Sex Variations in Youth Anxiety Symptoms: Effects of Pubertal Development and Gender Role Orientation

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Abstract

This study evaluated whether pubertal development and gender role orientation (i.e., masculinity and femininity) can partially explain sex variations in youth anxiety symptoms among clinic referred anxious youth (*N* = 175; ages 9-13 years; 74% Hispanic; 48% female). Using youth and parent ratings of youth anxiety symptoms, structural equation modeling results indicated that youth who reported being more advanced in their pubertal development reported high levels of femininity and anxiety symptoms. Youth who reported high levels of masculinity had low levels of anxiety symptoms as reported by both youths and parents. The estimated effects of pubertal development, femininity, and masculinity on youth and parent ratings of youth anxiety symptoms were not significantly moderated by biological sex. Pubertal development and gender role orientation appear to be important in explaining levels of youth anxiety symptoms among clinic referred anxious youth.

Keywords

sex differences; youth anxiety symptoms; pubertal development; clinic referred anxious youth; femininity; masculinity

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Consistent with the significant disparity in anxiety disorder rates among adult women and men (e.g., Eaton, Dryman, & Weissman, 1991; Flint, 1994; Kessler et al., 1994), girls are more likely to manifest symptoms of anxiety than boys (see Albano & Krain, 2005; Silverman & Carter, 2006, for reviews). This pattern of girls manifesting more anxiety symptoms than boys appears to emerge during middle childhood and remains throughout adolescence and adulthood (Lewinsohn, Gotlib, Lewinsohn, Seeley, & Allen, 1998; Roza, Hofstra, van der Ende, & Verhulst, 2003). In an adolescent school-based sample (mean age 16.6 years; 52% female; 9% non-White) that included 1,709 who never met DSM diagnostic criteria for an anxiety disorder, 95 who had recovered from an anxiety disorder, and 467 who had a current anxiety disorder, Lewinsohn et al. (1998) found girls were more likely than boys to be diagnosed as a current case or recovered case, rather than never meeting for a diagnosable anxiety disorder. Further, current and recovered girls reported more anxiety symptoms than boys. Girls also had an earlier onset of anxiety disorders than boys. By age six, twice as many girls than boys had developed an anxiety disorder.

Findings from Lewinsohn et al. (1998) suggest that there may be sex-related factors involved in the manifestation of anxiety symptoms, particularly in middle childhood when these sex disparity findings emerge. Conversely, some studies have found equal rates of anxiety in boys and girls or that anxiety does not differ as a function of biological sex (e.g., Beidel & Turner, 1997; Masi, Mucci, Favilla, Romano, & Poli, 1999; Treadwell, Flannery-Schroeder, Kendall, 1995). Thus, firm conclusions about the relation between biological sex

and anxiety cannot be drawn. The most that can be stated is that girls are more likely than boys to show and/or report features of most kinds of anxiety symptoms and disorders. The reasons for these sex disparity findings are also unclear and research is needed to better understand such findings (Kistner, 2009; Rutter, Caspi, & Moffitt, 2003; Silverman & Carter, 2006). Thus, in this study we examined sex variations in youth anxiety symptoms in a sample of youth referred to an anxiety disorders specialty clinic. We used a clinic referred sample of anxious youth because sex variations in psychological distress is viewed as depending, in part, on the degree to which the psychological distress is a significant clinical problem for that sample (Klerman, 1989).

A second purpose of the present study was to test several explanations that have been proposed for the observed sex disparity in youth anxiety symptoms (Silverman & Carter, 2006). Empirical research is limited on this issue. Lewinsohn et al. (1998) is one of the few studies that investigated sex differences in youth anxiety. Findings demonstrated that controlling for 15 psychosocial variables (i.e., self-reported daily hassles, major life events, self-consciousness, self-esteem, social self-competence, emotional reliance, coping skills, family social support, friends social support, social desirability, physical illness, self-rated health, obesity index, frequency of exercise, and lifetime of physical symptoms) did not eliminate the sex difference in anxiety symptoms and disorders. Lewinsohn et al. concluded that female vulnerability to anxiety is likely associated with some type of genetic or biological difference between girls and boys rather than being purely environmentally determined.

Given research is limited on variables that may account for the sex disparity in youth anxiety symptoms, the present study evaluated whether pubertal development and gender role orientation (i.e., masculinity and femininity) can partially explain sex variations in youth anxiety symptoms. We tested a multivariate model specifying the relations among pubertal development, gender role orientation, and youth and parent ratings of youth anxiety symptoms. We next tested whether biological sex moderated the predictive effects of pubertal development and gender role orientation on youth and parent ratings of youth anxiety symptoms. Theoretical and empirical reasoning for focusing on pubertal development and gender role orientation is summarized below.

Pubertal Development and Sex Disparity in Youth Anxiety Symptoms

Puberty occurs, on average, about two years earlier in girls than boys (Grumbach & Styne, 1998). Girls experience greater and faster increases in body fat; boys experience greater and faster increases in muscular growth (Rogol, Clark, & Roemmich, 2000). It has been suggested that the weight gain associated with puberty in girls, along with the fluid self-perceptions of body image and emerging sexuality, elicit negative responses from other individuals (e.g., peers, parents, teachers) (Caspi, 1995; Caspi & Moffitt, 1991; Deardorff, Hayward, Wilson, Bryson, Hammer, & Agras, 2007). Boys, by comparison, generally experience more positive responses from other individuals to their pubertal changes and become more satisfied than girls as they progress through adolescence (e.g., Bearman, Presnell, Martinez, & Stice, 2006; Hargreaves & Tiggemann 2003). Thus, puberty may be a vulnerable time for the development of anxiety symptoms given gender specific stressors girls face relative to boys.

In addition, research findings using community samples are generally consistent in showing that girls have difficulty in accommodating to early pubertal development (e.g., Carter, Jaccard, Silverman, & Pina, 2009; Ge, Conger, & Elder, 2001; Graber, Seeley, Brooks-Gunn, & Lewinsohn, 2004; Hayward et al., 1992). Hayward et al. (1992), for example, examined the effects of chronological age and youths' self-ratings of pubertal development

and the occurrence of panic attacks in a school-based sample of sixth- and seventh- grade girls ($N = 754$; ages 10-16 years; race/ethnicity not reported). Results demonstrated that girls have higher prevalence rates of panic attacks at more advanced stages of pubertal development. In addition, pubertal status significantly predicted panic attack occurrence after controlling for chronological age. Lifetime history of anxiety disorders also appears to vary as a function of pubertal development (Graber et al., 2004). Using a community sample of young adults ($N = 931$; mean age 24.2 years; 58% women; 89% White), Graber et al. (2004) found that lifetime history of anxiety disorders is more common in young adult women who experienced early pubertal development than young adult women who experienced on-time pubertal development.

Anxiety has been less frequently studied in conjunction with timing of pubertal development than other internalizing problems such as depression (see Reardon, Leen-Feldner, & Hayward, 2009, for review). The work that has been conducted indicates that early pubertal development is associated with increased likelihood of anxiety symptoms, anxiety disorders, and anxiety relevant symptoms such as panic attacks. These findings do not appear to be accounted for by chronological age. Ge, Brody, Conger, and Simons (2006), for example, examined associations between youths' self-ratings of pubertal development and internalizing and externalizing symptoms in a community sample of African American children ($N = 867$; ages 10 to 12 years; 54% female). Relevant to the present study were findings indicating that girls who reported early pubertal development reported significantly higher generalized anxiety symptoms than girls who reported late and on-time pubertal development; boys who reported early pubertal development reported significantly higher social anxiety symptoms than boys who reported late and on-time pubertal development.

Although past research findings using community samples reveal that early pubertal development in boys is associated with anxiety and other internalizing problems such as depression (e.g., Ge, Conger, & Elder, 1996; 2001), findings are more consistent in showing that girls have greater difficulty in accommodating to early pubertal changes. As noted, boys generally experience more positive responses from other individuals to their pubertal changes than do girls (e.g., Bearman et al., 2006; Hargreaves & Tiggemann 2003), and thus may be less susceptible to the adverse effects of early pubertal timing.

Despite the empirical evidence for the likely importance of early pubertal development, extant theoretical models relating to the development or maintenance of anxiety and its disorders do not consider the role that early pubertal development plays. However, puberty is a significant developmental milestone and may mark an important window of vulnerability to anxiety (Hayward, 2003). This "sensitive period" may be particularly problematic for youth at risk for psychopathology by virtue of specific individual differences. Thus, this study adds to the existing literature by its examination of associations between pubertal development and youth anxiety symptoms among clinic referred anxious youth.

Gender Role Orientation and the Sex Disparity in Youth Anxiety Symptoms

According to gender role orientation theories, girls and boys are raised to develop socially prescribed interests, attitudes, and values consistent with their biological sex, resulting in masculine and feminine sex-typed behaviors and characteristics (e.g., Block, 1983; Hill & Lynch, 1983). Behaviors and characteristics consistent with the feminine gender role are theorized as being more related to expressions of anxiety than behaviors and characteristics consistent with the masculine gender role (Block, 1983). Girls are encouraged to adopt a feminine gender role, which promotes the expression of fearfulness and avoidance of feared objects and situations. Boys are encouraged to adopt a masculine gender role, which

promotes confrontation of fearful situations and active and purposeful coping behavior (Ollendick, Yang, Dong, Xia, & Lin, 1995). Given that expressions of anxiety are more related to the feminine gender role than the masculine, as girls adopt their gender-linked behaviors and characteristics, they are more inclined to report and experience problems such as anxiety than boys (Ollendick et al., 1995).

Past research findings using both community and clinic referred samples provide support for gender role theory in explaining sex differences in youth anxiety symptoms (Muris, Meesters, & Knoops, 2005; Palapattu, Kingery, & Ginsburg, 2006). Muris et al. (2005) examined the relation between youths' self-ratings of gender role orientation (i.e., masculinity and femininity) and fear and anxiety symptoms in a community sample of children (N = 209; ages 10 to 13 years; 51% female; 90% White). Relevant to the present study were findings indicating that femininity was positively associated with anxiety symptoms; masculinity was negatively associated with anxiety symptoms. Further, biological sex and gender role orientation accounted for unique variance in youth anxiety symptoms, with female sex and feminine gender role orientation being positively associated with youth anxiety symptoms. Additional support for gender role theory in explaining sex differences in youth anxiety symptoms also comes from studies on childhood fear using community (Brody, Hay, & Vandewater, 1990; Muris et al., 2005) and clinic referred samples of youth (Ginsburg & Silverman, 2000).

Examining the respective roles of femininity and masculinity in explaining the sex disparity in youth anxiety symptoms is of further importance given the theoretical links between pubertal development and gender role orientation. Extensions of gender role orientation theory suggest that social pressures to conform to stereotypically feminine vs. masculine gender roles become more salient with puberty onset (Hill & Lynch, 1983). As adolescents begin to look more like adults, other individuals in the adolescent's environment may expect the adolescent to act in ways that resemble the stereotypical male or female adult (Hill & Lynch, 1983). Thus, it is possible that gender role orientation will mediate the relation between pubertal development and youth anxiety symptoms, with early pubertal development and femininity being positively associated with youth anxiety symptoms.

A Multivariate Model of Sex Variation in Youth Anxiety Symptoms

To advance understanding about the sex disparity in boys and girls reporting of anxiety symptoms, we first tested a multivariate model specifying the relations among pubertal development, gender role orientation, and youth and parent ratings of youth anxiety symptoms among clinic referred anxious youth. We next tested whether biological sex moderated the structural coefficients linking pubertal development and gender role orientation to youth and parent ratings of youth anxiety symptoms. No study, to date, has examined the possible effects of pubertal development and gender role orientation on youth anxiety symptoms in a multivariate analysis to understand sex variation in youth anxiety symptoms.

A final innovation of the current study was its use of a sample of youth referred to an anxiety specialty clinic, the majority of whom were Hispanic/Latino (74%). Hispanics/Latinos represent the fastest growing minority group in the United States (about 38.7 million; U.S. Department of Commerce, 2002). Conducting clinical child psychological research with Hispanic/Latino samples, particularly relating to anxiety and its disorders, is of importance because anxiety disorders among Hispanic/Latino youths have relatively high prevalence rates (Merikangas et al., 2010; Roberts, Ramsey-Roberts, & Xing, 2006). For example, Robert et al. (2006) reported an 8.1% rate of anxiety disorders among Mexican American adolescents versus a 5.8% rate for their White counterparts. Despite the relatively

high prevalence, little empirical research – either anxiety disorders research or gender theory research - has been conducted in largely Hispanic/Latino youth samples. In light of the scarcity of past research, we viewed it premature to formulate specific hypotheses specific to Hispanics/Latinos.

The hypothesized dynamics of the present study are captured in the path diagram in Figure 1. Based on the preceding theoretical reasoning and research findings, pubertal development was assumed to be positively associated with youth and parent ratings of youth anxiety symptoms. Pubertal development was also assumed to be positively associated with femininity, masculinity (*see paths a, b*), and youth and parent ratings of youth anxiety symptoms (*see paths c, d*). In turn, femininity and masculinity would partially mediate the relation between pubertal development and youth and parent ratings of youth anxiety symptoms (*see paths e-h*. Femininity was hypothesized to be positively associated with youth and parent ratings of youth anxiety symptoms. Masculinity was hypothesized to be negatively associated with youth and parent ratings of youth anxiety symptoms.

Lastly, we hypothesized that biological sex would moderate the predictive effects of pubertal development, femininity, and masculinity on youth and parent ratings of youth anxiety symptoms. Based on research findings noted earlier, pubertal development, and femininity were hypothesized to be positively associated with youth and parent ratings of youth anxiety symptoms and to show stronger estimated effects on youth and parent ratings of youth anxiety symptoms for girls than boys. Masculinity was expected to be negatively associated with youth and parent ratings of youth anxiety symptoms and to show stronger estimated effects on youth and parent ratings of youth anxiety symptoms for boys than girls.

Method

Participants

A total sample of 175 boys and girls were selected from a larger pool of youth who presented to a youth anxiety disorders specialty research clinic. Youth were referred to the clinic by school counselors, mental health professionals, pediatricians, or by self-referral. The 175 boys and girls were selected from a larger pool youth because they were between the ages of 9 and 13. The sample was comprised of 84 girls and 91 boys, with an average age of 10.72 years ($SD = 1.40$). In terms of ethnicity/race, 75% were Hispanic/Latino, 14% were European American, 1% was African American, 1% was Asian, 4% indicated "Other," and 5% of the sample did not report ethnic\racial information. In terms of family income, 10% had incomes of $20,000 or less; 23% had incomes from $21,000 to $40,000; 18% had incomes from $41,000 to $60,000; 34% had incomes over $61,000, and 15% did not report income information. In terms of family structure, 65% of the parents were married, 16% of the parents were divorced, 14% of the parents were either single, widowed, remarried, unmarried living with partner, or separated, and 5% of the parents did not report family structure information.

Data from both parents and youth were used to derive a combined anxiety diagnosis using the Anxiety Disorders Interview Schedule for Children – Child and Parent Versions (ADIS for DSM IV- C/P; Silverman & Albano, 1996). The majority of the participants met diagnostic criteria for a primary combined diagnosis for separation anxiety disorder (32%) followed by social phobia (20%), and generalized anxiety disorder (12%). Comorbid secondary combined diagnoses in the total sample were common (68%; $n = 120$). The most frequent secondary combined diagnosis was social phobia (11%; $n = 19$), followed by separation anxiety disorder (10%; $n = 17$) and generalized anxiety disorder (9%; $n = 16$). Six percent of the participants had a secondary combined depression diagnosis [dysthymia (3%; $n = 6$) and major depression (3%; $n = 5$)].

Measures

Pubertal Development Scale—(PDS; Petersen, Crockett, Richards, & Boxer, 1988) is a 5-item youth self-rating scale designed to assess the extent that children and adolescents experience pubertal growth in several domains during the past 12 months. Youth respond 1 (*have not begun*) to 4 (*development completed*) to all items. Both boys and girls rated their body hair development, growth spurt, and skin changes. Boys rated the development of facial hair and voice change; girls rated the development of breasts and the occurrence of menarche. The PDS yields a composite score by averaging the 5 items within each sex to maintain the original metric. The composite scale formed was a continuous variable with 1 = pre pubertal, 2 = early pubertal, 3 = mid pubertal, and 4 = post pubertal development. In this study, a high composite score was an indicator of early pubertal timing because data were collected from closely age-spaced children for whom the majority of pubertal development was either pre or early (i.e., children who showed higher levels of pubertal development than their same age peers were considered early developers). This procedure is analogous to that used by Ge et al. (2006).

Past research has established satisfactory predictive validity for the PDS with a physical exam (significant correlations between 0.61 and 0.67; Brooks-Gunn, Warren, Rosso, & Garguilo, 1987; Robertson et al., 1992). Bond et al. (2006) reported moderate agreement between the PDS and self-rated Tanner Stage (Kappa = 0.50). Petersen et al. (1988) reported internal consistency estimates (coefficient alphas) for boys ranging from 0.68 to 0.78 and 0.76 to 0.83 for girls. In this sample, the coefficient alpha for boys was 0.70 and for girls it was 0.70.

Children's Sex Role Inventory—(CSRI; Boldizar, 1991) is a 60-item youth self-rating scale designed to assess sex typing in children and adolescents. It includes 20 masculine items, 20 feminine items, and 20 neutral items that serve as fillers. Youth respond 1 (*not at all true of me*), 2 (*a little true of me*), 3 (*mostly true of me*), or 4 (*very true of me*) to all items. The CSRI yields a Masculinity and Femininity score by averaging the ratings to the 20 items on each scale. CRSI Masculinity and Femininity scores can range from 4 *(highest)* to 1 *(lowest).* The CSRI has demonstrated high construct validity which was demonstrated by measures of sex-typed toy and activity preference, self-perceptions of global self-worth, scholastic competence, social acceptance, athletic competence, physical attractiveness, behavioral conduct and cognitive performance (Boldizar, 1991). Boldizar (1991) reported internal consistency estimates (coefficient alphas) of 0.75 for the Masculinity scale and 0.84 for the Femininity scale. In this sample, the coefficient alpha was 0.81 for the Masculinity scale and 0.82 for the Femininity scale.

Revised Children's Manifest Anxiety Scale—(RCMAS; Reynolds & Richmond, 1985) is a 37-item Yes/No self-rating scale of youth anxiety symptoms containing 28 anxiety items and 9 items that comprise the Lie Scale. The RCMAS yields a Total Anxiety score that can range from 0 to 28 and three subscale scores (worry and oversensitivity, physiological anxiety, and social concerns and concentration problems). Previous studies (e.g., Reynolds & Paget, 1981; Reynolds & Richmond, 1979) have demonstrated that the RCMAS has good concurrent validity (e.g., $r = 0.85$ with the trait scale of the State-Trait Anxiety Inventory for Children) and internal consistency (Kuder-Richardson = 0.83). In this sample, the coefficient alpha for the Total Anxiety score was 0.84.

Revised Children's Manifest Anxiety Scale - Parent version—As done by other investigators (e.g., Kendall, 1994; Pina, Silverman, Saavedra, & Weems, 2001; Strauss, Lease, Kazdin, Dulcan, & Last, 1989), the stem of each item of the child anxiety rating scale was changed from "I" to "My child." Past research has demonstrated that the RCMAS-P

Total Anxiety score has satisfactory internal consistency ($r = 0.85$) (Pina et al., 2001). In this sample, the coefficient alpha for the RCMAS-P Total Anxiety score was 0.78.

Control Variables—Three variables were used as covariates in the analyses: youths' age, marital status, and family income. Youth were asked their age at the time of the interview in years. Marital status and family income were provided by adult respondent for the household in which the youth lived during the time of the assessment (usually the mother). Responses for marital status ranged from 1 (married) to 7 (unmarried living with partner). Two levels of marital status were derived: 1 = married and 0 = not married. Responses for family income ranged from 1 ($20,000 or less) to 7 (over $150,000). Four levels of family income were derived: *1* = $ 0- 20,000; *2* = $21,000 to $40,000; *3* = $41,000 to $60,000; and *4* = over $61,000.

Procedure

All youth who presented at the youth anxiety disorders specialty research clinic were evaluated by trained advanced doctoral level graduate students. This evaluation was administered during two separate sessions within a 2-week period. At the initial intake, the youth and at least one parent (99% mothers; 1% fathers) were interviewed separately by trained advanced doctoral level graduate students using the ADIS for DSM IV- C/P (Silverman & Albano, 1996) to assess the presence of anxiety and related disorders. The reliability of diagnoses using the ADIS for DSM IV- C/P has been found to be satisfactory, both for interrater (Silverman & Nelles, 1988) and test-retest (Rapee, Barrett, Dadds & Evans, 1994; Silverman & Eisen, 1992; Silverman & Rabian, 1995). Diagnosticians were trained by observing live and video-taped samples. Initial discrepancies were discussed to reach agreement. Diagnosticians met an initial reliability criterion of 100% agreement on five consecutive child-parent interviews. Twenty percent of the child and parent interviews were videotaped and observed by independent judges and 100% agreement on all primary composite diagnoses and 85% or higher agreement on all additional comorbid diagnoses was obtained.

After the interviews, the parents completed a battery of questionnaires that included the parent version of the RCMAS and the youths completed a battery of questionnaires that included the PDS, CSRI, and RCMAS. The battery of questionnaires was administered by trained graduate or advanced undergraduate research assistants. The instructions for each questionnaire were first read aloud and examples were provided to the youth participants. When necessary, the questionnaires were read aloud by one of the study's research assistant. When this occurred, the youth read along and completed the forms; assistants did not physically view the youth's responses to decrease the potential of demand. Prior to the comprehensive assessment, youth and their parents were provided with a written and verbal explanation of the procedures and were asked to sign informed assent/consent forms. All procedures were approved by the University's Institutional Review Board.

Data Analytic Plan

Structural equation modeling (SEM) was used to test the hypothesized relations captured in Figure 1 using AMOS 17.0 with maximum likelihood estimation. Evaluation of the overall fit of the model in Figure 1 used several model fit indices, the Root Mean Squared Error of Approximation (RMSEA), the standardized root mean squared residual (SRMR), and the Comparative Fit Index (CFI). The reporting of multiple indices of fit is recommended, and these indices are among the most frequently reported to indicate overall model fit (Kline, 2005). Hu and Bentler (1999) suggest CFI values close to 0.95 or greater; SRMR values close to 0.08 and RMSEA values close to 0.06 or lower to represent acceptable model fit.

SEM analyses were conducted in several stages. First, given the extensive empirical history of the concept of androgyny that implies interaction effects between masculinity and femininity, we conducted preliminary tests to determine if there was any support for such interactive mechanisms. We did not find any, so such interaction terms were excluded from the models and are not mentioned further. We then examined the estimated effects of pubertal development and gender role orientation on youth anxiety symptoms in the context of Figure 1.

Pubertal Development was represented using the composite score of the PDS. Gender Role Orientation was represented using the CSRI-Femininity scale score and CSRI-Masculinity scale score, separately. Both child and parent reports of Youth Anxiety Symptoms (each representing a distinct measure of youth anxiety) were represented in the model by using the respective child and parent RCMAS total scores. Youths' age, marital status, and family income were included in the model as covariates for all endogenous variables. Marital status was reflected by a dummy variable scored as 1 = married and 0 = not married. Family income was reflected by three dummy variables using dummy coding, with 'over $61,000' as the reference group.

We hypothesized that Gender Role Orientation mediated the effects of Pubertal Development on Youth Anxiety Symptoms and used the joint significance test of mediation as recommended by MacKinnon, Lockwood, Hoffman, West, and Sheets (2002). This method simultaneously tests whether the independent variable is related to the hypothesized mediators and whether the hypothesized mediators are related to the dependent variable. The joint significance test has been shown to have more statistical power than other tests of mediation while retaining adequate control over Type I error rates (MacKinnon et al., 2002).

Second, we examined whether biological sex would moderate the predictive effects of pubertal development and gender role orientation on youth anxiety symptoms, rated by youths and parents, respectively. A multi-group solution was pursued with girls and boys representing the two groups. A multi-group solution estimates the model in Figure 1 simultaneously for each group to determine if the model is applicable for boys as well as girls. The model is tested with no equality constraints across groups to establish a common model form for both boys and girls. After establishing a common model, the equivalence of path coefficients can be tested by constraining all structural relations in Figure 1 to be equal across the groups. The fit of the unconstrained model is then compared to the fit of the constrained model via a χ^2 difference test. A significant χ^2 difference would indicate the path coefficients in the model varied as a function of biological sex. The results of these analyses (elaborated in the Results) found no support for coefficient differences for boys and girls, so the pooled model presented initially in the Results is meaningful (i.e., not misspecified).

Prior to the SEM analyses, the data for the continuous variables were evaluated for multivariate outliers by examining leverage indices for each individual and defining an outlier as a leverage score four times greater than the sample mean leverage. No outliers were found. Model based outliers were evaluated using a limited information approach in which the endogenous variables were regressed onto its relevant predictors and then standardized dfbetas were examined for each individual. An outlier was defined as any individual with an absolute standardized dfbeta greater than 1 for a given coefficient. No outlier was present based on this analysis.

Multivariate normality was evaluated using Mardia's index. The multivariate test was statistically non-significant (p >0.05). Examination of univariate indices of skewness and kurtosis revealed no absolute skewness values greater than 0.49 and no absolute kurtosis

values greater than 0.58. There were small amounts of missing data, occurring sporadically and never exceeding more than 15% of the cases for any given variable. There was no coherent pattern to the missing data. For those individuals with missing data, values were imputed using the Expectation-Maximization approach using the computer program Amelia (Honaker, Joseph, King, Scheve, & Singh, 2003).

Results

Descriptive Statistics

Differences between girls and boys on all study variables were tested. Table 1 presents the means and *d* statistics on the study variables by biological sex. Statistically significant sex differences were found for the youth reported RCMAS total score, PDS composite score, and CSRI – Femininity scale score. Girls reported significantly more symptoms than boys on the RCMAS – total score, [*F* (1, 174) = 4.39, *p* < 0.05; *d* = 0.33], as well as significantly more feminine on the Femininity scale of the CSRI [*F* (1, 174) = 10.55, *p* < 0.05; *d* = 0.47]. No significant sex differences were found on the parent rated RCMAS total score or the CSRI-Masculinity scale score.

Compared to boys, girls also reported being significantly more advanced in their pubertal development on the PDS [*F* (1, 174) = 4.17, *p* < 0.05; *d* = 0.36]. An interaction effect was also found between biological sex and age group (0 = ages 9-10 and 1= ages 11-13) on the PDS. On average, girls ages 11-13 years reported being significantly more advanced in their pubertal development [*F* (1, 174) = 24.85, *p* < 0.05] than girls ages 9-10 years (mean difference = .465). No other age differences on study variables were found as a function of biological sex or race/ethnicity.

Does Pubertal Development and Gender Role Orientation Predict Youth Anxiety Symptoms?

A variant of the theoretical model in Figure 1 was tested, which differed from Figure 1 in the following ways: (1) youths' age in years, marital status (a dummy variable scored 1 = married and 0 = not married), and family income (three dummy variables with 'over $61,000' as the reference group) were included in the model as covariates for all endogenous variables, (2) youth age in years, marital status, and family income were correlated with Pubertal Development, (3) correlated errors for the outcomes were permitted, and (4) correlated errors for Masculinity and Femininity were also permitted, to reflect the fact that their association is not simply a function of the exogenous variable in the model. Table 2 presents correlations on the study variables for the total sample.

Overall fit of the model was good [X^2 (1) = 0.56, *p* = 0.45; CFI= 0.99; SRMR = 0.04; RMSEA = 0.01]. More focused tests of fit revealed no theoretically meaningful or sizable modification indices nor were any of the absolute standardized residuals larger than 1.96. As shown in Figure 2, the path coefficient for youths' reports of pubertal development (*B* = 0.20; *p* < 0.05) to youths' reports of femininity was statistically significant: youth who reported being more advanced in their pubertal development reported high levels of femininity. Youths' reports of pubertal development (*B* = 2.96; *p* < 0.05) were also related to youths' reports of youth anxiety symptoms. Youth who reported being more advanced in their pubertal development reported high levels of anxiety symptoms. Youths' reports of masculinity were related to youths' reports of youth anxiety symptoms (*B* = −3.38; *p* < 0.05) and parents' reports of youth anxiety symptoms (*B* = −2.83; *p* < 0.05). Youth who reported more masculinity had low levels of anxiety symptoms as reported by both youths and parents. Pubertal development, masculinity, and femininity explained 10% of the variance of youth anxiety symptoms reported by the youths and 6% of the variance of youth anxiety

symptoms reported by the parents. The total effect of pubertal development on youth anxiety symptoms reported by the youths was 2.69. There was no support for the hypothesis that pubertal development was directly associated with masculinity.

Does Biological Sex Moderate the Predictive Effects of Pubertal Development and Gender Role Orientation on Youth Anxiety Symptoms?

A SEM multi-group solution was pursued with girls and boys representing the two groups. The same variant of the model in Figure 1 noted earlier was first tested with no equality constraints across groups. Overall fit of the unconstrained model was acceptable [X^2 (2) = 2.20, $p = 0.33$; CFI= 0.99, SRMR = 0.04, RMSEA = 0.02]. More focused tests of fit revealed no theoretically meaningful or sizable modification indices, nor were any of the absolute standardized residuals larger than 1.96. The model in Figure 1 was then tested against a constrained model that introduced equality constraints as a function of biological sex. All regression paths were constrained to be equal across groups except for the paths from the covariates to the endogenous variables. The error variances and correlated paths between exogenous variables were not constrained to be equal across groups. Overall fit of the constrained model was acceptable [X^2 (10) = 12.53, $p = 0.20$; CFI= 0.98, SRMR = 0.05, RMSEA = 0.05]. More focused tests of fit revealed no theoretically meaningful or sizable modification indices, nor were any of the absolute standardized residuals larger than 1.96. A nested chi square test was performed to compare the unconstrained model to the constrained model (X^2 diff (8) = 10.33, $p > 0.05$). The chi square difference was statistically non significant. This result leads us to conclude that the effects of pubertal development, femininity, and masculinity on youth anxiety symptoms reported by both youths and parents are similar for girls and boys.

Supplemental Analyses

Because the majority of the study's sample were Hispanic/Latino (74%), additional analyses were performed with just the Hispanic/Latino youth ($n = 131$; 51% females). The same variant of the model in Figure 1 noted earlier was first tested for the total sample of Hispanic/Latino youth. Findings were similar to those obtained with the total sample (both Hispanic/Latino youth and non-Hispanic/Latino youth) with one exception: Masculinity was *not* significantly related to Hispanic/Latino anxiety symptoms reported by the youths and parents. We also used a multi-group solution with Hispanic/Latino girls and Hispanic/Latino boys representing the two groups to test whether biological sex would moderate the predictive effects of pubertal development and gender role orientation on Hispanic/Latino youth anxiety symptoms. Findings were also similar to those obtained with the total sample (both Hispanic/Latino youth and non-Hispanic/Latino youth).

In addition to evaluating our theoretical model with just the Hispanic/Latino youth, we also provide perspectives on statistical power for testing our theoretical model. This was conducted so that one can better appreciate the possibility of a Type II error for statistically non-significant contrasts and path coefficients observed in our analyses. Power analyses for SEM models are complicated and often rest on assumptions that are impractical or not viable. We followed the practice recommended by Jaccard and Wan (1996) that provides a rough sense of statistical power by applying power analytic methods for ordinary least squares regression as applied to selected linear equations from the set of linear equations implied by the SEM model. Given a sample size of 175 and a two tailed alpha level of 0.05, and using the values of the standardized residuals observed in our modeling as guidelines, the power to detect a path coefficient that represents 5% explained variance over and above a set of five additional covariates was 0.87, 0.89 and 0.95 for the cases where the initial set of covariates accounted for 10% of the variance, 20% of the variance, or 30% of the variance, respectively.

Discussion

The study's findings suggest that pubertal development and gender role orientation are important in explaining levels of youth anxiety symptoms among clinic referred anxious youth. Specifically, boys and girls who reported being more advanced in their pubertal development self-reported high levels of femininity and anxiety symptoms. On the other hand, boys and girls who reported high levels of masculinity presented with low levels of anxiety symptoms as reported by both youths and parents. Thus, our findings suggest that boys and girls referred to an anxiety specialty clinic may share both vulnerability (early pubertal development) and protective (high levels of masculinity) factors that contribute to explaining levels of youth anxiety symptoms. Although biological sex did not moderate the predictive effects of pubertal development and gender role orientation on youth anxiety symptoms, this study is among the first wave of empirical attempts to examine these variables in a multivariate model to better understand the sex disparity in youth anxiety symptoms.

Our findings partially support our expectations regarding associations between pubertal development and youth anxiety symptoms. Pubertal development was positively associated with youths' ratings of youth anxiety symptoms. Pubertal development accounted for unique variance in youth anxiety symptoms above and beyond its relation to masculinity and femininity. This finding is consistent with past research using community samples documenting a risk for internalizing problems such as anxiety in early maturing girls and boys (e.g., Ge, Conger, & Elder, 1996; 2001; Graber, Lewinsohn, Seeley, & Brooks-Gunn, 1997; Stattin & Magnusson, 1990; Stice, Presnell, & Bearman, 2001).

Contrary to our expectations, pubertal development did *not* predict masculinity in our sample. The notion that gender roles become more salient with the onset of puberty was not supported with respect to masculinity (Hill & Lynch, 1983). It is possible that masculine traits may have been less characteristic of this sample because these youth were referred to an anxiety disorders specialty clinic. Given masculine traits are related to independence, problem-focused coping, and less avoidance behavior, parents may be less likely to seek help for a child who adopts masculine traits (Compton, Nelson, & March, 2000). More research is needed before a firm conclusion can be reached regarding associations between puberty and masculinity.

Our findings also partially supported expectations regarding associations between masculinity, femininity, and youth anxiety symptoms. Masculinity was negatively associated with both youth and parent ratings of youth anxiety symptoms. Masculinity, therefore, appears to be an important factor in explaining levels of youth anxiety for both girls and boys. Girls and boys were similar in terms of masculinity and viewed themselves as possessing relatively equal amounts of instrumental traits. This finding is inconsistent with gender role theory (Block, 1983; Hill & Lynch, 1983) and Muris et al. (2005) who found in their community samples that boys scored higher than girls on measures of masculinity. It is possible that sample differences may in part account for these divergent findings relative to our findings. Further, study participants resided in different countries (Netherlands, United States), with different cultural backgrounds (our sample was 74% Hispanic/Latino youth; Muris et al. sample was 90% White youth).

Femininity did *not* account for unique variance in youth anxiety symptoms above and beyond masculinity and pubertal development. This finding is inconsistent with past research using community samples (Muris et al., 2005; Palapattu et al., 2006), but consistent with studies on childhood fear among clinic referred anxious youth (Ginsburg & Silverman, 2000). One explanation for this finding may be due in part to the specific measure of

femininity used in our study. Muris et al. (2005) found that behavioral measures of femininity, such as toy and activity preferences, were better predictors of anxiety and fear than attitudinal measures such as the CSRI. It is possible that the CSRI-femininity subscale lacked sensitivity to fully assess the feminine gender role orientation in this clinical population. Future research should include multiple measures (i.e., attitudinal and behavioral) of gender role orientation to advance understanding of the effects of femininity on high levels of youth anxiety symptoms among clinic referred anxious youth.

The predictive effects of pubertal development, femininity, and masculinity on youth and parent ratings of youth anxiety symptoms were *not* moderated by biological sex in our sample. This finding was also contrary to our expectations. In fact, pubertal development and gender role orientation appeared to be more important than biological sex in explaining levels of youth anxiety reported by both youths and parents. One implication of this finding relates to the socialization of gender roles. Socialization of feminine traits may result in a greater tendency for negative cognitions and avoidance of feared situations, contributing to an increased risk for anxiety and other internalizing symptoms (Lengua & Stormshak, 2000; Nolen-Hoeksema, 1994). In contrast, socialization of masculine traits may result in more problem-focused coping (rather than emotion-focused coping strategies associated with feminine traits) and thus, reduce avoidant behavior and high anxiety. If this is indeed the case, interventions designed to increase instrumental traits may be useful for both boys and girls in reducing avoidant behavior and excessive anxiety.

Although our findings with just the Hispanic/Latino youth were similar to those obtained with the total sample, future comparative studies are needed to examine the influence of race and ethnicity within the context of our conceptual model. Past research has demonstrated a higher prevalence and/or severity of anxiety in Hispanic/Latino than in European American youth (e.g., Achenbach & Rescorla 2001; Ginsburg & Silverman, 1996; Pina & Silverman, 2004; Varela, Vernberg, Sanchez-Sosa, Riveros, Mitchell, M., & Mashunkashey, 2004). As such, it is possible that factors associated with Hispanic/Latino ethnic group membership, such as different beliefs about the cause of their illness and different language to describe their symptoms (Carrillo & Guamaccia, 2008; Ruiz, 1985) may influence symptoms of anxiety among Hispanic/Latino youth. More research is needed to better understand cultural factors that influence anxiety symptoms among clinic referred youth.

The present study has a number of limitations that should be noted. First, the findings are not necessarily generalizable to other samples. Further research in this area would benefit by considering both sampling and measurement and draw inferences accordingly. Second, the present study was cross-sectional and casual conclusions are not possible. For example, it is unclear whether more advanced levels of pubertal development is causing increased anxiety symptoms in clinic referred youth or if advanced pubertal development is compounding the difficulties faced by clinic referred youth. Third, the study relied on youths' self-ratings of pubertal development. Although most studies in this area of research have used youth self-report data to assess pubertal development, findings from Dorn, Susman, & Ponirakis (2003) demonstrate that the effects of pubertal development on youth psychosocial adjustment vary depending upon who rates the youths' pubertal development (i.e., parent, youth, physician). Future studies should include an even broader source assessment approach than that used in this study.

Lastly, past research has found other factors such as modeling of anxious behavior, overprotective childrearing practices, and reinforcement of avoidant behavior are risk factors for the development and maintenance of anxiety (Dadds & Roth, 2001). Thus, other factors not assessed in this study could have accounted in part for the study findings. Similarly, future research might consider assessing hormonal changes at puberty (rather than the

psychosocial effects of puberty) and sex variations in youth anxiety symptoms. There is some evidence that the emergence of internalizing symptoms is associated with the rise of gonadal hormones in girls and that this association may be independent of the psychosocial effects of puberty (sees Sanborn & Hayward, 2003, for a review).

Implications for Research, Policy, and Practice

This study is among the first wave of empirical attempts to examine these variables in a multivariate model to better understand the sex disparity in youth anxiety symptoms. Overall, our study findings may help identify novel high risk subgroups for targeted prevention and intervention programs. For example, greater attention might be placed on anxiety prevention and intervention programs during late childhood when the physical and hormonal changes associated with puberty began. Programs designed to increase instrumental traits may also be useful for both boys and girls in reducing avoidant behavior and excessive anxiety. Because this area of investigation is in its infancy, further validation of our study findings is needed.

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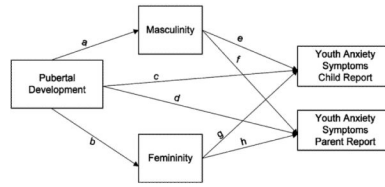
Figure 1.
Theoretical model
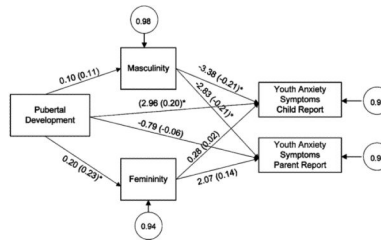
Figure 2.
Path coefficients of the effects of pubertal development and gender role orientation on youth anxiety symptoms for the total sample.

Note: Standardized path coefficients are in parentheses; youth age, marital status, and family income are included as covariates for all endogenous variables although not shown. Youth age, marital status, and family income are correlated with Pubertal Development although curved arrows are not shown. Error variances for Femininity and Masculinity are correlated although curved arrows are not shown. Error variances for child and parent reports of Youth Anxiety Symptoms are correlated although curved arrows are not shown *p < 0.05.

Table 1

Means and effect sizes between girls and boys on study variables

Variables	Girls (*n* = 84) M (SD)	Boys (*n* = 91) M (SD)	d
RCMAS-youth report	13.64(6.95)	11.71(5.90)	.33[*]
RCMAS-parent report	12.77(5.64)	12.43(5.79)	.12
PDS	2.11(0.46)	1.97(0.48)	.36[*]
CSRI-Femininity	3.05(0.37)	2.87(0.40)	.47[*]
CSRI-Masculinity	2.56(0.42)	2.63(0.42)	.19

Note: *RCMAS = Revised Child Manifest Anxiety Scale; PDS = Pubertal Development Scale; CSRI = Children's Sex Role Inventory;*

[*]
$p < 0.05$

Table 2

Intercorrelations for study variables for the total sample

Variable	1	2	3	4	5
1. RCMAS-youth report	--	.08	.11	−.04	−.20**
2. RCMAS-parent report		--	−.06	.01	−.13*
3. PDS			--	.23**	.11
4. CSRI-Femininity				--	.57**
5. CSRI-Masculinity					--

Note: RCMAS = Revised Child Manifest Anxiety Scale; PDS = Pubertal Development Scale; CSRI = Children's Sex Role Inventory;

**
p < 0.01;

*
p < 0.05