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Pubertal timing and vulnerabilities to depression in early adolescence: Differential pathways to depressive symptoms by sex[☆]



Jessica L. Hamilton^{a,*}, Elissa J. Hamlat^a, Jonathan P. Stange^a, Lyn Y. Abramson^b,
Lauren B. Alloy^a

^a Temple University, USA

^b University of Wisconsin, Madison, USA

A B S T R A C T

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Although research implicates pubertal processes in the emergence of the sex difference in depression during adolescence, few studies have examined how cognitive and affective vulnerabilities influence the effect of pubertal timing on depressive symptoms. The current study prospectively examined whether early pubertal timing predicted increases in depressive symptoms among adolescents with more negative cognitive styles and lower emotional clarity, and whether this risk was specific to adolescent girls. In a diverse sample of 318 adolescents, early pubertal timing predicted increases in depressive symptoms among adolescent boys and girls with more negative cognitive styles and adolescent girls with poor emotional clarity. These findings suggest that earlier pubertal maturation may heighten the risk of depression for adolescents with pre-existing vulnerabilities to depression, and that early maturing adolescent girls with lower levels of emotional clarity may be particularly vulnerable to depressive symptoms, representing one pathway through which the sex difference in depression may emerge.

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Adolescence is a critical developmental period during which depressive symptoms dramatically increase (Ge, Lorenz, Conger, Elder, & Simons, 1994). Beginning around age 13, the sex difference in depressive symptoms emerges, with girls becoming more than twice as likely as boys to experience depressive symptoms by mid-adolescence (Hankin, 2008; Hankin et al., 1998). Even at the subclinical level, depressive symptoms are associated with both impaired functioning (Gotlib, Lewinsohn, & Seeley, 1995) and the onset of depressive disorders during later adolescence and adulthood (van Lang, Ferdinand, & Verhulst, 2007). Given the timing of girls' substantial increase in depressive symptoms, pubertal processes have been implicated. Considered to be the most salient developmental event during early adolescence, the pubertal transition is associated with a myriad of biological, physical, emotional, and social changes that have been linked to the rise of depressive symptoms (for a review, see Hayward, 2003).

Given the sex-specific nature of the pubertal trajectory, research has identified a number of direct and indirect pathways through which pubertal processes may heighten girls' risk of depressive symptoms during early adolescence (Hyde, Mezulis,

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* Corresponding author. Department of Psychology, Temple University, Weiss Hall, 1701 North 13th Street, Philadelphia, PA 19122, USA.
E-mail addresses: jessica.leigh.hamilton@temple.edu, jess.swat@gmail.com (J.L. Hamilton).

& Abramson, 2008). Biologically, the rise in pubertal hormones (i.e. adrenal androgens, estrogen, testosterone) has been found to directly contribute to depressive symptoms among adolescent girls (Angold & Costello, 2006; Angold, Costello, & Worthman, 1998). Further, the physical changes associated with puberty, namely increased body mass index, have been found to have psychological consequences (i.e., greater body dissatisfaction), which, in turn, may lead to depressive symptoms in girls (Compian, Gowen, & Hayward, 2009; Rosenblum & Lewis, 1999). Beyond the hormonal and physical changes, the context in which puberty occurs also has significant social and emotional implications for adolescents. Specifically, considerable research has found that girls who undergo puberty earlier than their same-sex, same-age peers are at greater risk for depressive symptoms and disorders than their later developing peers (Conley & Rudolph, 2009; Ge, Conger, & Elder, 2001; Lewellyn, Rudolph, & Roisman, 2012; for a review, see Mendle, Turkheimer, & Emery, 2007). Findings on the effects of puberty for boys is somewhat less consistent, with many studies showing that earlier pubertal timing contributes to increases in depression symptoms (Ge et al., 2001; Ge et al., 2003; Mendle, Harden, Brookes-Gunn, & Graber, 2010) and others suggesting that early maturation has little to no effect on boys (Conley & Rudolph, 2009; Mendle, Harden, Brookes-Gunn, & Graber, 2012).

Advanced pubertal status relative to one's peers may confer a number of social and emotional risks, particularly during early adolescence (Ge et al., 2001). For instance, early maturing girls exhibit more noticeable physical changes characteristic of puberty (e.g., breast development) earlier than their peers, which may place them at greater risk for peer sexual, relational, or reputational victimization (Compian et al., 2009; Nadeem & Graham, 2005; Petersen & Hyde, 2009). Additionally, societal perceptions and expectations of more pubertally advanced girls may be incongruent with their cognitive and emotional resources (Ge & Natasuki, 2009; Susman & Dorn, 2009). Thus, beyond the stressful biological and social changes inherent in pubertal development, early pubertal timing may also create a socially and emotionally challenging environment for adolescent girls (Ge & Natasuki, 2009), which may increase the risk of depressive symptoms. Further, in addition to early pubertal timing, pubertal development in general is strongly linked to emotional processes (Dahl, 2004; Nelson, Leibenluft, McClure, & Pine, 2005), with research suggesting that adolescent girls experience increased emotional intensity and reactivity during puberty (DeRose & Brooks-Gunn, 2008; Silk et al., 2009). In this sense, the biological components of pubertal development could exacerbate the negative experiences of girls with early pubertal timing. Thus, adolescent girls who are more pubertally advanced may experience greater extreme variations in mood and more negative emotions than their less advanced peers, which may contribute to greater peer stress and depressive symptoms.

However, despite the risks associated with early pubertal timing, many adolescents undergo the pubertal transition with few difficulties (Graber, 2003). Thus, recent research has sought to identify personal characteristics that increase the risk of depressive symptoms during this developmental period, particularly for girls. According to the accentuation hypothesis (Caspi & Moffitt, 1991; for a review, see Ge & Natasuki, 2009), early pubertal maturation represents a novel and ambiguous period during which individual differences in personal vulnerabilities are expressed and amplified. Specifically, this model proposes that adolescents without pre-existing vulnerabilities should be able to cope effectively with the stressful nature of pubertal development, even when it is early relative to peers, whereas individuals with underlying vulnerabilities will have difficulty managing this environment, thereby exacerbating the negative effects of early puberty and the likelihood of emotional and behavioral difficulties. Although numerous studies have empirically tested this hypothesis (Caspi & Moffitt, 1991; Ge, Conger, & Elder, 1996; Ge et al., 2001; Sontag, Graber, Brooks-Gunn, & Warren, 2008), fewer studies have evaluated this theory in relation to personal vulnerabilities to depression. For example, a recent study by Rudolph and Troop-Gordon (2010) examined the interactive effects of early pubertal timing and personal risk factors on depressive symptoms, finding that early maturing girls with negative self-focus and maladaptive coping skills experienced greater increases in depressive symptoms than early maturing girls without these characteristics.

Surprisingly, given the abundance of research investigating the adverse effects of contextual factors on the pubertal transition (for a review, see Ge & Natasuki, 2009), few studies have examined factors that may confer vulnerability to, or resilience against, the impact of early pubertal timing on depression during adolescence. Although adolescence is generally considered to be a period of increasing cognitive and emotional abilities (Steinberg, 2005), it is also a time during which cognitive and affective vulnerabilities to depression first emerge. In particular, cognitive styles have received considerable empirical support as vulnerabilities to depressive symptoms and disorders during adolescence (for a review, see Abela & Hankin, 2008). Specifically, negative cognitive styles, characterized by the tendency to attribute negative events to stable and global causes and to infer negative consequences and negative self-characteristics following the occurrence of stress (Abramson, Metalsky, & Alloy, 1989), are theorized to emerge during the transition from middle childhood to early adolescence when individuals develop the cognitive capacity for formal operational thought and abstract thinking (Cole et al., 2008; Gibb & Alloy, 2006a, 2006b). Indeed, numerous studies have found that adolescents with negative cognitive styles are vulnerable to experiencing increases in depressive symptoms following high levels of stress (e.g., for reviews, see Abela & Hankin, 2008; Lakdawalla, Hankin, & Mermelstein, 2007; Lee, Hankin, & Mermelstein, 2010; Stange, Alloy, Flynn, & Abramson, 2013). Thus, adolescents with negative cognitive styles may be more likely to react negatively to the changes and stress associated with earlier puberty, thereby increasing their risk for depressive symptoms. Additionally, given that earlier puberty is generally associated with more adverse effects for girls (i.e., greater exposure to peer stress and lower body esteem), adolescent girls with an underlying cognitive vulnerability to depression may be particularly vulnerable to depressive symptoms during this time. However, no known research has examined how negative cognitive style may heighten the risk of depressive symptoms during an early pubertal transition.

In addition to cognitive vulnerability, research also has suggested that deficits in emotional clarity, defined as the ability to identify, understand, and distinguish one's own emotions and emotional experiences, is an important risk factor for

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