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Elucidating the Mechanisms Linking Early Pubertal Timing, Sexual Activity, and Substance Use for Maltreated Versus Nonmaltreated Adolescents


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 A B S T R A C T

Purpose: To test models linking pubertal timing, peer substance use, sexual behavior, and substance use for maltreated versus comparison adolescents. Three theoretical mechanisms were tested: (1) peer influence links early pubertal timing to later sexual behavior and substance use; (2) early maturers engage in substance use on their own and then select substance-using friends; or (3) early maturers initiate sexual behaviors which lead them to substance-using peers.

Methods: The data came from a longitudinal study of the effects of child maltreatment on adolescent development (303 maltreated and 151 comparison adolescents; age, 9–13 years at initial wave). Multiple-group structural equation models tested the hypotheses across three time points including variables of pubertal timing, perception of peer substance use, sexual behavior, and self-reported substance use.

Results: Early pubertal timing was associated with substance-using peers only for maltreated adolescents, indicating the mediation path from early pubertal timing through substance-using peers to subsequent adolescent substance use and sexual behavior only holds for maltreated adolescents. Mediation via sexual behavior was significant for both maltreated and comparison adolescents. This indicates that sexual behavior may be a more universal mechanism linking early maturation with risky friends regardless of adverse life experiences.

Conclusions: The findings are a step toward elucidating the developmental pathways from early puberty to risk behavior and identifying early experiences that may alter mediation effects.

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**IMPLICATIONS AND
 CONTRIBUTION**

Early pubertal timing is associated with substance-using peers only for maltreated adolescents, whereas sexual behavior links early maturation with risky friends regardless of adverse life experiences. These findings are a step toward elucidating the pathways from early puberty to risk behavior and identifying early experiences that may alter mediation effects.

There is overwhelming evidence that early pubertal timing is a risk factor for a variety of psychological and behavioral problems, including early sexual activity and substance use [1–3]. Similarly, studies show that maltreated adolescents engage in

substance use and risky sexual activity more than nonmaltreated adolescents [4,5]. Early puberty can be stressful and confusing, and for youth with maltreatment experiences, these stressors may be exacerbated, potentially strengthening associations between early puberty and problem behaviors. However, as of yet, there is incomplete evidence delineating the specific mediators linking early puberty to risk behavior for either maltreated or nonmaltreated adolescents. It is likely that there are multiple mechanisms, operating singularly or in combination, that link early pubertal timing with risk behavior (e.g., sexual activity and substance use). Elucidating the pathways leading from puberty

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to sexual activity and substance use is integral for identifying strategic targets in the delivery of prevention programs [6].

The overarching theory guiding much of the work on the effects of pubertal timing has been termed the maturation disparity hypothesis [7]. This theory states that early maturers will encounter new stressors and environments before they are cognitively and emotionally prepared, thereby increasing vulnerability to psychopathology. Increases in risk behavior may be because of early maturers' exposure to deviant peers or as a coping response to the mismatch between physical and social maturity. The peer influence mechanism is supported by evidence showing that exposure to deviant peers, especially older or male peers, increases the delinquent behavior of early maturing girls [8]. Additionally, Drapela et al. [9] found that peers' smoking was a mediator between early timing and smoking in a two-wave study of adolescent boys, whereas Wichstrom [10] found the association between early puberty and substance use to be mediated by peer problem behavior across two time points. More recent research revealed a longitudinal mediation effect of deviant peers on the association between pubertal timing and substance use for girls but not boys [11]. These mediation effects have only been investigated with normative samples, and the comparison of peer influence processes for early-maturing maltreated versus nonmaltreated adolescents is limited. Research shows strong links between maltreatment and risk behavior, but whether these associations are due to peer influence is not clear. For example, in a cross-sectional study, Perkins and Jones [12] found that physically abused adolescents who perceived their peers to be engaged in negative behaviors (i.e., substance use, trouble in school) were more likely to use alcohol, drugs, and engage in sexual activity. Conversely, other research showed that exposure to delinquent peers was not as significant in the development of delinquency for maltreated adolescents versus comparison adolescents [13].

Alternatively, selection effects may perpetuate the risk behavior of early maturers. Previous theory about selection processes posits that risk behaviors are initiated in an effort to cope with the stress of early puberty, as well as to reconcile the disparity between social and physical maturity. This implicates the adolescent as an active participant in the selection of deviant peers [14]. However, it may be that the hormones linked with pubertal development, particularly androgenic hormones such as testosterone, may be the initial impetus for sexual interest, leading early maturers to seek out sexual partners, thereby exposing them to risky peers [15,16]. Thus, the selection of risky peers may be initiated via hormonal drive rather than cognitions about reconciling their maturational disparity or as a coping mechanism. Evidence shows that early maturing females report more sexual motivation and exposure to sexual content in the media [17], whereas early maturing adolescent boys reported downloading and viewing pornography on the Internet more than on-time and late maturers [18]. Hormonal changes are also responsible for the physical developments that may affect an adolescent's selection of peers or behavioral patterns [19]. Although maltreated youth are at higher risk for early sexual debut and sexual risk behavior [4], there is little evidence that they initiate normative sexual behaviors at an earlier age. Therefore, sexual behavior may link early puberty to deviant peers and/or substance use for both maltreated and nonmaltreated adolescents. There are still substantial gaps in the literature regarding the mechanisms linking early puberty with risk behavior; more importantly,

there is little knowledge on how these mediation effects may be moderated by maltreatment.

The present study

The purpose of this study was to test mediation models linking pubertal timing, peer substance use, sexual behavior, and substance use for maltreated versus comparison adolescents. The peer-influence model hypothesizes that early puberty leads directly to association with deviant peers and then to sexual behavior and substance use. On the other hand, the selection model has two possible pathways: (1) early puberty leads to substance use and then association with deviant peers or (2) early puberty leads to increased sexual behavior and then to deviant peers and subsequent substance use. It is not hypothesized that these mediation models are mutually exclusive as it is possible that selection and peer influence are reciprocal processes. We hypothesize that selection effects will operate via increased sexual interest which will lead early maturers to sexual/romantic partners that may also be conduits for exposure to more advanced risk behavior.

Regarding maltreatment as a potential moderator, there is evidence that peers may influence both maltreated and non-maltreated early maturers. Maltreatment is well known to be associated with higher rates of risk behavior; thus, we expect that early-maturing maltreated youth may be more likely to engage in risk behavior on their own and then affiliate with other deviant peers (i.e., selection). Peer-influence effects may be more salient for comparison youth who are less likely to engage in risk behavior of their own volition. Sexual behavior may be a more universal mechanism whereby both maltreated and comparison youth become exposed to risky peers.

Methods

Participants

Data were from the first three assessments of an ongoing longitudinal study examining the effects of maltreatment on adolescent development. At Time 1 (T1), the sample was composed of 454 adolescents aged 9–13 years (241 males and 213 females). Time 2 (T2) and Time 3 (T3) occurred approximately 1 and 2.5 years after baseline. The attrition rate between T1 and T2 was 13.8% ($n = 63$) and between T1 and T3 was 29% ($n = 132$). Participants not seen at T2 were more likely to be in the maltreatment group (odds ratio [OR] = 4.38, $p < .01$), and those not seen at T3 were more likely to be Latino (OR = 3.37, $p < .01$) and in the maltreatment group (OR = 5.36, $p < .01$). Descriptives of the sample for all three time points can be found in [Table 1](#).

Recruitment. The maltreatment group ($n = 303$) was recruited from active cases in the Children and Family Services (CFS) of a large west coast city. The inclusion criteria were (1) a new substantiated referral to CFS in the preceding month for any type of maltreatment (e.g., neglect, physical abuse, sexual abuse, or emotional abuse); (2) child age of 9–12 years; (3) child identified as Latino, African-American, or Caucasian (non-Latino); and (4) child residing in one of 10 zip codes in a designated county at the time of referral to CFS. With the approval of CFS and the institutional review board (IRB) of the affiliated university, potential

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