ranging from 18 to .78.

Parent Interview Data. For the parent data, the equal form model yielded parameter estimates with an offending estimate for girls, specifically a standardized factor loading from the SP factor to fear of natural environment that was greater than 1. Hence the equal form model was not accepted as viable. Therefore the factor invariance and error invariance models were not tested.

Chapter V.

DISCUSSION

This dissertation study evaluated the internal validity of symptoms of four common DSM-IV anxiety disorders in youth, SAD, SOP, SP, and GAD, in a predominantly Latino sample of anxious youth and their parents. This is only the second study to date to evaluate internal validity of anxiety disorders using data from a semi-structured diagnostic interview in a clinic referred sample of anxious youth. All other past studies have used data from rating scales in community samples of youth (e.g., De Ross et al., 2002; Lahey et al., 2008; Spence, 1997). In addition, although Higa-McMillan et al. (2008) evaluated internal validity of symptoms of DSM-IV SOP and GAD using the child version of the ADIS-IV in clinic referred youth, the present study extends Higa-McMillan et al. by examining internal validity of symptoms of additional prevalent anxiety disorders (i.e., SOP and SP) using both child and parent versions of the ADIS-IV.

Specialized CFAs for ordered categorical measures were conducted on dichotomous (*yes/no*) items comprising the ADIS-IV: C/P sections of SAD, SOP, SP and GAD to test six factor models tested in previous CFA studies (e.g., Higa-McMillan et al., 2008; Lahey et al., 2008; Spence, 1997): (1) a single factor model; (2) a correlated two factor model; (3) a correlated three factor model; (4) an uncorrelated four factor DSM model; (5) a correlated four factor DSM model; and (6) a correlated five factor model. The metric invariance of the best fitting model was also examined across youth sex. Below is a summary of the study's findings along with a discussion of the study's implications and limitations, as well as future directions.

Major Findings of the Present Study

CFAs Based on Youth and Parent Interview Data. Contrary to predictions, results of CFAs indicated that the factor model with five correlated factors relating to DSM-IV SAD, SOP, SP, GAD Worry, and GAD Somatic provided the best fit of the youth and parent data. This finding is consistent with Higa-McMillan et al. (2008), who showed that a factor model with four correlated factors relating to SOP, MDD, GAD Worry, and GAD Somatic distress fit significantly better than other factor models, including a DSM model with three correlated factors relating to SOP, MDD, and GAD. The present study's findings contrast with those of most past studies. Most past studies have shown that factor models based on the DSM fit significantly better than other factor models (e.g., Chorpita et al., 2005; De Ross et al., 2002; Spence, 1997; 1998).

The inconsistent findings regarding the internal structure of the anxiety disorders may be due in part to the type of assessment method used across studies. Whereas the present study conducted CFAs on data gathered by the child and parent versions of the ADIS (similar to Higa-McMillan et al., 2008), most past work conducted CFAs on data gathered by rating scales such as the SCAS and RCADS (e.g., Chorpita et al. 2005; Spence, 1997), obtained typically from a single source (child, parent).

Unlike rating scales, diagnostic interviews are designed to assess for the presence/absence of DSM disorders. As such, diagnostic interviews typically include items that cover all symptoms used to meet DSM criteria for a particular disorder. Rating scales, in contrast, might not include all the symptoms of a specific DSM disorder. For example, the ADIS assesses for the presence/ absence of all six somatic symptoms included in Criteria C of GAD (i.e., nervous, tired easy, trouble concentrating, irritability,

muscle aches, trouble sleeping). The SCAS and RCADS rating scales do not include items that assess for these specific symptoms. The internal structure of DSM anxiety disorders, and GAD in particular, may vary if these specific symptoms are included (or not) in the CFAs. Given that different assessment methods may yield different findings with respect to the internal structure of the anxiety disorders, further research would be worthwhile to examine the issue.

Metric Invariance by Youth Sex. Results of multiple group CFAs based on youth data supported the metric invariance of the correlated five factor model across youth sex. An equal form model, which also had thresholds constrained to be equal across sex, showed acceptable model fit. This finding suggests that the internal structure of anxiety disorders does not differ across boys and girls ages 7 to 16 years of age (i.e., equal factor structure). In addition, the same level of the continuous latent response variable (underlying the dichotomous symptom "present" or "absent" responses) is present before a boy or girl endorses one category (x = 0 or "absent") relative to the other category (x= 1 or "present") (i.e., invariance of thresholds). Subsequent models constraining the factor loadings and the errors of the item indicators also yielded acceptable model fit. In addition, formal tests comparing the equal form model to the factor invariance model and the factor invariance model to the error invariance model supported the invariance of these parameters across sex. Thus, the degree to which the ADIS items relate to the factors of SAD, SOP, SP, GAD Worry, and GAD Somatic, and the amount of unique variance associated with the items did not differ across boys and girls (i.e., factor loading and residual invariance, respectively). These findings suggest that the items used to assess the anxiety disorders have similar meaning across boys and

girls of this age range.

Sex differences in prevalence rates of anxiety disorders in children and adolescents have been found, with girls having higher rates than boys (Costello, 1989; Costello et al., in press; Kashani & Orvaschel, 1990). To the extent that the internal validity of the symptoms that comprise anxiety disorder diagnoses differ across sex, differences (or similarities) in rates of anxiety disorders may reflect item content rather than true findings. Thus, finding metric invariance of the structure of anxiety across boys and girls in the present sample provides some evidence that sex differences in rates of anxiety disorders may not be due to measurement non-equivalence. However, given that this is the first study to examine internal validity of symptoms of anxiety across youth sex using both youth and parent interview data, it would be important for findings to be replicated before drawing firm conclusions.

Metric invariance of the correlated five factor model could not be examined for the parent data because the equal form model yielded parameter estimates with one offending estimate for the subsample of girls. As a consequence, subsequent models with constraints on factor loadings and errors of the item indicators were not tested. Finding an offending estimate may be due in part to sample size (Brown, 2006). Confirmatory factor analyses conducted with categorical data require large sample sizes (Brown, 2006). Furthermore, the presence of highly skewed categorical indicators requires larger sample sizes than categorical indicators that are not skewed (Brown, 2006). Given that the present study used dichotomous data and some of the indicators were highly skewed (rate of positive endorsements by parents was < 10% for 9 of 49 indicators), the sample size for parents in this study (n = 479) may not have been sufficiently large for the multiple

group CFAs relative to the sample size for youth (n = 625). Additional research studies using samples sufficiently large enough to examine this issue are needed.

Similarities across Youth and Parents. It is important to highlight the similarities of the findings between youth and parents. The correlated five factor model was found to be the best fit of the data relative to the other factor models for both youth and parents. This finding is similar to Lahey et al. (2008), who also found that the structure of DSM child disorders was similar for both youth and parent reports. This finding, along with the finding of Lahey et al. (2008), indicate that the structure of the anxiety disorders is similar for both informants.

It is interesting that the structure of the anxiety disorders may be similar for youth and parents in light of rather consistent research findings showing poor child parent agreement on their reporting of the presence of anxiety disorders (Choudhury, Pimentel, & Kendall, 2003; Grills & Ollendick, 2003; Rapee et al., 1994). This would suggest that disagreement between youth and their parents on the presence of anxiety disorders is not necessarily due to differences in the way each informant conceptualizes the anxiety construct (Spence, 1998). Instead, youth age and youth sex, which have been found to be associated with disagreement between youth and their parents, may be operating more (Choudhury et al., 2003; Grills & Ollendick, 2003). Future research needs to explore further the reasons for the disagreements between youth and their parents on the presence of anxiety disorders. Nevertheless, for now it appears safe to say that the often found disagreement between youth and their parents is unlikely to be due to differences in the internal structure of anxiety across youth and parents.

Internal Structure of Anxiety among Latino Youth. The present dissertation study is the first to evaluate the internal validity of symptoms of DSM-IV anxiety disorders in a predominantly Latino sample of youth. Evaluation of the internal validity of DSM-IV anxiety disorders among Latinos is important given that Latinos comprise the largest minority population in the US (US Census Bureau, 2007) and Latino youth also present with higher rates of anxiety disorders than European American youth (Ginsburg & Silverman, 1996; Roberts et al., 2006). Based on this study's findings, the internal structure of DSM-IV anxiety disorders, (i.e., SAD, SOP, and SP), which has been found in samples of Caucasian and multiethnic youth was also found in this sample. These findings provide support for the application of the DSM's classification of anxiety disorders (i.e., SAD, SOP, and SP) in this sample of predominantly Latino youth and parents who present at a child anxiety clinic and who are largely English speaking.

Implications

Theoretical. The findings of the present study provide support for the internal validity of DSM-IV anxiety disorders, particularly SAD, SOP, and SP, as measured by a diagnostic interview among predominantly Latino youth. Internal validity was examined by testing hypothesized factor models of the internal structure of anxiety disorders. Such an examination can help shed light on the conceptualization of anxiety and its disorders among youth (Cantwell, 1996). The findings suggest that DSM-IV SAD, SOP, and SP can be conceptualized as distinct but related diagnostic entities, thus supporting the DSM-IV's classification of psychiatric disorders.

However, this study's finding along with the finding of Higa-McMillan et al. (2008) raise doubt regarding the internal structural validity of DSM-IV GAD in youth.

Although highly correlated, GAD Worry items clustered together on one factor whereas GAD Somatic symptoms clustered together on another factor. This factor model that differentiated between somatic and worry symptoms of GAD was found to fit significantly better than a four factor DSM model, which posited that all GAD symptoms cluster together on only one factor. This finding suggests that DSM-IV GAD is not well conceptualized as a single diagnostic entity, but may be better conceptualized as two distinct but related entities of worry and somatic distress among youth.

Finding that GAD symptoms clustered together on two factors of Worry and Somatic distress rather than a single factor is theoretically interesting given the current diagnostic criteria for GAD, which requires endorsement of both uncontrollable worry as well as the presence of somatic symptoms (Criteria C). The few studies that have evaluated criteria C for GAD in youth (Kendall & Pimentel, 2003; Tracey, Chorpita, Douban, & Barlow, 1997), found significant problems with these criteria in samples of youth and parents. Tracey et al. (1997) and Kendall and Pimentel (2003) found poor child parent agreement on the presence of GAD Criteria C somatic symptoms. Tracey et al. (1997) further found that child parent agreement on the presence of GAD was improved when Criteria C was not taken into account. Further, both Tracey et al. (1997) and Kendall and Pimentel (2003) found that older youth reported more somatic symptoms than younger youth.

Thus, for younger youth, somatic symptoms may not play a large role in the clinical description of GAD. This may be due to developmental differences such that older youth are more likely to identify somatic symptoms that are associated with worry (Kendall & Warman, 1996). Future studies should consider examining the factor

structure of symptoms of GAD by youth age to determine whether a two factor structure of DSM-IV GAD emerges in older as well as younger youth. If the present study's findings are replicated, modifications in the classification of DSM-IV GAD may be warranted.

Clinical Implications. On a clinical level, the findings of this dissertation study provide support for the continued application of the DSM's anxiety disorders classification in a predominantly Latino sample of youth and their parents, particularly when it comes to the diagnoses of SAD, SOP, and SP. Interestingly, minimal revisions have been proposed for the diagnostic criteria of SAD, SOP, and SP in the upcoming fifth edition of the DSM (APA, 2010), which is consistent with the study's findings that shows support for the internal validity of these DSM disorders.

The applicability of DSM-IV GAD among Latino youth, however, is questionable. In the adult GAD literature, it has been suggested that Latinos may emphasize somatic symptoms more than cognitive symptoms as Latinos tend to somaticize psychological symptoms (e.g., Escobar, Rubio-Stipec, Canino, & Karno, 1989; Koss, 1990). Consequently Latinos may make a distinction between worry and somatic symptoms associated with GAD (Hirai, Stanley, & Novy, 2006). Future studies should consider examining the factor structure of symptoms of DSM-IV GAD across Latinos and European American youth to determine whether a two factor structure of DSM-IV emerges for European American youth as well as Latino youth. If findings of the present study are replicated, clinicians working with Latino youth and families need to be aware of the distinctions made among cognitive and somatic symptoms of GAD among Latinos.

In contrast to the minimal revisions that have been proposed for SAD, SOP, and SP, significant revisions to the diagnostic criteria of GAD in the fifth edition of the DSM have been proposed, including revisions to Criteria C. It has been proposed that somatic symptoms that are part of DSM-IV Criteria C, which are nonspecific to GAD (i.e., fatigue, difficulty concentrating, irritability, and trouble sleeping), should be removed (APA, 2010). Instead, DSM-V Criteria C for GAD would be met if an individual experiences one or both of two symptoms, namely, restlessness and muscle tension. If the proposed revisions for GAD are accepted, future research should examine the internal structure of DSM-V GAD to determine whether its internal validity is improved relative to the internal validity of DSM-IV GAD among youth.

Limitations and Future Directions

Although the present study represents an important contribution to the research literature on the internal validity of DSM-IV anxiety disorders among youth, the study's main limitations should be noted. First, internal validity was not evaluated for all the DSM-IV anxiety disorders, including, PD, OCD, and PTSD. For each diagnostic section of the ADIS-IV: CP, youth and parents are asked between one and three initial screening questions followed by a series of symptom and severity questions if the initial screening questions are answered "yes." In this study, all items in the SAD, SOP, SP, and GAD sections were asked regardless of whether the youth or parent answered "yes" to the screening items or not. However, if initial screening items were answered "no" in the PD, OCD, and PTSD sections of the ADIS-IV: C/P, then the presence (or absence) of symptoms for these respective disorders were not further inquired. Given the low frequencies of PD, OCD, and PTSD diagnoses in this sample, it was not possible to

evaluate the internal validity for these DSM-IV disorders. Thus, the structure of anxiety disorders may or may not differ from the structure found in the present study if these specific anxiety disorders were included. Future studies should evaluate internal validity of all DSM-IV anxiety disorders assessed using a diagnostic interview.

Second, internal validity was not evaluated for symptoms of other prevalent DSM-IV disorders of childhood and adolescence, including ADHD, CD, and MDD. Consequently, the structure of anxiety disorders may differ from the structure found in this study if such disorders were included. Indeed, past studies that evaluated the internal validity of symptoms of DSM-IV anxiety disorders and other disorders of childhood and adolescence (i.e., ADHD, CD, MDD) using rating scales have found that a factor structure that combines GAD and MDD into a single factor fit significantly better than factor structures based on the DSM that make distinctions among these disorders in community samples of youth and parents (Lahey et al., 2004; Lahey et al., 2008).

This finding is in accordance with suggestions made in the literature that MDD and GAD are considered part of a single "distress" factor (Krueger, 1999; Watson, 2005) as opposed to two separate but related constructs. Although some studies have found that GAD and MDD are part of one factor, other studies have found that a factor structure in which GAD and MDD are separate but related entities fits significantly better than when these disorders are collapsed into one factor (Ebesutatni et al., 2010; Higa-McMillan et al., 2008). These inconsistencies may be due in part to the difference in samples (community samples vs. clinical samples), differences in measures (rating scales vs. interviews), or differences in informant (child vs. parent). Future research should further evaluate the internal validity of anxiety disorders as well as MDD using both youth and

parent interview data in clinic samples of youth.

Third, although the present study conducted tests of metric invariance of the correlated five factor model across youth sex, metric invariance was not evaluated for youth age as done in past studies (e.g., Lahey et al., 2008; Spence, 1998). This is because the number of older youth in this study were too small (n = 152) to be included in multiple groups CFAs. Because multiple group CFAs are simultaneous analyses of more than one group, such analytical procedures require sufficiently large sample sizes for each group included in the analyses (Brown, 2006).

Further, because of the categorical nature of dichotomous data, multiple group CFAs of a large number of ordered categorical variables (50 variables) are even more sample intensive than multiple groups CFAs of continuous variables (Brown, 2006). As such, sample sizes larger than the one included in the present study would be required to examine metric invariance across youth age. Given that no study to date has evaluated whether the internal structure of DSM-IV anxiety disorders assessed using a diagnostic interview varies according to youth age, future studies are warranted to examine this issue.

Fourth, although a predominantly Latino sample of youth (n = 495) was used, the number of youth of other ethnicities (i.e., European American youth; n = 130) was too small to include in multiple groups CFAs to examine metric invariance by youth ethnicity. Thus, it is unclear whether the internal structure of anxiety disorders found in the present study varies for Latino and European American youth. Although one study found metric invariance of the structure of anxiety as measured by the Revised Children's Manifest Anxiety Scale (RCMAS; Reynolds & Richmond, 1979) across Latino and

European American youth (Pina, Little, Knight, & Silverman, 2009), no studies have examined whether internal structure of DSM anxiety disorders as measured by an interview varies across these subgroups of youth. Future studies are needed to investigate this issue in samples that are sufficiently large enough to conduct multiple groups CFAs.

Fifth, although the present study included a heterogenous sample of Latino youth, the number of youth within each subgroup was too small to conduct tests of metric invariance across these subgroups of youth (e.g., Cuban, Nicaraguan, Venezuelan). Given that Latinos are a heterogenous group with distinct nationalities, cultures, and acculturation levels (U.S. Department of Health and Human Services, 2001), it is important for future research to investigate whether the internal structure of DSM-IV anxiety disorders varies across different Latino youth subgroups. It may be possible that cultural differences across these subgroups can influence the way that anxiety is expressed across these groups of youth. Future studies should also include other culturally diverse samples of youth and parents (e.g., African Americans, Asian and Pacific Islanders).

Sixth, the present study included a sample of predominantly Latino youth and parents who chose to have the interview administered in English. Thus, the findings of this study might not generalize to samples of Latinos who are largely Spanish speaking. It has been suggested that choice of language can affect the accuracy of assessment and the expression of symptoms of psychopathology (Hirai et al., 2006). Thus, the internal structure of anxiety disorders may look different from the structure that emerged in the present study if a sample of Latino youth and parents was used. Thus, future studies should examine internal validity of anxiety disorders in samples of Latino youths and

parents who chose to have the diagnostic interview administered in Spanish.

Table 1

DSM-IV-TR Anxiety Disorders

Disorder	Clinical Features
Separation Anxiety Disorder	Excessive and developmentally inappropriate anxiety concerning separation from home or attachment figures that begins prior to 18 years old, has been present for at least 4 weeks, and causes clinically significant distress or impairment in important areas of functioning (e.g., social, academic).
Specific Phobia	Marked, excessive, and persistent fear in either presence or anticipation of a circumscribed object or event that is developmentally inappropriate, leads to avoidance or attempts at avoidance of object or event, not due to a recent stressor, present for at least 6 months, and causes clinically significant distress or impairment.
Social Phobia	Marked and persistent fear circumscribed (e.g., school) or pervasive (e.g., school, family, and friends), of situations in which there is likelihood of social evaluation for at least 6 months, leads to avoidance or attempts at avoidance of situation, and causes clinically significant distress or impairment.
Generalized Anxiety Disorder	Excessive anxiety and worry that is difficult to control, not focused on a specific situation or object, unrelated to a recent stressor, occurs more days than not, at least one physical symptom (e.g., restlessness, stomach, and muscle aches), present for at least 6 months, and causes clinically significant distress or impairment.

Table 1 (cont.)

DSM-IV-TR Anxiety Disorders

Disorder	Clinical Features
Panic Disorder	Sudden occurrence of a cluster of symptoms that peak within 10 minutes (e.g., palpitations, sweating, trembling, feelings of shortness of breath, chest pain, nausea, dizziness). Reoccurs unexpectedly, associated with at least 1 month of chronic worry or fear about future attacks and consequences regarding attacks, and leads to avoidance or attempts at avoidance. Can occur either independently or with agoraphobia.
Posttraumatic Stress Disorder	Exposure to a traumatic event leads to persistent reexperiencing (e.g., intrusive thoughts or images), persistent avoidance of situations/persons associated with event or lack of responsiveness (e. g., avoid thoughts, feelings, conversations associated with or a reminder of event), and increased arousal (e. g., hypervigilance, sleep disturbance). Present for at least 1 month and causes clinically significant distress or impairment.
Acute Stress Disorder	Exposure to a traumatic event leads to dissociative symptoms (e.g., detachment, reduction of awareness, derealization, depersonalization, dissociative amnesia) that are experienced during or after the event. Exposure to traumatic event also leads to reexperiencing (e.g., recurrent thoughts, images), persistent avoidance of stimuli associated with event (e.g., thoughts, feelings, conversations, activities, places, people), and increased arousal (e.g., hypervigilance, sleep disturbance). Present for at least 2 days to a maximum of one month and occurs within a month of the event. Causes clinically significant distress or impairment.
Obsessive-Compulsive Disorder	Obsessive thoughts, impulses, or images, compulsions or both that lead to marked distress, last over 1 hour a day, and causes clinically significant distress or impairment. Attempts are made to ignore obsessions; relieve distress by performing compulsions.

Note: DSM-IV-TR = Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (text revision) (APA, 2000).

Table 2

Studies that Examined Retest Reliability of DSM Anxiety Disorders in Youth

				Reliability of Diagnoses (Kappas)		
Study	Interview Schedule	Retest interval	Sample Characteristics	Child	Parent	Composite
Ambrosini (2000)	Schedule for Affective Disorders and Schizophrenia for School- Age Children (K-SADS)	2 to 38 days	Clinical sample N = 20 youth and parents 6 to 18 years			OAD .78 SAD .80
Angold & Costello, (1995); (2000)	Child and Adolescent Psychiatric Assessment CAPA	1 to 11 days	Clinical sample N= 77 youth 10 to 16 years	OAD .74 GAD .79		
Reich (2000)	Diagnostic Interview for Children and Adolescents (DICA)	1 to 7 days	Clinical and community sample N= 30 clinic youth; 10 youth from community 6 to 17 years	*Child:* OAD .55 SAD .60 SP .65. *Adolescent:* OAD .72 SAD .75		

Table 2 (cont.)

				Reliability Diagnoses (Kappas)		
Study	Interview Schedule	Retest interval	Sample Characteristics	Child	Parent	Composite
Shaffer et al. (2000)	NIMH Diagnostic Interview Schedule for Children Version IV (NIMH DISC-IV)	Mean = 6.6 days	Clinical sample N= 84 parents; 82 youth Ages: 9 to 17 years	SP .68 SOP .25 SAD .46	SP .96 SOP .54 SAD .58 GAD .65	SP .86 SOP .48 SAD .51 GAD .58
Silverman et al., (2001)	Anxiety Disorders Interview Schedule for DSM-IV: Child and Parent Versions (ADIS for DSM-IV: C/P).	7 to 14 days Mean: 11.7 days	Clinical sample N= 62 Ages: 7 to 16 years	SAD .78 SOP .71 SP .80 GAD .63	SAD .88 SOP .86 SP .65 GAD .72	SAD .84 SOP .92 SP .81 GAD .80

Note: OAD = overanxious disorder; SAD = separation anxiety disorder; SOP = social phobia; SP = specific phobia; GAD = generalized anxiety disorder.

Table 3

Symptom Indicators of ADIS-IV: C/P SAD, SOP, SP, and GAD

Anxiety Disorder	Symptom Indicator
SAD	1. Distress when away from home or parents
	a. Scared when parent is gone
	b. Upset, begs parent to stay home
	c. Cries, feels bad when parent is gone
	d. Parent only: cries when left with sitter/relative
	e. Gets upset ahead of time
	2. Worry about losing or harm befalling parents
	a. Worries about parents
	b. Child ADIS only: Worries that parents will not return
	3. Worry that untoward event will lead to separation
	4. Reluctance/refusal to attend school or other places
	5. Reluctance/fear to be alone
	a. Tries to be near parents
	b. Tries not to be home alone
	c. Afraid to be alone in room
	6. Reluctance/refusal to sleep without parents nearby
	a. Needs parent at night
	b. Hard to sleep over other kids houses
	7. Nightmares involving separation
	8. Physical symptoms when separation occurs
SOP	1. Answering questions in class
	2. Giving oral reports or reading aloud
	3. Asking a teacher a question/help
	4. Taking tests
	5. Writing on the chalkboard
	6. Working or playing in groups
	7. Gym class
	8. Walking or standing in hallway
	9. Starting or joining in on conversations
	10. Using public restrooms
	11. Eating in front of others
	12. Attending meetings
	13. Talking on the telephone
	14. Musical or athletic performances
	15. Inviting a friend over

Table 3 (cont.)

Anxiety Disorder	Symptom Indicator
SOP	16. Speaking to adults
	17. Speaking unfamiliar people
	18. Attending parties
	19. Having picture taken
	20. Saying no to others
	Telling people to stop doing things
SP	1. Animals
	2. Natural environment type (high places, thunderstorms/lightning, water, dark)
	3. Blood injection injury type (getting shots, having a blood test, seeing blood)
	4. Situational type (ways of traveling such as cars and planes, elevators or small enclosed places).
	5. Other type (Doctors/dentists, vomiting, loud noises, costumed characters, choking, contracting an illness or disease)
GAD	Worries
	1. School worry
	2. Performance worry
	3. Social/interpersonal worry
	4. Little things worry
	5. Perfectionism
	6. Health of self worry
	7. Health of others worry
	8. Family issues worry
	9. World worry
	Somatic symptoms
	10. Nervous
	11. Easily tired
	12. Trouble concentrating
	13. Upset easily
	14. Muscle aches
	15. Trouble sleeping

Note: SAD = separation anxiety disorder; SOP = social phobia; SP = specific phobia;

GAD = generalized anxiety disorder.

Table 4

Factor Loadings, Residuals, and Thresholds for the Five Factor Model

		Youth			Parent		
Anxiety Diagnosis	Symptom	Factor Loadings	Residual Variance	Thresholds	Factor Loadings	Residual Variance	Thresholds
SAD	Distress when away from home or parents	0.86 **	0.26	-0.32**	0.86**	0.26	-0.11
	Worry about losing/harm befalling parents	0.76 **	0.43	-0.22**	0.77**	0.41	0.41**
	Worry untoward event lead to separation	0.72 **	0.49	0.02	0.67**	0.55	0.52**
	Reluctance/refusal to attend school/other places	0.65 **	0.58	0.66**	0.72**	0.48	0.66**
	Reluctance/fear to be alone	0.82 **	0.33	-0.51**	0.66**	0.57	-0.25**
	Reluctance/refusal to sleep without parents nearby	0.66 **	0.57	-0.06	0.67**	0.55	-0.01
	Nightmares involving separation	0.78 **	0.38	0.73**	0.67**	0.55	1.03**
	Physical symptoms when separation occurs	0.61 **	0.62	0.32**	0.69**	0.52	0.21**
SOP	Answering questions in class	0.81 **	0.34	1.15**	0.85**	0.27	0.72 **
	Giving oral reports or reading aloud	0.83 **	0.32	0.81**	0.83**	0.32	0.71**
	Asking a teacher a question/help	0.82 **	0.33	1.35**	0.79**	0.38	0.36**
	Taking tests	0.50 **	0.75	1.43**	0.43**	0.81	0.96**
	Writing on the chalkboard	0.63 **	0.61	1.41**	0.75**	0.44	1.14**
	Working or playing in group	0.82 **	0.33	1.62**	0.79**	0.38	1.15**

Table 4 (cont.)

		Youth			Parents		
Anxiety Diagnosis	Symptom	Factor Loadings	Residual Variance	Thresholds	Factor Loadings	Residual Variance	Thresholds
SOP	Gym class	0.65 **	0.58	1.92**	0.58**	0.66	1.44**
	Using public restrooms	0.68 **	0.54	1.84**	0.42**	0.82	1.35**
	Starting or joining in on conversations	0.83 **	0.32	1.26**	0.87**	0.25	0.77**
	Walking or standing in hallway	0.80 **	0.36	1.84**	0.65**	0.58	1.44**
	Eating in front of others	0.75 **	0.43	1.84**	0.58 **	0.67	1.70**
	Attending meetings	0.74 **	0.45	1.65**	0.72 **	0.48	1.33**
	Musical or athletic performances	0.65 **	0.57	1.26**	0.62 **	0.62	1.07**
	Inviting a friend over	0.69 **	0.53	1.74**	0.82 **	0.33	1.32**
	Speaking to adults	0.71 **	0.50	1.30**	0.83 **	0.32	0.85**
	Speaking unfamiliar people	0.67 **	0.55	0.84**	0.86 **	0.26	0.64**
	Attending parties	0.80 **	0.36	1.27**	0.68 **	0.54	1.07**
	Having picture taken	0.73 **	0.46	1.91**	0.66 **	0.56	1.88**
	Saying no to others	0.71 **	0.49	1.15**	0.61 **	0.63	0.89**
	Telling people to stop doing things	0.74 **	0.45	1.14**	0.65 **	0.58	0.79**
SP	Animals	0.35	0.88	1.10**	0.33	0.89	0.95**
	Natural environment type	0.63**	0.61	0.93**	0.93 **	0.13	0.61**
	Blood injection injury type	0.55 *	0.70	1.16**	0.45 *	0.80	0.87**
	Situational type	0.50 *	0.75	1.40**	0.56 *	0.69	1.33**
	Other type	0.59 **	0.65	0.80**	0.36 *	0.87	0.55**
GAD	School worry	0 .79 **	0.38	0.77**	0.62 **	0.62	0.47**
	Performance worry	0 .60 **	0.63	1.33**	0.72 **	0.48	0.80**

Table 4 (cont.)

		Youth			Parents		
Anxiety Diagnosis	Symptom	Factor Loadings	Residual Variance	Thresholds	Factor Loadings	Residual Variance	Thresholds
GAD	Social/interpersonal worry	0 .76 **	0.42	1.30**	0.74 **	0.46	0.80**
	Little things worry	0 .66 **	0.57	1.26**	0.60 **	0.64	1.18**
	Perfectionism	0 .68 **	0.54	1.37**	0.62 **	0.62	0.84**
	Health of self worry	0 .67 **	0.55	1.11**	0.54 **	0.70	1.17**
	Health of others worry	0.62 **	0.62	0.70**	0.72 **	0.48	0.97**
	Family issues worry	0.55 **	0.70	1.03**	0.78 **	0.40	1.19**
	World worry	0.55 **	0.70	1.06**	0.62 **	0.61	1.16**
	Nervous Cant Relax	0.92 **	0.16	-0.03	0.83 **	0.31	0.02
	Tired Easily	0.80 **	0.36	0.48**	0.68 **	0.53	0.55**
	Concentration	0.82 **	0.33	0.19**	0.87 **	0.24	-0.05
	Upset Easily	0.75 **	0.44	0.39**	0.91 **	0.16	-0.22**
	Muscles Aches	0.63 **	0.61	0.78**	0.65 **	0.58	0.63**
	Trouble Sleeping	0.76 **	0.43	0.28**	0.74 **	0.45	0.26**

Note: SAD = Separation anxiety disorder; GAD = Generalized anxiety disorder; SOP = Social phobia; SP = Specific phobia. ** $p < .01$; *$p < .05$.

Table 5

Correlations Among the Latent Factors: Youth and Parent Data

	Youth					Parent				
	SAD	SOP	SP	GAD WORRY	GAD SOM	SAD	SOP	SP	GAD WORRY	GAD SOM
SAD	1.00					1.00				
SOP	.14*	1.00				-0.07	1.00			
SP	.28**	.09	1.00			.35**	.01	1.00		
GAD WORRY	.28**	.59**	.42**	1.00		.32**	.26**	.28**	1.00	
GAD SOM	.34**	.49**	.24**	.75**	1.00	.23**	.30**	.05	.71**	1.00

Note: SAD = Separation anxiety disorder; SOP = Social phobia; SP = Specific phobia; GAD = Generalized anxiety disorder. ** = $p < .01$; * = $p < .05$.

Table 6

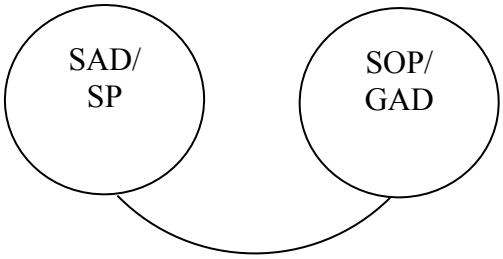
Correlations Among the Latent Factors: Girls and Boys

	Girls					Boys				
Latent Factor	SAD	SOP	SP	GAD WORRY	GAD SOM	SAD	SOP	SP	GAD WORRY	GAD SOM
SAD	1.00					1.00				
SOP	.03	1.00				.28**	1.00			
SP	.40**	.05	1.00			.20*	.18	1.00		
GAD WORRY	.32**	.56**	.52**	1.00		.27**	.65**	.30*	1.00	
GAD SOM	.29**	.53**	.33**	.72**	1.00	.40**	.44**	.20	.78**	1.00

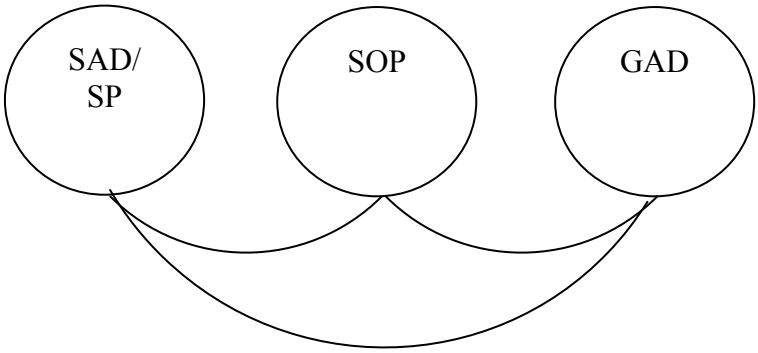
N*ote*: SAD = Separation anxiety disorder; SOP = Social phobia; SP = Specific phobia; GAD = Generalized anxiety disorder. ** = $p < .01$; * = $p < .05$.

a) Single Factor Model

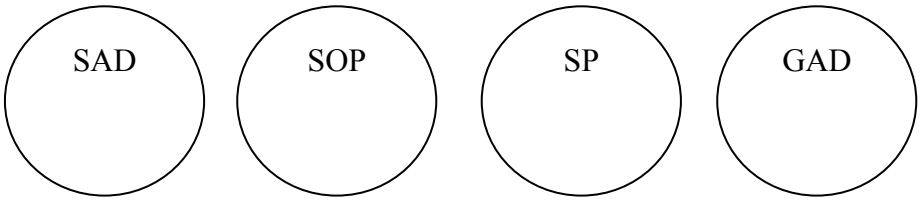
b) Correlated Two Factor Model



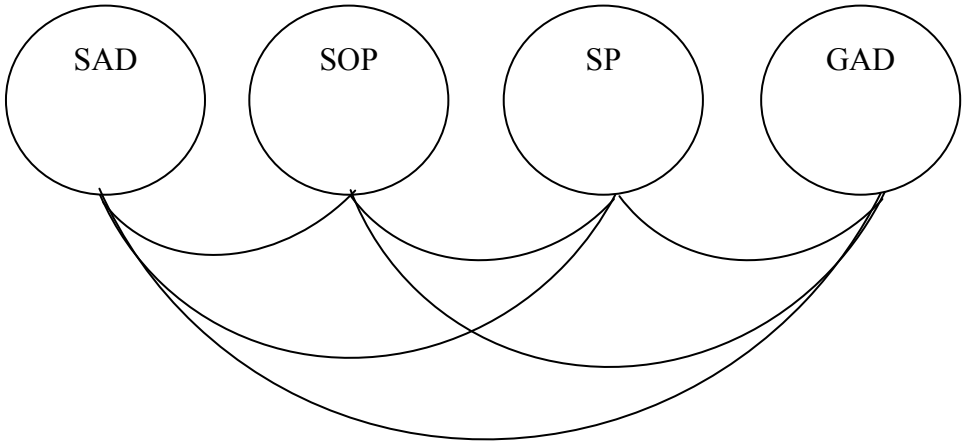
c) Correlated Three Factor Model



d) Uncorrelated Four Factor Model



e) Correlated Four Factor Model



f) Correlated Five Factor Model

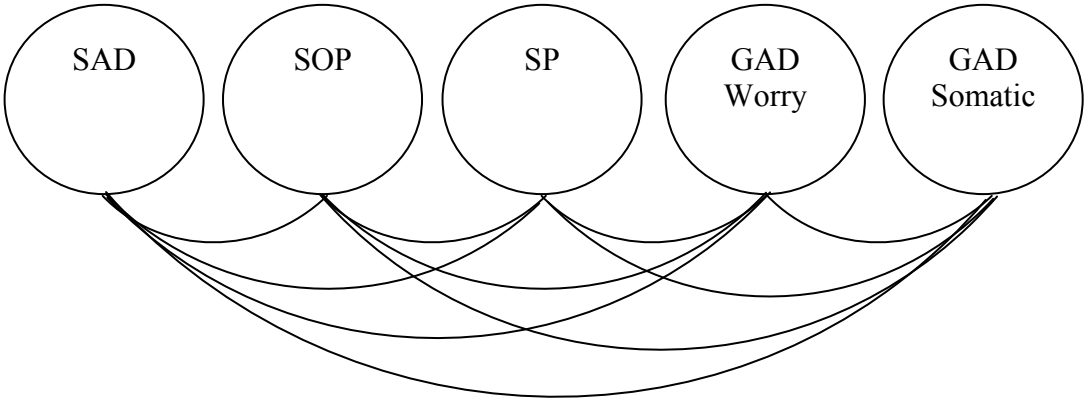


Figure 1. Hypothesized Factor Models.

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Marin, C. E., Hernandez, I., Rey, Y., Nichols-Lopez, & Silverman, W. K. (2008, November). *Maternal Control and Acculturation in Relation to Anxiety Symptoms in Hispanic-Latino Youth.* Poster presented at the Annual Meeting for the Association for Behavioral and Cognitive Therapies. Orlando, FL. November 2008.

Marin, C. E., Moreno, J., Rey, Y., & Silverman, W. K. (2008, November). *Therapy Specificity and Mediation in Family and Group Cognitive Behavioral Therapy.* In C. Alfano (Chair), Predicting Treatment Response among Children and Adolescents with Anxiety and Phobic Disorders. Symposium conducted at the Annual Meeting for the Association for Behavioral and Cognitive Therapies. Orlando, FL.

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