



Original article

Deviant Peers as a Mediator of Pubertal Timing–Substance Use Associations: The Moderating Role of Parental Knowledge

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 A B S T R A C T

Purpose: Early perceived pubertal timing and faster maturation have been linked to increased risk of adolescent substance use (SU), particularly for girls, but the mechanisms underlying this association are not well understood. We sought to replicate and extend findings from Westling et al. (2008) showing that peer deviance mediates the link between early puberty and SU with stronger pathways in the context of low parental knowledge of adolescents' whereabouts and activities.

Methods: Participants ($n = 1,023$; 52% female, 24% nonwhite, and 12% Hispanic) were recruited through middle schools. Pubertal timing and tempo were derived from repeated measures of perceived pubertal development. Specific sources of parental knowledge included child disclosure and parental solicitation. Two measures of peer deviance (problem behaviors and SU) were obtained. The use of any substances (alcohol, cigarettes, marijuana, and other illicit drugs) was coded from all assessments.

Results: For girls, earlier pubertal timing was associated with higher likelihood of SU but only in girls who disclosed less. For boys, slower tempo predicted greater SU, equally across parental knowledge groups. Pubertal timing and tempo were generally not associated with peer deviance; however, we detected a significant indirect effect such that peer problem behavior mediated the association between girls' early pubertal timing and SU. Parental knowledge did not moderate this effect.

Conclusions: Peer deviance was not strongly supported as a mechanism underlying atypical pubertal risk for SU (supported in one of the eight models). Parental knowledge appears to serve as a contextual amplifier of pubertal risk, independent of peer influences.

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IMPLICATIONS AND CONTRIBUTION

Low parental knowledge contextually amplified pubertal risk for adolescent substance use; the role of peers was largely independent. Girls identified as at risk through pubertal profiles may benefit from interventions that increase bidirectional communication of their whereabouts/activities with parents. Peer groups remain important regardless of youths' pubertal profiles and parenting environment.

The pubertal transition is a key biological and social process of change during adolescence and is associated with changes in social environments and increased behavior problems, including substance use (SU) [1]. Complex models for how puberty and social environments together impact the development of SU have become more common in the literature but are rarely

replicated and thus may be sample specific. The goal of this study is to replicate and extend one such model presented by Westling et al. (2008), described in more detail in the following paragraph.

Findings regarding the associations between pubertal timing and SU are mixed. Early and faster pubertal maturation has been linked to increased risk for SU in adolescence, particularly in girls [2–4], although sometimes later and/or slower pubertal maturation marks increased risk for SU in boys [5–7]. According to the developmental readiness hypothesis, youth with earlier pubertal timing may be emotionally or physiologically unprepared for the physical and social changes associated with puberty and therefore

Conflicts of Interest: The authors have no conflicts of interest to disclose.

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be at greater risk for mental health problems, substance initiation, and SU [8,9]. Early developing youth may also seek out or be invited into friend groups who are more mature and engage in more mature activities (e.g., SU). According to the maturation compression hypothesis [10], these potential consequences of earlier timing may also develop when pubertal milestones are experienced in a compressed timeframe (faster tempo), as the timing of subsequent milestones occurs earlier and earlier. Yet, later timing and/or slower tempo may also index risk: youths (especially boys) who appear younger for longer periods of time relative to their peers may engage in more mature activities (e.g., SU) to compensate for their younger physical appearance in an attempt to increase status. Furthermore, experimental studies in animals show that early initiation of SU may delay or slow pubertal maturation in boys, with some supporting evidence in humans [6,11]. Here, we examine both timing and tempo of pubertal maturation in relation to SU in boys and girls.

There has been increasing interest in understanding how contextual factors may mediate, strengthen, or weaken the association between atypical pubertal maturation and SU. Two of the most salient contextual factors are peer influences, specifically peer deviance and peer SU, and parenting, specifically the extent of parents' knowledge of adolescents' whereabouts and activities [12–14]. Peer characteristics are often considered as a mediator of puberty SU associations: peer deviance, risky behaviors, and perceived and actual SU of peers can mediate associations between pubertal risk and SU [15–17]. Parental knowledge has been shown to moderate associations of pubertal risk and SU such that lower levels of knowledge exacerbate (and higher levels diminish) associations between atypical pubertal maturation and SU [13], a finding we observed in our earlier work in this sample [5]. Furthermore, low parental knowledge has also been shown to exacerbate the influence of peer deviance on SU [18,19]. Together, this literature suggests that parents and peers together may be implicated in how adolescents' pubertal maturation marks risk for SU [19,20].

Westling et al. (2008) proposed and tested a moderated mediation pathway such that peer deviance (in sixth/seventh grade) would mediate the link between early puberty (in fourth/fifth grade for girls and sixth/seventh grade for boys) and SU (alcohol and cigarette use in seventh/eighth grade) and that both mediation pathways (to and from peer deviance) would be strengthened in the context of low parental knowledge (in sixth/seventh grade). For boys, early pubertal timing predicted alcohol use only in the context of low/average (not high) parental knowledge. For girls, affiliation with deviant peers partially mediated the association of early pubertal timing with cigarette use, and parental knowledge moderated the association of early pubertal timing and affiliation with deviant peers such that mediation was found only for girls in the context of low parental knowledge. Our goal was to replicate and extend findings from Westling et al. (2008). We expand upon the study of Westling et al. (2008) by using a larger sample, including tempo and timing \times tempo interactions in addition to timing, and investigating specific sources of parental knowledge (child disclosure and parental solicitation) as moderators and aspects of peer deviance (problem behaviors and SU) as mechanisms of associations of pubertal maturation and SU.

Present Study

We hypothesized that peer deviance would mediate the association of pubertal timing and tempo with SU and that

parental knowledge would moderate these pathways, given evidence that parental knowledge moderates associations of pubertal risk and SU [5], and peer deviance and SU [19,20], and to replicate the pattern of results from Westling et al. (2008). Given our earlier findings [5], we tested distinct communicative sources of parental knowledge (child disclosure and parental solicitation). Boys and girls were examined separately, given prior evidence of sex differences in pubertal maturation and associations of puberty with peer, parenting, and SU outcomes [13].

Method

Participants

Study participants were 1,023 students recruited from six middle schools (52% female, 24% nonwhite, and 12% Hispanic); at the time of enrollment, students were equally distributed across sixth (33%), seventh (32%), and eighth (35%) grades. See the study by Jackson et al. [21] for study/procedure details. The sample was largely representative of the schools from which it was drawn with regard to sex and grade distribution, although our sample is more racially diverse but less disadvantaged than the school populations (<http://infoworks.ride.ri.gov/>).

Procedure

Participants were recruited through schools; study information and consent forms were both distributed at schools and mailed to students' homes. Consent forms were returned to schools by 39% of students; 65% of those returned allowing for participation. Interested youths who had written informed parental consent (88%) attended a 2-hour in-person group orientation that included a 45-minute computerized baseline survey and explanation of study procedures.

Over 4 years, participants completed a series of web-based follow-up surveys. The first five surveys were administered on a semiannual basis (6 months apart over 2 years); the sixth was administered 1 year later. At that point, the survey design was modified as part of a new funding cycle, and assessments were administered on a quarterly basis (data collection is ongoing). The present study draws data from the first six assessments (W1–W6; mean [M]_{ageW1} = 12.66, standard deviation [SD] = .94; M_{ageW2} = 13.15, SD = .93; M_{ageW3} = 13.64, SD = .92; M_{ageW4} = 14.16, SD = .92; M_{ageW5} = 14.64, SD = .93; and M_{ageW6} = 15.63, SD = .91) and a seventh assessment (W7; M_{age} = 16.61, SD = .89) taken from the quarterly survey (the timing of which varied across school cohort) that fell 1 year after W6.

Response rates for a given semiannual survey ranged from 92% (W2) to 79% (W7). More than 76% of the sample had valid data on SU at W7 ($n = 785$). Kruskal-Wallis tests showed that youths with and without valid SU data did not differ on most demographic variables (e.g., parents' marital status, income, mother's age, and qualifying for free/reduced school lunches), p 's $> .05$. Exceptions were that youths who had slightly younger fathers and whose parents had lower education were less likely to have SU data ($\chi^2 = 4.46$ – 9.95 , p 's $< .05$). Youths who disclosed less to parents at W1 were less likely to have SU data ($\chi^2 = 15.72$, $p < .05$), but there were no differences between youths with and without valid SU data on other study-related variables. All procedures were approved by the university institutional review board, and a Certificate of Confidentiality was obtained from National Institute on Alcohol Abuse and Alcoholism to preserve participant confidentiality.

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