



Published in final edited form as:

J Child Fam Stud. 2016 May ; 25(5): 1375–1384. doi:10.1007/s10826-015-0318-0.

Interactive Effects of Psychosocial Stress and Early Pubertal Timing on Youth Depression and Anxiety: Contextual Amplification in Family and Peer Environments

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Abstract

While off-time pubertal development has emerged as a potential risk factor for both symptoms of depression and anxiety in youth, the literature is mixed and inconsistent as to (1) how early versus late pubertal timing confers risk for both boys and girls, (2) if the conferred risk is distinct between symptoms of anxiety and depression, and (3) under what social contexts (e.g., family environment, peer relationships) off-time pubertal development may emerge as a potent risk factor for these symptoms. The present study examined the impact of perceived pubertal timing on symptoms of anxiety and depression in two distinct psychosocial contexts: parent's perceptions of their own harsh parenting and parent's perceptions of their child's peer problems. The sample consisted of 412 parents ($M = 38.6$ years old, $SD = 7.8$, 60.4% mothers) of children between the ages of eight and seventeen ($M = 12.13$, $SD = 2.97$, 45.4% girls). All constructs were assessed by parent reports. Linear multiple regression analyses revealed that the interaction between earlier pubertal timing and greater peer problems was significantly related to higher youth depressive and anxiety symptoms. The interaction between earlier pubertal timing and greater harsh discipline was significantly related to higher youth anxiety but not depressive symptoms. Youth gender did not qualify findings. Results suggest that the contextual amplification process of early pubertal timing may occur in both high stress family and peer environments and impact both girls and boys.

Keywords

pubertal timing; youth anxiety; youth depression; peer problems; harsh parenting

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Introduction

Pubertal development is a period of change marked by “rapid and dramatic transformation across virtually all domains of life” (Mendle, 2014, p. 218). In particular, the relation between the *timing* of puberty and youth mental health problems has long been a topic of scholarly interest (e.g., Belsky, Steinberg, & Draper, 1991) as off-time pubertal development (i.e., experiencing the physical changes associated with puberty earlier or later than one’s same-sex peers) has been associated with symptoms of depression and anxiety across adolescence (e.g., Ge, Conger, & Elder, 2001; Ge, Brody, Conger, & Simons, 2006; Graber, Nichols, & Brooks-Gunn, 2010; Graber, Seeley, Brooks-Gunn, & Lewinsohn, 2004; Mendle, 2014). As these symptoms in youth continue to be a major public health problem (e.g., Kessler et al., 2012; Merikangas et al., 2010), identifying contextual variables that may potentially exacerbate symptoms of depression and anxiety when off-timing pubertal development occurs is of substantial importance (e.g., Skoog & Stattin, 2014).

To date, the most consistent findings in the relation between off-time pubertal development and youth mental health problems are for girls (e.g., Deardorff et al., 2011; Ellis, 2004; Weingarden & Renshaw, 2012). Early pubertal timing in girls is associated with symptoms of depression (e.g., Angold, Costello, & Worthman, 1998; Ge et al., 2003; Mendle et al., 2007; Wasserman, Holmbeck, Lennon, & Amaro, 2012), anxiety (e.g., Reardon et al., 2009), and subclinical internalizing problems (e.g., Mendle et al., 2007, Conley & Rudolph, 2009, Smith & Powers, 2009). For boys, although initial work suggested that early pubertal onset was potentially advantageous (Jones & Mussen, 1958; Mussen & Jones, 1957), more recent research indicates that, similar to girls, early pubertal maturation is associated with elevated anxiety and depressive symptoms (Susman & Dorn, 2009; also see Mendle, 2014). However, these findings for boys have been much less consistent than for girls (e.g., Ge et al., 2003; Marceau, Ram, Houts, Grimm, & Susman, 2011; Rudolph, Troop-Gordon, Lambert, & Natsuaki, 2014).

Findings are also inconsistent for girls exhibiting late pubertal development, as research has found that these girls present with both fewer (e.g., Rudolph et al., 2014) and more (e.g., Graber, Lewinsohn, Seeley, & Brooks-Gunn, 1997) symptoms of depression and anxiety than on-time developing girls (Negriff & Susman, 2011). For boys, theoretical models suggest that later maturation may be associated with more internalizing problems than on-time boys but few studies have demonstrated this relation (Negriff & Susman, 2011; Mendle, 2014; for an exception, see Conley & Rudolph, 2009).

Although evidence suggests that early off-time pubertal timing, especially for girls, is a risk factor for symptoms of depression and anxiety, this picture is incomplete as it fails to account for whom and under what conditions the association exists (e.g., Negriff, Fung, & Trickett, 2008). For example, a recent meta-analysis noted that early pubertal timing in girls alone is not a strong predictor of depression, but rather a risk factor that may be more or less potent for some youth (Galvao et al., 2013). This research dovetails with the growing evidence that the relation between off-time pubertal development (especially earlier development) and symptoms of depression and/or anxiety is largely dependent on social context (e.g., family environment, social relationships with peers) (e.g., Ge et al., 2001;

Hamlet, Stange, Abramson, & Alloy, 2013). From a diathesis-stress perspective (e.g., Ellis, Boyce, Belsky, Bakermans-Kranenburg, & van Ijzendoorn, 2011), early maturation may be considered a vulnerability that interacts with stress encountered in various social contexts to predict increases in depression and/or anxiety during adolescent development (Ge et al., 2001). Ge and Natsuaki (2009) have referred to the effects of these social stressors in adolescent development as the contextual amplification of pubertal timing. This construct forms the foundation of the current research and informs the exploration of two important social contexts for youth: peer relations and family relations. Building on the work of Ge et al. (2001) and Rudolph and Troop-Gordon (2010) demonstrating that general stressful life events or family stress (e.g., arguments between parents) combined with early pubertal onset exacerbated depressive symptoms, we consider the role of two specific stressors: peer problems and harsh parenting.

Peer relationship social stress is related to symptoms of depression and anxiety in youth (Deater-Deckard, 2001; Rudolph, 2002); however, the interaction of peer problems (e.g., stressful peer relations, low peer popularity) and off-time puberty has received limited attention and, among studies conducted, has produced mixed findings. When depressive symptoms serve as the outcome, the combination of early pubertal timing and peer problems was associated with higher levels of these symptoms among girls whereas later pubertal timing and peer problems were associated with more depressive symptoms among boys (Conley & Rudolph, 2009). In contrast, both Nadeem and Graham (2005) and Teunissen et al. (2011) found that early pubertal timing and peer problems were associated with more depressive symptoms in girls *and* boys. When anxiety symptoms serve as the outcome, the combination of early puberty and peer problems has been associated with more social anxiety for a combined sample of girls and boys (Blumenthal, Leen-Feldner, Trainor, Babson, & Bunaciu, 2009). Finally, when a measure that combined anxiety and depressive symptoms was utilized, pubertal timing and peer problems did not interact to predict symptoms for either boys or girls (Sontag, Graber, & Clemans, 2011). The discrepancies in findings across the limited number of studies conducted are far more apparent than the commonalities. The current study aimed to clarify this literature by assessing *both* depression and anxiety symptoms with a sample of girls and boys.

Although harsh parenting has been associated with youth internalizing problems (see McKee, Jones, Forehand, & Cuellar, 2013) and with earlier pubertal onset (e.g., Belsky et al., 2007), the interaction between harsh parenting and pubertal timing on the prediction of anxiety symptoms has been ignored, as depressive symptoms or internalizing symptoms more broadly have been more commonly examined. Deardorff et al. (2013) failed to find that harsh parenting amplified depressive symptoms when off-timing puberty occurred in Hispanic girls. Similarly, Negriff and colleagues (2008) failed to find that maltreatment (i.e., neglect, physical abuse, sexual abuse), which includes but is not limited to harsh parenting, interacted with pubertal timing to influence depressive symptoms. In contrast to these two studies, Benoit, LaCourse, and Claes (2013) found that parental rejection and early pubertal onset were associated with higher levels of depressive symptoms for girls and boys. When internalizing symptoms have served as the outcome, Arim and Shapka (2008) found that higher levels of a father's psychological control (e.g., love withdrawal, invalidating feelings) and early pubertal timing was associated with more internalizing symptoms for girls, but

fewer of such problems for boys when compared to youth with fathers who exhibited lower levels of psychological control.

The absence of anxiety as an outcome in any studies of early pubertal timing and harsh parenting, and, as with peer problems, the discrepancies in depressive symptom outcomes across studies stand out more than the similarities of findings (e.g., Benoit et al., 2013; Dearnorff et al., 2013). Furthermore, only one study has examined internalizing problems and, with this outcome, similarities and differences in depression and anxiety symptoms cannot be ascertained (Arim & Shapka, 2008).

Taken together, the current study sought to investigate the contextual amplification of off-time pubertal development by examining two common stressors for youth during adolescence – peer problems and harsh parenting – and two types of internalizing symptoms – anxiety and depression. We hypothesized that the combination of early pubertal timing with either harsh parenting or peer problems would be associated with higher levels of depressive and anxiety symptoms, especially for girls. We examined both depressive and anxiety symptoms as these two outcomes have received differential attention (i.e., depressive symptoms have received more attention), have yielded inconsistent findings *across* studies (e.g., Blumenthal, Leen-Feldner, Trainor, Babson, & Bunaciu, 2009; Conley & Rudolph, 2009), and have generated different findings when examined in the same study (e.g., Hamlat, Stange, Abramson, & Alloy, 2013). Furthermore, it has been recommended that viewing depression and anxiety symptoms as separate but related constructs is ideal for both research and practice on emotional health problems in youth (Lavigne, Hopkins, Gouze, & Bryant, 2014; Snyder et al., 2009). We examine peer problems and harsh parenting as stressors as both could amplify early puberty timing; however, as there are no studies that have included both of these types of stressors, we do not offer differential predictions. Finally, we examine late pubertal onset, but because of limited literature on these youth, we do not offer a specific hypothesis.

Method

Participants

Parents were recruited online through Amazon's Mechanical Turk (MTurk) as part of a larger study on the assessment of parenting ($N = 615$). MTurk is currently the dominant crowdsourcing application in the social sciences (Chandler, Mueller, & Paolacci, 2013) and prior research has convincingly demonstrated that data obtained via crowdsourcing methods are as reliable as those obtained via more traditional data collection methods (e.g., Buhrmester, Kwang, & Gosling, 2011; Casler, Bickel, & Hackett, 2013; Paolacci & Chandler, 2014; Shapiro, Chandler, & Mueller, 2013). For the current study, 412 parents of children between the ages of eight and seventeen ($M = 12.13$, $SD = 2.97$, 45.4% girls) were included in analyses and children younger than eight from the full sample were excluded. Parents were on average 38.6 years old ($SD = 7.8$) with 60.4% being mothers. Participants were predominately White (78%) with an additional 10.7% who identified as Black, 6.4% as Latino, 3.8% as Asian, and 1.1% as American Indian, Alaska Native, or other Pacific Islander. Parents' education level ranged from obtaining a H.S. degree or GED (12.4%), attending some college (30.3%), earning a college degree (40.3%), to attending at least some

graduate school (17%). Reported family income ranged from under \$5,000 a year to over \$100,000 a year with 22.3% making less than \$30,000 per year, 15.8% making between \$30,000 and \$40,000, 11.9% making between \$40,000 and \$50,000, 11.9% making between \$50,000 and \$60,000, 26.4% making between \$60,000 and \$100,000, and 13.8% making at least \$100,000. Parent marital status was organized into three categories with 17.1% reporting being single (not living with a romantic partner), 67.2% being married, and 15.6% being in a cohabiting relationship (living with a romantic partner but not married).

Procedure

All study procedures were approved by the Institutional Review Board at the University of Vermont. All parents were consented online before beginning the survey in accordance with the approved IRB procedures. Parents were compensated \$4.00 for participation. For families with multiple children in the target age range, one child was randomly selected through a computer algorithm while parents were taking the survey and measures were asked in reference to parenting specific to this child. Participants were recruited from MTurk under the restriction that they were U.S. residents and had at least a 95% task approval rate for their previous HITs (see Paolacci & Chandler, 2014 for more detail on MTurk). Ten attention check items were placed throughout the online survey. These questions asked participants to enter a specific response such as “Please select the Almost Never response option” that changed throughout the survey appearing in random order within other survey items. Participants ($N = 2$) were not included in the study (i.e., their data removed from the dataset) if they had more than one incorrect response to these ten check items to ensure that responses were not random or automated.

Measures

Demographic information—Parents responded to demographic questions about themselves (e.g., parental age, education), their families (e.g., household income), and the target child’s demographic information (e.g., gender, age).

Pubertal timing—Pubertal timing was assessed by parent report of their child’s pubertal timing relative to those of their same-sex peers. The specific item read: “Compared to your child’s same-sex peers (age-mate peers), when would you say your child began to experience changes due to puberty, including changes in physical development?” This question was measured from 1 (“much earlier than most of his/her peers”) to 5 (“much later than most of his/her peers”). This item is adapted from the pubertal timing item on the Pubertal Development Scale (PDS), the most widely used and researched measure of self and parent reported pubertal development (e.g., Dorn, Dahl, & Woodward, 2006; Dorn, 2006; Petersen, Crockett, Richards, & Boxer, 1988). This assessment of pubertal timing was transformed into three categories ($-1 =$ early, $0 =$ on-time, $+1 =$ late) but examined as a continuous measure ranging from early to late timing. Of the current sample, 18.8% of youth experienced pubertal timing that was a little or much earlier than most of their peers (ratings of 1 or 2), 68.9% of youth experienced pubertal timing at about the same time as their peers (rating of 3), and the remaining 12.2% of youth experienced pubertal timing that was a little or much later than their peers (ratings of 4 or 5). The mean age of youth were quite similar across early ($M = 12.18$, $S.D. = 2.9$), on-time ($M = 12.11$, $S.D. = 3$), and late ($M = 12.2$,

S.D. = 2.9) pubertal timing groups. This distribution is generally consistent with previous work that has assigned categories of early/on time/late pubertal timing to samples (Brooks-Gunn & Warren, 1989; Ge, Conger, & Elder, 2001; Smith & Powers, 2009).

Peer problems—The peer problem subscale of the Strengths and Difficulties Questionnaire (SDQ, Goodman, 1997) was used in the current study. Responses to each of the five peer problem items (e.g., playing alone; being bullied and generally not liked by other children) were assessed on a 3-point Likert scale (not true, somewhat true, or certainly true). The psychometric properties are well established (Bjornsdotter, Enebrink, & Ghaderi, 2013; Bourdon, Goodman, Rae, Simpson, & Koretz, 2005; Goodman, 2001). In the current study, the reliability of the peer problems subscale was adequate ($\alpha = .74$).

Harsh discipline—The harsh discipline subscale of the Multidimensional Assessment of Parenting Scale (MAPS; Parent & Forehand, 2014) was used for the current study. MAPS items were selected and adapted from a number of well-established parenting scales: The Alabama Parenting Questionnaire (APQ; Frick, 1991), the Parenting Practices Questionnaire (PPQ; Block, 1965; Robinson, Mandelco, Olsen, & Hart, 1995), the Parenting Scale (PS; Arnold, O’Leary, Wolff, & Acker, 1993), the Management of Children’s Behavior Inventory (MCBS; Perepletchikova & Kazdin, 2004), the parent report version of the Children’s Report of Parenting Behavior Inventory (CRPBI; Shaefer, 1965; Schludermann, & Schludermann, 1988), the Parent Behavior Inventory (PBI; Lovejoy, Weis, O’Hare, & Rubin, 1999), the Parenting Young Children scale (PARYC; McEachern, Dishion, Weaver, Shaw, Wilson, & Gardner, 2012), and the Parental Monitoring scale (PM; Stattin & Kerr, 2000). The 6-item harsh discipline subscale includes items representing use of physical discipline (e.g., “I spank my child with my hand when he/she has done something wrong”) and corporal punishment (e.g., “When spanking my child, I have used other things besides my hand”). The reliability of the harsh discipline subscale was excellent ($\alpha = .89$). Initial validity data are promising for the MAPS (Parent, McKee, Rough, & Forehand, in press; Parent, McKee, & Forehand, in press).

Anxiety and depressive symptoms—The Revised Child Anxiety and Depression Scale (RCADS; Chorpita & Ebesutani, 2014) –parent report short version– was used to assess youth anxiety and depressive symptoms. The original RCADS is a 47-item parent and youth report questionnaire used to assess youth depressive and anxiety symptoms consistent with DSM–IV (APA, 1994) nosology. The 37 anxiety items may be summed to yield an Anxiety Total score and the 10 depression items may be summed to yield a Depression Total score. Strong support for the validity and reliability of the RCADS scale scores have been demonstrated in both clinical (e.g., Chorpita, Moffit, & Gray, 2005) and nonclinical samples (e.g., Chorpita, Yim, Moffit, Umemoto, & Francis, 2000). For the parent report version, parents were asked to indicate how often each item applies to their child on a 4-point Likert scale (0 = never, 1 = sometimes, 2 = often, 3 = always).

Recently, Ebesutani and colleagues (2012) shortened the RCADS from 47 items to 25 items using a large school-based sample and a clinic-referred sample of youth and findings supported the use of the 25-item RCADS for a more efficient assessment of the general problem areas of anxiety and depression. Their results revealed that all anxiety items

primarily reflected a single “broad anxiety” dimension, which informed the development of a reduced 15-item Anxiety Total scale. Although specific DSM-oriented anxiety subscales were not included in this version, the items comprising the Anxiety Total scale were evenly pulled from the five anxiety-related content domains from the original RCADS. The resultant 15-item Anxiety Total scale demonstrated significant correspondence with anxiety diagnostic groups based on structured clinical interviews (Ebesutani et al., 2012). The scores from the 10-item Depression Total scale (retained from the original version) were also associated with acceptable reliability in the clinic-referred and school-based samples. In the current study, the reliability of the anxiety ($\alpha = .86$) and depression ($\alpha = .85$) subscales were excellent.

Data Analytic Plan

Preliminary Analysis—Prior to analyses, parental race was dichotomized to White (1) or Person of Color (2). The effect of categorical (e.g., youth gender) and continuous demographic variables (e.g., parent age) on the primary outcomes was examined using analysis of variance and bivariate correlations, respectively. If significant associations emerged between demographic variables and primary model variables, those demographic variables were controlled for in primary analyses.

Primary Analyses—In order to investigate the effects of the interaction of pubertal timing and psychosocial stressors on adolescent anxiety and depressive symptoms, we conducted multiple linear regression analyses in SPSS 22 using the computational tool PROCESS (Hayes, 2013). Pubertal timing, harsh discipline or peer problems, and their interaction were simultaneously entered into the regression model given that our primary hypothesis is concerned with the interaction rather than conditional effects. When significant interactions emerged, figures were created that illustrated the form of the interaction by depicting the regression lines of the relation between peer problems or harsh discipline (25th, 50th, and 75th percentile) and youth internalizing at early, on-time, and late scores of pubertal timing (Aiken & West, 1991). Lastly, three-way interactions were tested by including youth gender in order to ascertain whether the effects on youth internalizing symptoms differed by youth gender. Results are presented first for depressive symptoms and then anxiety symptoms as the outcome and within those sections the results for peer problems and then harsh discipline are presented.

Results

Means, standard deviations, ranges, and bivariate correlations for all study variables are included Table 1. Youth depressive and anxiety symptoms were significantly correlated with youth age such that older youth evidenced higher levels of internalizing. Thus, youth age served as a covariate in primary analyses. Youth depressive and anxiety symptoms did not significantly differ by parent age, race, family income, marital status, or parent education. Therefore, these variables were not controlled for in the primary analyses.

Here we report results first for depressive symptoms as an outcome variable and then anxiety symptoms as an outcome variable. All analyses were conducted with the full sample of youth ages 8 to 17. See Table 2 for results from all four models. All analyses include youth

age as a covariate. Analyses conducted excluding the younger children (8- and 9-year-olds) revealed equivalent results.

When peer problems was examined as the moderator of interest and depressive symptoms as the outcome, peer problems, but not pubertal timing, was related to youth depressive symptoms such that higher levels of peer problems were associated with higher levels of youth depressive symptoms. The interaction between pubertal timing and peer problems was significantly related to youth depressive symptoms. Follow-up simple slope analyses indicated that, in the context of high levels of peer problems, early pubertal timing was associated with the highest levels depressive symptoms and late pubertal timing was associated with the lowest levels of depressive symptoms (Figure 1). We also tested a three-way interaction between pubertal timing, peer problems, and child gender. All two-way interactions involving youth gender were non-significant and the three-way interaction was also not significant, suggesting that the associations in the model were consistent for boys and girls. When harsh discipline was examined as the moderator of interest, harsh discipline, but not pubertal timing, was related to youth depressive symptoms such that higher levels of harsh discipline were associated with higher levels of youth depressive symptoms. The interaction between pubertal timing and harsh discipline was not significantly related to youth depressive symptoms. Further, in a model testing a three-way interaction between pubertal timing, harsh discipline, and child gender, all two- and three-way interactions were non-significant.

When peer problems was examined as a moderator and anxiety symptoms as the outcome, peer problems, but not pubertal timing, was related to youth anxiety symptoms such that higher levels of peer problems were associated with higher levels of youth anxiety symptoms. The interaction between pubertal timing and peer problems was significantly related to youth anxiety symptoms. Follow-up simple slope analyses indicated that, in the context of high levels of peer problems, early pubertal timing is associated with the highest levels of anxiety symptoms and late pubertal timing is associated with the lowest levels of anxiety symptoms (Figure 2). Lastly, we tested a three-way interaction by including youth gender in the model. All two-way interactions involving youth gender were non-significant and the three-way interaction was also not significant. Harsh discipline, but not pubertal timing, was related to youth anxiety symptoms such that higher levels of harsh discipline were associated with higher levels of youth anxiety symptoms. The interaction between pubertal timing and harsh discipline was significantly related to youth anxiety symptoms. Follow-up simple slope analyses indicated that, in the context of high levels of harsh discipline, early pubertal timing was associated with the highest levels anxiety symptoms and late pubertal timing was associated with the lowest levels of anxiety symptoms (Figure 3). Lastly, we tested a three-way interaction by including youth gender into the model. All two- and the three-way interactions were also not significant.

Discussion

From a diathesis-stress perspective (e.g., Ellis, Boyce, Belsky, Bakermans-Kranenburg, & van Ijzendoorn, 2011), earlier pubertal development has been considered a vulnerability that interacts with contexts of social stress to predict increases in internalizing problems (e.g., Ge

et al., 2001). This process has been referred to as the contextual amplification of pubertal timing (Ge & Natsuaki, 2009). The current study sought to clarify the research on the contextual amplification of off-time pubertal development by examining two common stressors for youth across development –peer problems –and harsh parenting and two types of internalizing symptoms –anxiety and depression. We hypothesized that the combination of early pubertal timing with either harsh parenting or peer problems would be associated with higher levels of depressive and anxiety symptoms, especially for girls.

Findings indicated that off-time pubertal timing alone was not associated with anxiety and depression. However, consistent with the contextual amplification hypothesis, earlier pubertal timing *and* more peer problems was related to the highest levels of both depressive and anxiety symptoms as compared to other combinations of pubertal timing and peer problems. Furthermore, later pubertal development evidenced the lowest levels of internalizing problems in the context of stressful family and peer contexts. Interestingly, earlier pubertal timing and more harsh parenting was associated with the highest levels of anxiety, but not depression, as compared to other combinations of these two variables.

Our findings indicate that the relation of early pubertal timing with internalizing symptoms is dependent on social context, in particular, two contexts that have been identified as especially important for youth family (e.g., Steinberg, 2001) and peers (e.g., Murray-Close, Nelson, Ostrov, Casas, & Crick, in press). Both contexts combined with early pubertal onset exacerbate anxiety symptoms and, in the case of peer problems, depressive symptoms. The finding that harsh parenting was associated with anxiety, but not depressive symptoms, is surprising as the literature suggests that this type of parenting is more strongly associated with the latter than the former youth outcome (see McLeod, Weisz, & Wood, 2007; McLeod, Wood, & Weisz, 2007, for reviews). Of importance for our purposes, the differential findings suggest the value of including both anxiety and depression as outcomes in the study of pubertal timing and social context.

Some prior studies have found differential depression or anxiety outcomes for boys and girls when early pubertal timing occurs in the context of family or peer stress (e.g., Arim, Tramonte, Shapka, Dahinten, & Willms, 2011; Conley & Rudolph, 2009); however, the majority of studies, consistent with our findings, have failed to find differential outcomes (e.g., Nadeem & Graham, 2005). Thus, our findings are consistent with most of the literature, suggesting that contextual amplification of early pubertal timing may occur with *both* girls and boys. This finding suggests that future research and theory should not focus exclusively on girls but rather include both boys and girls to meaningfully consider potential gender differences (and similarities) in the contextual amplification of off-time pubertal development.

The current study has several limitations and strengths that should be noted. First, the data are cross-sectional, raising questions about the direction of effects and temporal precedence that are better addressed by longitudinal designs. Caution should be used when interpreting causal pathways in the current model, and future research examining similar questions should utilize longitudinal designs. Second, due to the crowdsourcing methodology (i.e., MTurk), all variables in the model were taken from a single reporter. As this is a potential

issue of shared method variance, the use of multiple reporters on constructs of interest could strengthen the confidence in findings in future work. Third, and relatedly, the current study was limited in its use of parent-reported pubertal timing. While many studies of pubertal timing have used similar methodology, future work would benefit from the use of a more comprehensive assessment of pubertal timing (e.g., Tanner stages). Lastly, our findings are restricted to the social contexts of two youth outcomes. Different social context indicators (e.g., permissive parenting) or outcomes (e.g., social competence, externalizing problems) may have yielded different findings. In terms of strengths, our study included two social contexts and two indicators of internalizing problems, which has not occurred in prior research. Furthermore, as we identified few studies that have examined pubertal timing in the context of peer problems (five studies) or harsh parenting (four studies), our study adds to both of these limited but growing literatures independently.

There are several clinical implications of our findings. First, providers should be aware of early pubertal timing as a potential tipping point in at-risk youth's development of emotional health problems (Mendle, Leve, Van Ryzin, & Natsuaki, 2013). Second, given that youth gender did not serve as a moderator, our findings suggest that providers should be sensitive to the pubertal development and social contexts of girls *and* boys. Third, future research should seek to determine if anxiety and depression prevention or intervention efforts are similarly efficacious for girls and boys displaying early pubertal timing. In sum, these findings suggest that harsh parenting and peer problems *do* amplify internalizing symptoms of youth with earlier onset puberty. Furthermore, at least in the family context, outcomes differ by the types of internalizing problems (i.e., depressive or anxiety symptoms) assessed.

Acknowledgments

This research was supported by the Child and Adolescent Psychology Training and Research, Inc (CAPTR). Justin Parent is supported by NICHHD F31HD082858. Rex Forehand is supported by RO1HD064723 and RO1MH100377.

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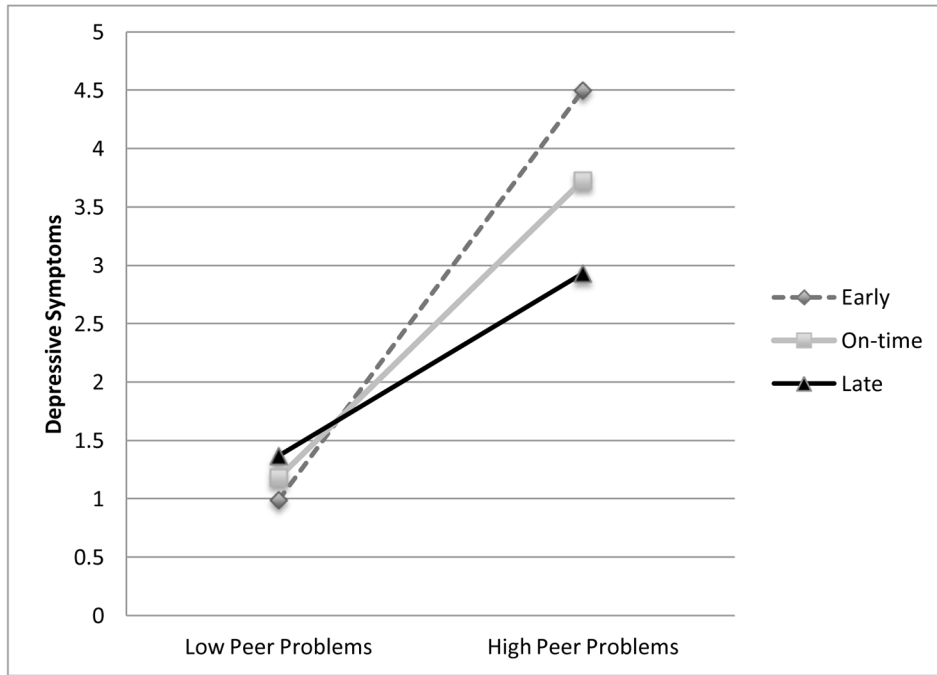


Figure 1. Interaction between pubertal timing and peer problems predicts youth depressive symptoms.

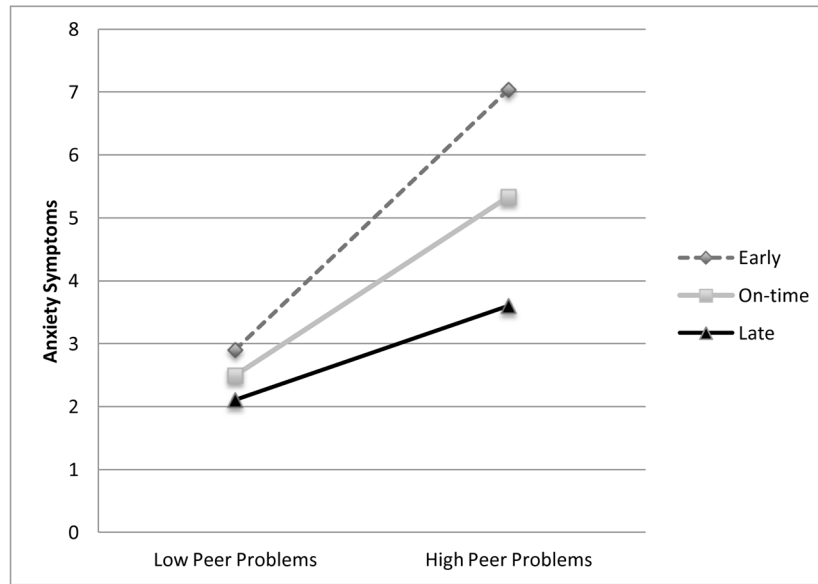


Figure 2. Interaction between pubertal timing and peer problems predicts youth anxiety symptoms.

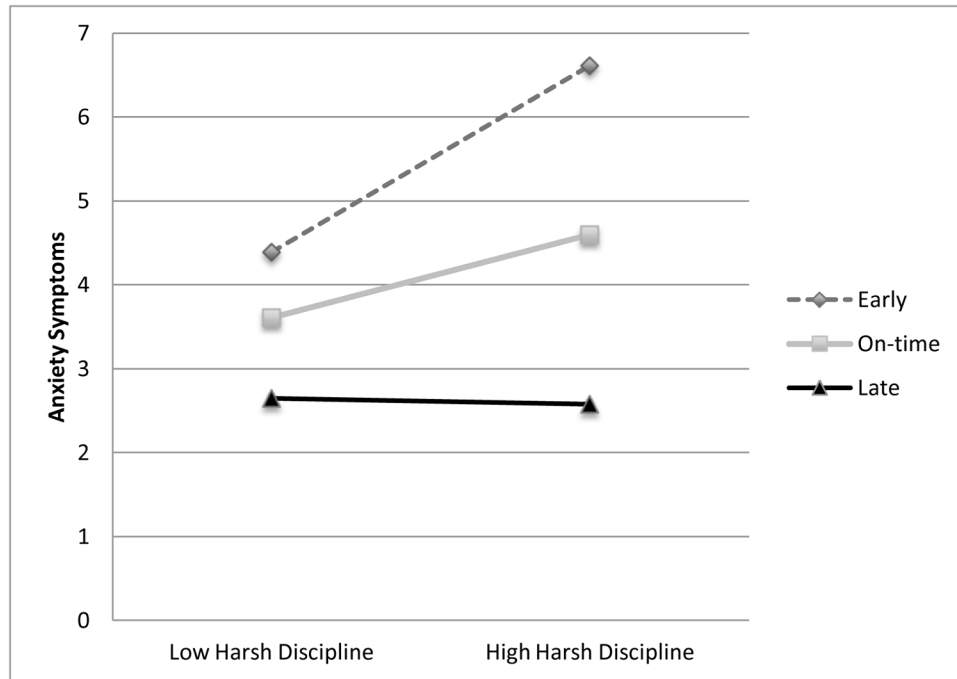


Figure 3. Interaction between pubertal timing and harsh parenting predicts youth anxiety symptoms.

Table 1

Means and correlations among main study variables.

	M (SD)	Range	2	3	4	5
1. Pubertal Timing	--	-1-1	-.05	-.06	-.11*	-.18**
2. Peer Problems	1.82 (2.0)	0-9	--	.22**	.49**	.42**
3. Harsh Discipline	8.70 (3.7)	6-22		--	.14**	.16**
4. Depressive Symptoms	2.73 (3.5)	0-17			--	.71**
5. Anxiety Symptoms	4.38 (4.6)	0-32				--

Note:

* $p < .05$,** = $p < .01$

Table 2

Standardized estimates for all four primary models.

	β	<i>b</i>	95% CI	<i>p</i>
Depressive Symptoms				
Youth Age	.09	.10	.001 – .19	.047
Pubertal Timing	.03	.19	-.57 – .95	.623
Peer Problems	.49	.85	.70 – .99	.000
Pubertal Timing * Peer Problems	-.16	-.32	-.58 – -.07	.011
Youth Age	.15	.18	.06 – .29	.002
Pubertal Timing	.06	.34	-1.2 – 1.9	.668
Harsh Discipline	.14	.13	.04 – .23	.005
Pubertal Timing * Harsh Discipline	-.17	-.12	-.29 – .05	.179
Anxiety Symptoms				
Youth Age	.08	.12	-.02 – .25	.088
Pubertal Timing	-.05	-.41	-1.5 – .63	.443
Peer Problems	.41	.94	.73–1.14	.000
Pubertal Timing * Peer Problems	-.16	-.43	-.78 – -.08	.015
Youth Age	.14	.21	.07 – .36	.006
Pubertal Timing	.09	.73	-1.3–2.76	.483
Harsh Discipline	.16	.20	.07 – .32	.002
Pubertal Timing * Harsh Discipline	-.28	-.25	-.47 – -.03	.027