Puberty and Gender Interact to Predict Social Anxiety Symptoms in Early Adolescence

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Abstract

This study examines direct and interactive effects of puberty and gender on social anxiety symptoms in early adolescence. One hundred-six participants were assessed at ages 9.5 and 11. Results suggest that gender and puberty interact to predict social anxiety symptoms. Advanced puberty was associated with increased symptoms for girls only.

Keywords

Puberty; Anxiety; Women's Health; Adolescent Development

The highest risk period for onset of social anxiety symptoms occurs during adolescence [1,2]. Social anxiety, in turn, predicts underachievement in school, fewer social networks and close friends, and poorer social skills [3]. As with depression, social anxiety is more common in adolescent girls than boys [4]. While rates of depression increase in girls relative to boys during puberty, no published studies have addressed whether puberty is also a time when gender differences in social anxiety symptoms emerge. The current study tested whether pubertal status and gender are associated with social anxiety symptoms among early adolescents. Puberty and gender were expected to interact to predict social anxiety symptoms, with advanced pubertal status leading to heightened symptoms of social anxiety for girls but not for boys.

Method

Participants

Institutional Review Board approval was obtained from the university. Participants constitute a cohort followed for 11 years from birth. The original cohort consisted of 260 infants enrolled in a study of risk factors for obesity [5]. Parents were recruited from well newborn nurseries. Eligible infants were born full term, had Apgar scores of 7 or above, and had no congenital abnormalities or illness during newborn hospitalization. At recruitment, 46% were girls. The

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majority (88%) was non-Hispanic White, with 9% Asian and 3% Hispanic. Ninety-nine percent of fathers and 75% of mothers were employed; 80% of parents had a college degree. Of the 146 children who participated at age 11, 106 (52% girls) had pubertal data at ages 9.5 and 11. These 106 youth comprise the present sample. Of note, the larger study officially ended at age 6 accounting for the reduced sample size; however, over half of the participants opted to continue. The only group difference between those who left and those who remained is mothers who remained in the study exhibited higher educational attainment.

Measures

Pubertal status was measured at ages 9.5 and 11 by self-reported Tanner staging using line drawings of the five pubertal stages, which compares favorably with pediatric examination [6]. Breast and pubic hair development were averaged for girls and genitalia and pubic hair for boys. Social anxiety was assessed at age 11 using the Social Anxiety subscale from the Multidimensional Anxiety Scale for Children (MASC), which evidences good reliability and validity [7]. The coefficient alpha in the current sample was .86. Remaining subscales from the MASC, Physical Symptoms, Harm Avoidance, and Separation/Panic, were used in secondary analyses. Given the potential social implications of advanced pubertal development for young girls, we expected that a gender by puberty interactive effect would be limited to the Social Anxiety subscale.

Results

Preliminary analyses

Participants were dichotomized as nonpubertal (Tanner stage I) and pubertal (Tanner stage II or greater). At age 9.5, 40% of boys and 44% of girls were nonpubertal. By age 11, 21% of boys and 15% of girls were nonpubertal. To capture change, participants were categorized into 3 groups based on pubertal status at both assessments. Group 1 included children who were nonpubertal at ages 9.5 and 11. Ten participants (1 girl, 9 boys) reported being pubertal at 9.5 and nonpubertal at 11. These participants were classified as nonpubertal at both time points, assuming that youth report more accurately at older ages. Group 2 included those who transitioned from nonpubertal at age 9.5 to pubertal at age 11, and Group 3 those classified as pubertal at both ages. Table 1 shows sample size and mean social anxiety scores by group. Sample means and standard deviations were comparable to normative data reported in the MASC manual for boys and girls in this age group.

Primary analyses

Two-way analysis of variance (ANOVA) was conducted. Pubertal status, gender and their interaction were entered as independent variables to predict social anxiety scores at age 11. There were no main effects for pubertal status [$F(2,100) = 1.0$, *ns*] or gender [$F(1,100) = 0.1$, *ns*]. There was, however, a significant interaction between gender and pubertal status [$F(2,100) = 4.4$, $p < .05$]. To probe this interaction, analyses were stratified by gender with pubertal status as the independent variable and social anxiety at age 11 as the dependent variable (Figure 1). As predicted, for girls, pubertal status was significantly related to social anxiety symptoms [$F(2,52) = 3.9$, $p < .05$] with more developed girls exhibiting greater symptoms. For boys, the relationship between pubertal status and social anxiety symptoms was not significant [$F(2,48) = 0.8$, *ns*].

Secondary Analyses

Secondary analyses were conducted using the Harm Avoidance, Physical Symptoms, and Separation/Panic subscales to determine whether findings were unique to social anxiety. Results were not significant.

Discussion

Findings suggest that the emergence of social anxiety symptoms in early adolescence may depend on gender and pubertal status. Only in girls was advanced pubertal development associated with higher levels of social anxiety. These results are consistent with those in the area of gender differences in depression [8]. To date, it is unknown why internalizing symptoms increase in girls relative to boys at puberty. Evidence suggests that hormones may play a critical role [9]. Future studies examining relations between morphological changes, hormones, and social anxiety are warranted.

In the psychosocial realm, puberty may be a vulnerable time for the development of social anxiety symptoms given gender-specific stressors girls face, including body dissatisfaction, restricted gender roles, and unwanted sexual attention [10]. Girls with advanced physical development may elicit negative responses from others associated with weight gain, emerging sexuality, and body image. Future studies should examine biological and psychosocial mechanisms related to puberty and social anxiety. At minimum, pubertal stage should be assessed in future studies of social anxiety given that gender differences may only be detectable when pubertal status is considered.

The current sample was predominantly European American and educated, therefore caution should be used when generalizing these findings to a broader population of adolescents. Small sample size may have prevented detecting main effects for pubertal status and gender but provided a statistically conservative test of the interaction. The current study is limited in that it does not address the issue of clinically significant social anxiety. Future studies would benefit from including clinical cut-points or assessing diagnostic criteria for Social Anxiety Disorder. Finally, although this study was prospective, it is difficult to determine the direction of effects. The possibility remains that elevated prepubertal anxiety symptoms contributed to advanced pubertal development.

Acknowledgments

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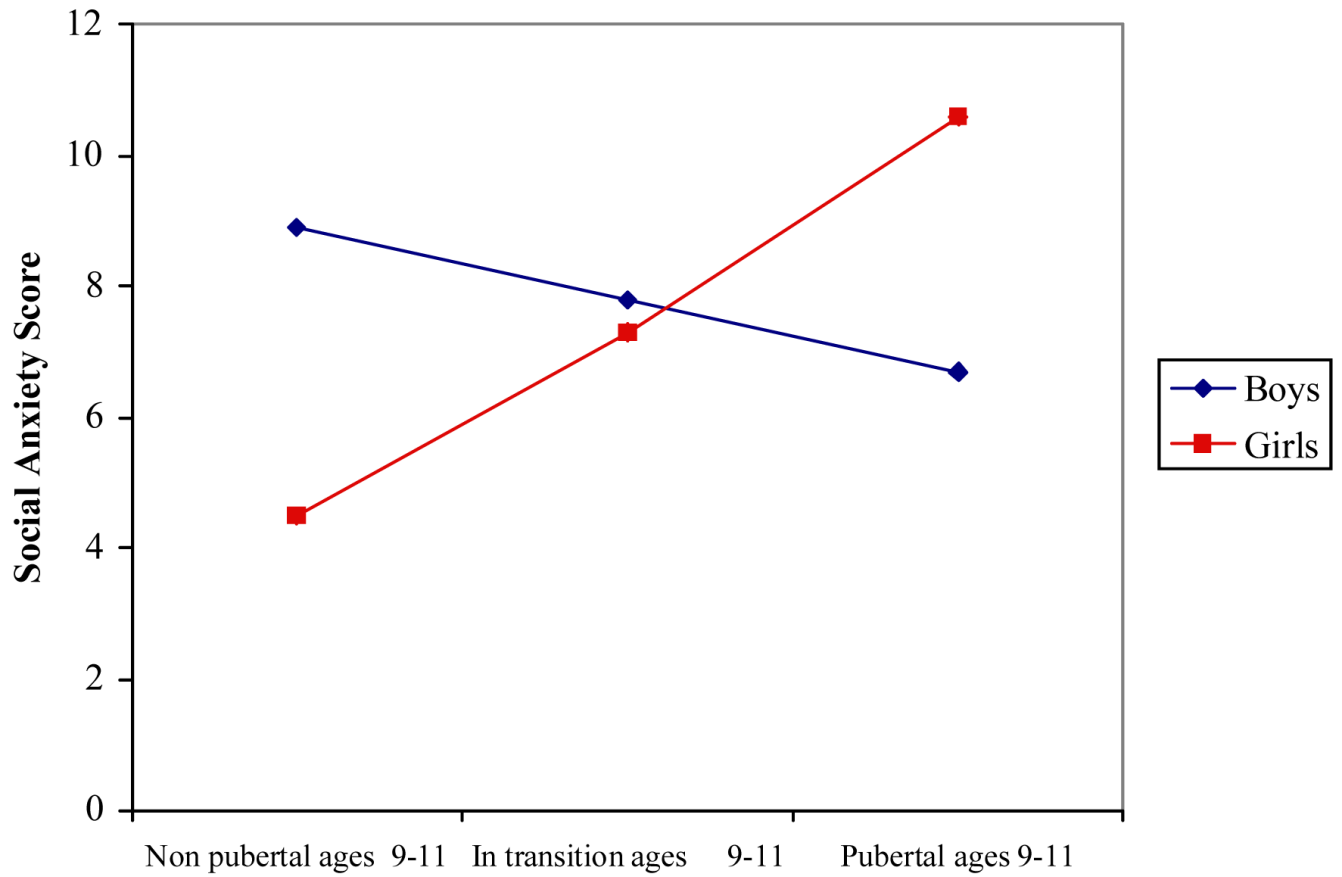
Figure 1.
Interaction between pubertal status and gender in predicting social anxiety symptoms on the Multidimensional Anxiety Scale for Children (MASC) at age 11.

Table 1

Mean Scores and Standard Deviations on the Social Anxiety Subscale of the Multidimensional Anxiety Scale for Children (MASC) at Age 11 by Pubertal Status and Gender

	Boys ($n = 51$)	Girls ($n = 55$)
Non pubertal at 9 and 11 ($n = 19$)	8.9(4.7) ($n = 11$)	4.5(4.9) ($n = 8$)
In transition at 9 and 11 ($n = 25$)	7.8(5.1) ($n = 10$)	7.3(5.1) ($n = 15$)
Pubertal at 9 and 11 ($n = 62$)	6.7(5.2) ($n = 30$)	10.6(6.6) ($n = 32$)

Gender $F(1,100) = .1$, *ns*

Puberty $F(2,100) = 1.0$, *ns*

Gender by Puberty Interaction $F(2,100) = 4.4$, $p < .05$