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Early sexual initiation and mental health: A fleeting association or enduring change?

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Abstract

The present research examined how the within-person association between sexual initiation and internalizing symptoms decays over time, using data with annual measurement occasions across adolescence (N = 1,789) and statistical models of within-person change. Sexual initiation was associated with increased levels of internalizing symptoms for early-initiating girls (9th grade, approximately age 15), but not for on-time-initiating girls or for boys. The association between girls' early sexual initiation and internalizing symptoms declined precipitously over time. Indeed, one year after sexual debut, early-initiating girls were similar to on-time or non-initiating girls on internalizing symptoms, suggesting early sexual initiation does not produce lasting detriments to girls' mental health. Findings inform how researchers perceive sexual initiation, both as a developmental milestone and as a prevention target.

Introduction

By the time they graduate high school, one-half to two-thirds of adolescents will have engaged in sexual intercourse (Centers for Disease Control and Prevention [CDC], 2014; Halpern, Waller, Spriggs, & Hallfors, 2006). The transition to sexual intercourse is associated with increases in levels of depression and anxiety, particularly for girls who initiate prior to age 16 (Meier, 2007; Zimmer-Gembeck & Helfand, 2008). However, less is known about the longevity of the association between sexual initiation and internalizing symptoms. If early sexual intercourse increases adolescent girls' internalizing symptoms, does this effect persist or dissipate with age? Addressing this question is critical for understanding gendered age trends in mental health and for informing sex-education interventions aimed at improving girls' mental health. The present research examines the

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within-person association of sexual initiation with internalizing symptoms during adolescence. By using a dataset with annual measurement occasions, we are able to assess if the association between sexual initiation and internalizing symptoms changes with time since initiation, further clarifying the sex-mental health link.

Past research has explored the association between sex and mental health using both cross-sectional and longitudinal approaches. The majority of this research focuses on early sexual initiation, although definitions of what constitutes early vary from study to study. Madkour et al. (2010) explain that there is no consensus definition of early sexual initiation, and it is unclear whether a definition should be drawn from the statistical distribution of age at first intercourse or based on an age before which individuals who initiate sexual intercourse are more susceptible to negative outcomes. Absent a single standard, researchers typically define early sexual initiation as occurring at or before 14–16 years old (Haase, Landberg, Schmidt, Lüdke, & Silbereisen, 2012; Hallfors et al., 2004; Madkour, Farhat, Halpern, Godeau, & Gabhainn, 2010; Rector, Johnson, & Noyes, 2003; Waller et al., 2006; Zimmer-Gembeck & Helfand, 2008).

Cross-sectional research has found that adolescents who have engaged in sexual intercourse are more likely than adolescents who have not to be depressed and to have attempted suicide, and that early-initiating female adolescents are especially at risk (Haase et al., 2012; Hallfors et al., 2004; Madkour et al., 2010; Rector et al., 2003; Waller et al., 2006). Longitudinal research further clarifies this association, finding that sexual initiation is associated with within-person increases in levels of depression and anxiety for younger adolescents (Meier, 2007; Sabia & Rees, 2008; Tubman, Windle, & Windle, 1996). Additionally, early sexual initiation is more strongly associated with internalizing symptoms for girls than boys (Meier, 2007; Spriggs & Halpern, 2008; Madkour et al., 2010).

A biopsychosocial perspective explains that early sexual initiation may be linked with internalizing symptoms due to intrapersonal, interpersonal, and environmental factors, and the interactions between these factors. At the intrapersonal level, genetically-influenced characteristics such as early pubertal maturation and dopaminergic systems may simultaneously predispose certain individuals to initiate sex early and to react to early sexual experiences with heightened internalizing symptoms (Harden, 2014; Rudolph, Troop-Gordon, Lambert, Natsuaki, 2014). Psychological factors such as feeling regret or not feeling “ready,” which are more common among individuals who initiate sexual intercourse early than their on-time-initiating peers (Wight et al., 2008), may also influence negative emotional reactions to first sexual experiences (Walsh, Ward, Caruthers, & Merriwether, 2011). Interpersonal factors, such as stigmatization by peers and the sexual double standard, may also influence reactions to early sexual initiation (Dickson, Paul, Herbison, & Silva, 1998; Symons, Vermeersch, & Van Houtte, 2014; Walsh et al., 2011). Finally, environmental/experiential factors may also predispose individuals who are at risk of having higher internalizing symptoms to initiate sexual intercourse earlier than their peers. For example, neighborhood poverty and parental rejection in childhood are linked with both early sexual initiation and higher internalizing symptoms (Benoit, Lacourse, & Claes, 2013; Dupéré, Lacourse, Willms, Leventhal, & Tremblay, 2008; Natsuaki, Biehl, & Ge, 2009).

Additionally, a biopsychosocial perspective may explain why early sexual initiation is more strongly associated with girls' internalizing symptoms than boys'. More cultural and social sanctions exist for early-initiating girls than for their male peers due to cultural beliefs about girls' virginity (Kreager, Staff, Gauthier, Lefkowitz, & Feinberg, 2016; Milhausen & Herold, 2002), which may make it more likely that girls view early sexual initiation as a negative life event and thus react negatively to it. These societal proscriptions against girls' early sexual initiation may also interact with biological factors. Girls who initiate sex early are more likely to have experienced early pubertal maturation, which places them at increased risk of responding to negative life events with heightened depressive symptoms (Benoit et al., 2013). Thus, early-initiating girls may be at greater risk of negative mental health outcomes than early-initiating boys due to the interaction of a high likelihood of early pubertal maturation with societal proscriptions against females' early sexual initiation.

Research findings that sexual initiation is associated with internalizing symptoms for early-initiating female adolescents have developmental and prevention implications. From a developmental perspective, sexual initiation is a milestone in adolescent development. Knowledge of sexual initiation's impact on developmental trajectories informs a lifespan understanding of sexual development. From a prevention perspective, sexual education program developers use evidence about sexual activity in adolescence to inform their curricula. Due in part to the mental health risks of early sexual initiation, most sexual education programs for adolescents encourage students to delay or abstain from sexual intercourse (Kirby, Laris, & Rolleri, 2007; Manlove, Romano Papillio, & Ikramullah, 2004).

Because of the implications for development and prevention, it is important to understand how sexual initiation is associated with changes in mental health. However, much of the research on sexual initiation and internalizing symptoms is cross-sectional, and longitudinal work often looks at increases in levels of internalizing symptoms over a short time period, typically one or two years (Meier, 2007; Sabia & Rees, 2008; Tubman et al., 1996). Simply knowing that internalizing symptoms increase soon after sexual initiation provides limited information about how sexual initiation may be associated with longer-term changes in mental health, and the latter have potentially different policy implications than do short-term spikes in internalizing symptoms following early sexual initiation. Both developmental and prevention perspectives would benefit from a more precise understanding of how sexual initiation is associated with changes in internalizing symptoms over time.

Developmental changes in individual and contextual factors make it possible that the association between early sexual initiation and internalizing symptoms may decay as time since first sexual intercourse passes. In accordance with a biopsychosocial perspective, these changes may originate from individual-level or social changes across adolescence. First, adolescents generally adapt to stressful events, and cognitive factors may improve coping with age. Research on stressful life events has found that older adolescents use more varied and more adaptive coping strategies to handle stressors than younger adolescents do, which may explain why the association of early adolescent life stress with internalizing symptoms becomes weaker with increased time since the stressful event (Galaif, Sussman, Chou, & Wills, 2003; Griffith, Dubow, & Ippolito, 2000; Mann, Kristjansson, Sigfusdottir, & Smith,

2014). If similar processes influence internalizing symptoms after sexual initiation, individuals may be better able to cope with their feelings about sexual initiation over time.

Second, subsequent sexual experiences may also dilute the influence of first sexual experiences on mental health. As sexual experiences accumulate, first sexual intercourse represents a smaller proportion of total experiences. If post-initiation experiences are positive or if individuals feel more prepared for future sexual experiences, their overall opinions of sexual activity may become more favorable, and sexual experiences should no longer be detrimental to mental health. Additionally, sexual experiences in adolescence may contribute to increased sexual pleasure, sexual body-esteem, perceptions of entitlement to sexual desire, and sexual agency (Horne & Zimmer-Gembeck, 2005). These positive outcomes of continued sexual experiences may counteract the association of sexual initiation with internalizing symptoms.

Third, in addition to these individual-level factors, changes in the social landscape may contribute to decay in the association between sexual initiation and internalizing symptoms. Two key developmental changes are that more peers become sexually active and that peers' attitudes toward sex become increasingly positive (CDC, 2014; Chara & Kuennen, 1994; Lefkowitz, 2005). Thus, shortly after their own sexual debut, early-initiating female adolescents may no longer be stigmatized by their sexual status, which should be reflected in decreased internalizing symptoms.

In addition to changes that unfold gradually across adolescence, factors that occur simultaneously with or quickly after sexual initiation may contribute to decay in the sexual initiation-internalizing symptom association. Many adolescents are resilient to various adverse events and use intrapersonal, peer, and family protective factors in order to cope with stressful events (Zolkoski & Bullock). After experiencing early sexual initiation, adolescents may draw on these supportive factors in order to cope with emotional distress, thereby reducing the association between sexual initiation and internalizing symptoms relatively quickly.

Limited research has addressed the question of whether sexual initiation is associated with lasting changes in mental health. In addition, the available findings are mixed. For example, Spriggs and Halpern (2008a) found that sexual debut timing in adolescence was unassociated with emerging adult depressive symptomatology. In contrast,Haase et al. (2012) found that individuals who initiated sex early reported lower subjective well-being in young adulthood, compared to their on-time-initiating peers.

We propose to build on past research by utilizing data from the PROSPER project to address how the association between sexual initiation and internalizing symptoms changes as the time since sexual initiation increases. The use of PROSPER data strengthens the present research in several ways. First, because PROSPER is a longitudinal study with annual data collection across adolescence, we can examine time since sexual initiation on an annual level, whereas past research has included fewer time points and gaps of several years between reported sexual initiation and current internalizing symptoms. In other words, whereas past research has examined the association between sexual onset and young adult

outcomes, our study examines how this association potentially varies throughout adolescence. This difference is important due to the rapid changes in coping skills, sexual socialization, and sexual behavior that occur during the adolescent years (CDC, 2014; Chara & Kuennen, 1994; Galaif et al., 2003; Griffith et al., 2000; Mann et al., 2014; Lefkowitz, 2005).

Yearly data also allow us to examine within-person changes, thus ruling out stable between-person differences that may make prior findings spurious. For example, Spriggs and Halpern (2008a) compared depressive symptomatology between adolescents who did or did not initiate sex prior to age 16 and found a short-term association between female early initiation and depressive symptoms. Although adjusting estimates for pre-debut depression and sociodemographic characteristics, Spriggs and Halpern's between-person analysis remains subject to bias resulting from heterogeneity in unobserved characteristics that are relatively time stable, such as impulsivity, community and school characteristics, and IQ. Our analyses address this limitation by using individuals as their own controls and establishing if the timing of sexual debut is associated with changes in depression and if this association potentially varies over age.

Second, PROSPER focuses on rural youth, a population that is underrepresented in developmental research and may face unique developmental challenges and opportunities (Conger, 2013). Regarding sexual initiation, some research has found that living in a rural setting is protective against initiating sexual intercourse among adolescents, whereas other research has found the opposite association (for review, see Kirby, Lepore, & Ryan, 2005). If norms of sexual initiation are different in rural communities, then initiating sex before age 15 may be differentially associated with internalizing symptoms in rural versus urban communities. Regarding internalizing symptoms, rural adolescents may employ different strategies to cope with stressors than their urban counterparts (Elgar, Arlett, & Groves, 2003). Additionally, some research has found that living in an urban area may be protective against experiencing depression (Peen, Schoevers, Beekman, & Dekker, 2009; Wang, 2004), although this finding is not consistent across all studies (Probst et al., 2006). If living in a rural area is protective against depression, early-initiating rural adolescents may not experience the same increases in levels of internalizing symptoms that have been found in other research.

Building on past research, we examine the within-person association of sexual initiation with changes in internalizing symptoms during adolescence using a rural sample and annual measurements of internalizing symptoms across adolescence. Specifically, we will address the following research questions:

- **i.** What is the within-person association between the timing of sexual initiation and changes in internalizing symptoms during adolescence?
- **ii.** How does this association differ by gender, and for adolescents who initiate early versus on-time?
- **iii.** Does the association of sexual initiation with internalizing symptoms decay over time?

The first two questions are replications of past research, although we employ stronger statistical methods. Because the majority of longitudinal research on the association between sexual initiation and mental health has used Add Health data, replication with additional samples is also useful. We hypothesize that, consistent with past research, sexual initiation will be associated with an increase in levels of internalizing symptoms for female adolescents who initiate early (prior to entering 10th grade). The third question extends prior research and is a central contribution of this study. We hypothesize that the internalizing symptoms of early-initiating girls will become more similar to those of on-time and non-initiators over time. Because sexual initiation and internalizing symptoms covary with many intrapersonal, relational, and environmental factors, we control for a number of associated time-varying and time-stable variables: alcohol use, maternal and paternal warmth, living in a two-parent family, receiving free/reduced lunch at school, delinquency, grades, and race/ethnicity.

Method

Participants and Procedure

Participants come from the PROSPER longitudinal study of substance use prevention (Spoth, Greenberg, Bierman, & Redmond, 2004; Spoth et al., 2007). PROSPER follows two successive cohorts of students from 28 rural communities in Iowa (n = 14) and Pennsylvania (n = 14), with 1,300 to 5,200 enrolled public school students per community. The communities were predominantly White (61% to 97%) and had a median household income of $37,000. Students were surveyed in their classrooms in the fall and spring of grade 6 (W1 and W2) and then every spring thereafter until grade 12 (W8). Participation rates ranged from 86–90% across waves for all eligible students, with an average of 87.2% participation and about 11,000 students responding at each wave. Enrollment in the study was open at each wave, drawing the sample from the entire student body at each occasion (Osgood et al., 2013). A subsample of participants was contacted one year after the end of high school when they were around 19 years of age (W9). The present research focuses on individuals who participated in the W9 follow-up, which is when exact age of sexual initiation was first assessed (N = 1,989).

Beginning in 9th grade (W5), data on internalizing symptoms were collected from in-school surveys. Therefore, the current paper includes data from W5 (when internalizing symptoms were first assessed) to W9. Participants who reported having sex before W5 were excluded from analyses (n = 138) because we lack concurrent measures of internalizing symptoms. We also excluded 62 participants who did not provide information on whether or not they ever had sexual intercourse and/or their age at sexual initiation. Our final sample consisted of 8,945 measurement occasions from 1,789 participants.

Fifty-four percent of participants included in the analyses were female. Ninety-two percent of participants were White, 3% were Hispanic/Latino, 2% were Black/African American, 1% were Asian, <1% were Native American/American Indian, and 3% reported another race or multiple races. The average age of participants at W5 was 15.20 (SD = 0.35). At W5, 17% reported that they bought lunch from school for free/at reduced cost, a proxy for economic disadvantage. At W5, 80% lived in a household with two adults (both parents or a

parent and step-parent). Participants received mostly B grades on average and reported low levels of delinquency (measures described below; descriptive statistics in Table 1).

Compared to the overall PROSPER sample, participants in the analytic sample were 1.24 times more likely to be female (χ^2 (1) = 18.31, $p < .001$), 6.03 times more likely to be White (χ^2 (1) = 553.72, $p < .001$), 0.44 times as likely to be Black (χ^2 (1) = 19.73, $p < .001$), 0.36 times as likely to be Hispanic (χ^2 (1) = 57.09, $p < .001$), and 0.68 times as likely to report another race/ethnicity (χ^2 (1) = 6.50, $p < .05$). On W5 measures, individuals in the analytic sample were 0.48 times as likely to receive free/reduced price lunch (χ^2 (1) = 61.47, $p < .001$), reported lower levels of delinquency (Cohen's $d = 0.19$, $t(2787.37) = 7.68$, $p < .001$), lower frequency of drunkenness (Cohen's $d = 0.19$, $t(2524.44) = 4.66$, $p < .001$), higher grades (Cohen's $d = 0.19$, $t(2462.54) = -16.33$, $p < .001$), and lower logged internalizing symptoms (Cohen's $d = 0.05$, $t(10847) = 2.00$, $p < .05$). The samples did not differ on maternal warmth ($t(10460) = -1.69$, $p > .05$) or paternal warmth ($t(2130.42) = -0.44$, $p > .05$, measures described below).

Although PROSPER began collecting data on internalizing symptoms for the majority of the sample in W5, a minority of participants were selected to participate in in-home surveys in which they provided internalizing data beginning in spring of the 6th grade (W2; $N = 251$). These participants' data were used in sensitivity analyses. The in-home participants did not differ significantly from the larger analytic sample on gender, race/ethnicity, likelihood of initiating sex by W9, age at sexual initiation, or internalizing symptoms. Of the W5 control variables, the in-home subsample was higher in paternal warmth (Cohen's $d = 0.19$, $t(1501) = -2.64$, $p < .01$), lower in delinquency (Cohen's $d = 0.19$, $t(374.29) = 4.36$, $p < .001$), and lower in frequency of drunkenness (Cohen's $d = 0.19$, $t(368.80) = 2.92$, $p < .01$). The samples did not differ in W5 maternal warmth or grades.

Measures

Sexual initiation—Age at sexual initiation was first assessed for the entire PROSPER sample at W9. Participants responded to the question, "In your entire lifetime, have you had sexual intercourse (that is, penis in the vagina, going all the way, making love) with a female [asked to men] /male [asked to women]?" and, if they selected yes, "How old were you the first time you had sexual intercourse?" Wave of sexual initiation was then determined by matching the age of first sexual intercourse reported in W9 to the wave of data collection covering that age. For example, if someone reported initiating sexual intercourse at age 15, and s/he was 15 years old at W5, then s/he was coded as having initiated sex at W5. At W9, 78% of participants reported ever having had sexual intercourse. Among participants who reported having had sexual intercourse, the mean age of first intercourse was 16.63 ($SD = 1.43$) for boys and 16.34 ($SD = 1.47$) for girls. These numbers are similar to national averages; by age 19, 71% of adolescents have had sexual intercourse, and the average age of sexual initiation is 17 (Finer & Philbin, 2013; Martinez, Copen, & Abma, 2011). Of boys in our sample who reported having had sexual intercourse, 16% initiated at W5, 25% initiated at W6, 24% initiated at W7, 17% initiated at W8, and 18% initiated at W9. Of girls who reported having had sexual intercourse, 25% initiated at W5, 22% initiated at W6, 22% initiated at W7, 15% initiated at W8, and 17% initiated at W9.

Sexual initiation was coded as a time-varying dichotomous variable, coded as 0 in all waves prior to self-reported sexual initiation, and 1 at the wave of sexual initiation and all subsequent waves. *Waves since sexual initiation* was coded as 0 in the wave of sexual initiation and all prior waves. It was coded as 1 in the first wave after sexual initiation, 2 in the second wave after sexual initiation, etc. This time-varying variable allows us to estimate potential decay in the sexual initiation coefficient over time in our within-person analyses (see Analytic Plan).

Early versus on-time sexual initiation: In this paper, we define early initiators as individuals who initiated in W5 (9th grade, approximately age 15). This definition is consistent with past research that defines sexual initiation as "early" if it occurs before age 16 (Zimmer-Gembeck & Helfand, 2008). Also, in additional analyses (not presented), we examined the mean internalizing symptoms of individuals who initiated sexual intercourse at each wave separately to see how mean internalizing scores changed over time for individuals initiating sexual intercourse at W5, W6, W7, W8, and W9. These analyses revealed that only initiation at W5 was associated with higher levels of internalizing symptoms. Therefore, comparisons of early versus on-time sexual initiation distinguish between W5 initiation and W6-W9 initiation.

Pre-W5 sexual initiation: Although the bulk of the analyses presented define early sexual initiation as occurring at W5, some participants reported sexual initiation before W5. 72 boys (mean age of sexual initiation = 12.67 (SD = 1.75)) and 66 girls (mean age of sexual initiation = 13.02 (SD = 0.97)) initiated sexual intercourse prior to W5. These participants were used in supplemental analyses presented in the results section.

Internalizing symptoms—Beginning at W5, at each wave participants completed seven items from the anxious/depressed subscale of the Achenbach Youth Self Report measure (Achenbach, 1991). Participants were asked the extent to which each statement was true for them now or in the past six months, with responses ranging from 0 ("not true at all") to 2 ("very true"). Sample items include "I feel worthless or inferior" and "I am nervous or tense." Cronbach's alpha ranged from 0.82 to 0.88 across waves. Because scores were positively skewed, the log (mean internalizing symptoms + 1) was used in analyses. Mean scores by wave and gender are presented in Table 1.

Control variables

Maternal and paternal warmth: Because past research has shown that relationships with parents tend to change around the time of sexual initiation (Ream, 2006), the present analyses controlled for mother-child and father-child warmth. Participants completed the mother warmth and father warmth subscales of the Quality of Parental Relationships Inventory (Conger, Ge, Elder, Lorenz, & Simons, 1994). Participants responded to six items assessing the frequency of warm parent-child interactions such as "your mother let you know she really cares about you" and "you acted loving and affectionate toward her" in the past month. Response options ranged from 1 ("always or almost always") to 5 ("never or almost never"). Responses were reverse scored and the mean was taken separately for items addressing mother-child warmth and father-child warmth. Cronbach's alpha ranged from .95

to .97 across waves for mothers, and .96 to .97 for fathers. The means by wave and gender are presented in Table 1. To specify the theoretically-expected temporal ordering of parent warmth and the outcome (i.e., that internalizing symptoms are responses to parent warmth rather than parent warmth is a response to internalizing symptoms), we included lagged measures of parent warmth in our analyses.

Alcohol use: Because alcohol use tends to covary with sexual activity and internalizing symptoms (Hallfors et al., 2004; Santelli, Robin, Brener, & Lowry, 2001), the present analyses controlled for alcohol use. We used data that were lagged by one wave, which means that we used data from W4 to W8. Participants responded to the question, "During the past year, how many times have you been drunk from drinking beer, wine, wine coolers, or other liquor?" Response options ranged from 1 (not at all) to 5 (more than 12 times). Mean responses by wave and gender are presented in Table 1.

Two-parent family: Living in a household with two parents is protective against early sexual initiation (Davis & Friel, 2001; Lammers, Ireland, Resnick, & Blum, 2000). Each wave until W8, students answered the question, "Who do you live with most of the year?" Students who responded that they lived with both parents, or a parent and a step-parent, were coded as living in a two-parent family (1). Students who responded that they live with only their mother, only their father, or in another type of household were coded as not living in a two-parent family (0). We included this variable, lagged by one wave, as a control variable. Mean responses by wave and gender are presented in Table 1.

Free/reduced price lunch: Socioeconomic status is protective against early sexual initiation and high levels of internalizing symptoms (Goodman, Slap, & Huang 2003; Paul, Fitzjohn, Herbison, & Dickson, 2000). Therefore, we controlled for whether a student received free/reduced price lunch at school as an indicator of socioeconomic disadvantage. Each wave until W8, students answered the question, "What do you usually do for lunch on school days?" Students who responded that they receive free lunch from school or that they buy their lunch at school at a reduced price were coded as receiving free/reduced price lunch (1). Students who responded that they bring a lunch from home, go home for lunch, buy school lunch at full price, buy lunch outside of school, or don't eat lunch were coded as not receiving free/reduced price lunch (0). We included this variable, lagged by one wave, as a control variable. Mean responses by wave and gender are presented in Table 1.

Delinquency: Because delinquency predicts early sexual initiation (French & Dishion, 2003) and internalizing symptoms (Beyers & Loeber, 2003), we controlled for delinquency. Each wave until W8, students indicated the frequency with which they engaged in 12 delinquent behaviors in the past year. Response options ranged from 1 (never) to 5 (five or more times). Sample items include, "Taken something worth $25 or more that did not belong to you," "Beat up someone or physically fought with someone because they made you angry (other than just playing around)," and, "Purposely damaged or destroyed property that did not belong to you." Each student's mean score was calculated; scores lagged by one wave were included in analyses. Mean responses by wave and gender are presented in Table 1.

Grades: High academic performance is protective against early sexual initiation and high internalizing symptoms (Masten et al., 2005; Wheeler, 2011). Each wave until W8, students answered the question, “What grades do you generally get in school?” Response options included “mostly A’s (90–100)” (1), “mostly B’s (80–90)” (2), “mostly C’s (70–80)” (3), “mostly D’s (60–70)” (4), and “mostly lower than D’s” (5). We took the reverse score, so that higher scores reflected higher grades. We included this variable, lagged by one wave, as a control variable. Mean responses by wave and gender are presented in Table 1.

Intervention or control condition: PROSPER is an intervention program, and several participating schools were assigned to an intervention condition, whereas others received no treatment. We controlled for whether participants attended an intervention school (1, 51%) or a control school (0).

Analytic Plan

Multiple imputation was used to account for missing data in the analytic sample. Ten imputed datasets were created using chained iterations within each wave, replacing missing data for control variables and internalizing symptoms. The lowest proportion of imputed data was internalizing symptoms at W9 (0.1%), and the highest proportion of missing data was paternal warmth at wave 9 (39%).

We tested our hypotheses with hybrid fixed-effects and random-effects models of within-person change (Firebaugh, Warner, & Massoglia, 2013). Essentially, we estimate random effects models of (logged) internalizing symptoms that include sexual initiation predictors capturing both within-person variation (i.e., indicators of pre- and post-sexual initiation person-waves) and between-person variation (i.e., the proportion of waves at or after a person reports sexual initiation). For example, someone who initiated sex in wave 7 would have values of 0 in waves 5 and 6 and 1 in waves 7 through 9 of the within-person variable and a value of 0.4 for all waves of the between-person (i.e., mean) variable. Someone who did not initiate sex during the study period would have a value of 0 for all waves of both variables. The coefficient for the within-person sexual initiation variable would be equivalent to that found in a fixed-effects model. The advantage of the hybrid approach is that we are also able to include a time-invariant indicator of early sexual initiation and a time-varying measure of time-since-initiation for early initiators into our models. The time-invariant indicator tests if, compared to non-early initiators, early initiators have more internalizing symptoms, whereas the time-varying measure tests if this association decays over time. To present more parsimonious models, we include only within-person variables for our (lagged) time-varying control variables and omit their person-level means. In unlisted analyses, we tested interaction effects of early sexual initiation, on-time sexual initiation, waves since early sexual initiation, and waves since on-time sexual initiation for all of our control variables, and found no statistically significant interactions. Therefore, these interactions are not included in the final model.

Random effects models were estimated in STATA (i.e., mi estimate: xtreg) and the wave variable was anchored to W5 (Wave = 0 at W5, 1 at W6, etc.) to allow for a more interpretable intercept. Preliminary analyses indicated the need for both linear and quadratic

coefficients for time (i.e., wave). Because past research suggests that sexual initiation may be associated with increases in internalizing symptoms for girls only (Madkour et al., 2010; Meier, 2007; Tubman et al., 1996), analyses were conducted separately for boys and girls.

Results

Association of Sexual Initiation with Internalizing Symptoms

Model 1 examined the association between sexual initiation and internalizing symptoms regardless of timing of sexual initiation. Sexual initiation was not associated with internalizing symptoms for boys or girls when the analyses were aggregated across wave of sexual initiation (Table 2).

Model 2 included two different variables that indicated the associations of sexual initiation with internalizing symptoms for participants who initiated early (W5) and those who initiated on-time (W6-W9). Relative to girls who did not initiate at W5, girls who initiated at W5 experienced a 0.24 standard deviation increase in (logged) internalizing symptoms. Sexual initiation was not associated with the outcome for boys or for later-initiating girls (Table 3).

Model 3 added a term indicating time since sexual initiation, which tested whether the association between sexual initiation and internalizing symptoms changed over time. There was a significant decay over time of the positive association between sexual initiation and internalizing symptoms for early-initiating girls (Table 3). On-time-initiating girls and on-time-initiating boys also showed decreases in internalizing symptoms with increased time since sexual initiation. The decay terms for on-time-initiating girls and boys indicate that, although initiating sexual intercourse was not associated with a significant contemporaneous change in internalizing symptoms for these groups, levels of internalizing symptoms did decrease significantly over time compared to non-initiators.

Lagged Sexual Initiation

In order to further address the persistence of any association between sexual initiation and internalizing symptoms, we performed additional random effects analyses with sexual initiation lagged by one wave. These analyses tested whether the association between early sexual initiation and internalizing symptoms endured one wave after reported sexual initiation. For these analyses, we created a lagged sexual initiation variable by matching the age of first sexual intercourse reported in W9 to the first wave of data collection in which participants were one year **older** than their reported age at sexual initiation. For example, if someone reported initiating sexual intercourse at age 15, and s/he was 16 years old at W6, then this participant was given a value of 0 on the lagged sexual initiation variable prior to W6, and a value of 1 at W6 and each subsequent wave. Early initiators were individuals who initiated prior to W6, which is equivalent to our previous definition of early initiators having initiated sex at W5.

After creating lagged sexual initiation variables, we performed equivalent random effects models to those reported in Tables 2 and 3. The results of the lagged analyses are reported in Tables 4 and 5. Net of the decay terms, there was no significant association between early or

on-time sexual initiation and internalizing symptoms for either boys or girls. For early initiating girls, this lack of significance suggests that, by one year after early sexual initiation, their levels of internalizing symptoms were similar to those of their on-time or non-initiating peers. Additionally, there were no statistically significant decay effects for girls or early-initiating boys. However, there was a statistically significant decay effect for boys' on-time sexual initiation, which together with the negative main effect of sexual initiation suggests that the internalizing symptoms of this group increased less over time compared to non-initiating boys.

Additional Sensitivity Analyses

Because W5 initiators initiated sexual intercourse during the first wave of data collection used in these analyses, it was difficult to determine whether their elevated internalizing symptoms represented a spike in internalizing symptoms (suggesting a causal link with sexual initiation) or was preceded by years of elevated internalizing symptoms (suggesting no causal link). In order to assess internalizing symptoms prior to W5, we conducted sensitivity analyses using a subset of the sample who were female, participated in W9, and had internalizing data beginning in W2 ($N = 134$; 952 person-occasions). Of this subsample, 16% initiated sexual intercourse at W5, 66% initiated sex between W6-W9, and 18% had not initiated sex by W9. There were no statistically significant differences in the distribution of early, on-time, and no sexual initiation between the W2-W9 and W5-W9 samples (χ^2 (2) = 2.42, $p > .05$). We tested the difference between the mean log(internalizing symptoms) score of early-initiating (i.e., initiating at W5) female participants versus those who did not initiate early, at each wave. Prior to W5, the difference in internalizing symptoms between these two groups never approached statistical significance (i.e., *t*-values were always less than 1.00 and p-values were greater than .30). At W5, when the early initiators first had sex, their levels of internalizing symptoms increased, resulting in a greater difference between the two groups. This difference, which corresponded to 0.63 standard deviations, was comparable in magnitude to that found using our full sample and reached statistical significance ($t(123) = -2.65$, $p < .01$). Although these analyses relied on a smaller sample and did not utilize a within-person statistical strategy, the results suggest that the heightened internalizing symptoms of early initiators co-occurs with sexual initiation.

Comparisons of W5 Initiators to Pre-W5 Initiators

One possible limitation of the present analyses is that our definition of early sexual initiation only refers to 9th grade. Some individuals initiate sexual intercourse prior to 9th grade, and these individuals may experience more severe or long-lasting mental health consequences. Therefore, we conducted two exploratory analyses with individuals who initiated sexual intercourse prior to W5. First, we included pre-W5 initiators in our random-effects models, collapsed with the W5 initiator group. The results were similar to the original analyses, and for parsimony's sake are not presented here. There were no differences in the significance levels of any time-varying sexual initiation, or waves since sexual initiation variables.

Second, we conducted *t*-tests for differences in internalizing symptoms between W5 initiators and very early initiators at each wave. We found no statistically significant differences for boys (*t*-values ranged from 0.01 to 0.79, *p*-values ranged from .99 to .43) or

girls (*t*-values ranged from 0.04 to 0.95, *p*-values ranged from .89 to .63). Taken together, these results suggest that pre-W5 initiators are similar to W5 initiators in their levels and trajectories of internalizing symptoms.

Discussion

Past research has found that sexual initiation is associated with increases in levels of internalizing symptoms for girls who initiate early, but that this association may not extend into young adulthood (Spriggs & Halpern, 2008a). The present research replicated the findings of past research with richer data, a rural sample, and a more sophisticated statistical design. By examining the association between sexual initiation and internalizing symptoms with annual measurements over the entire adolescent period, we found that the association between girls' early sexual initiation and internalizing symptoms decayed over time, such that one year after sexual initiation they were similar to their later- or non-initiating peers on internalizing symptoms. We build on past research addressing the associations between sexual initiation and mental health in adolescence versus young adulthood, adding that the association between sexual initiation and internalizing symptoms varies even within adolescence. In sum, we found that the association between female early initiators' sexual initiation and mental health does not persist indefinitely, and that time since sexual initiation may gradually confer benefits to individuals' mental health.

Sexual Initiation and Individual Development

These findings contribute to knowledge of the role of sexual initiation in developmental trajectories of mental health, which is important to a lifespan understanding of sexuality and mental health. Consistent with past research, we found that early sexual initiation may be disruptive to female adolescents' mental health. However, the decay in the association between sexual initiation and internalizing symptoms and results of lagged analyses suggest that the emotional significance of sexual initiation fades.

Our finding that the association between girls' early sexual initiation and internalizing symptoms fades within a year informs conversations about the possible mechanisms for this decay. Rather than processes that unfold across adolescence, such as changing norms for sexual activity (CDC, 2014; Chara & Kuennen, 1994; Lefkowitz, 2005), the decay in the association between girls' early sexual initiation and internalizing symptoms is likely due to factors that may occur within a year of sexual initiation. For example, as individuals gain distance from their first sexual intercourse, they may gain perspective that allows them to see the event as less negative. This explanation is consistent with research on relationship dissolution and other life events finding that, although transitions are often accompanied by changes in well-being, individuals eventually adapt to their new state (Diener, Lucas, & Scollon, 2006; Loewenstein & Frederick, 1999; Sbarra & Emery, 2005).

Additionally, the state of being sexually active may confer benefits to mental health, explaining gradual decreases in internalizing symptoms following sexual initiation for both early- and on-time-initiating adolescents. Being sexually active may facilitate formation of the sexual self-concept, which is positively associated with mental health (Rostosky, Dekhtyar, Cupp, & Anderman, 2008). Romantic relationship development and sexual

pleasure also benefit sexually active individuals, and these benefits may mean that repeated sexual experiences can improve mental health (Vasilenko, Lefkowitz, & Welsh, 2014).

Prevention Implications

In addition to their developmental significance, findings about the association between sexual initiation and internalizing symptoms can inform prevention efforts. Among many reasons cited in support of policies that aim to delay or prevent sexual intercourse is the idea that pre-marital sexual intercourse causes psychological harm (Abbott, White, & Felix, 2010). Past research has dispelled the idea that most adolescents experience psychological harm due to sexual initiation, finding, as this paper did, that sexual initiation is not associated with internalizing symptoms for boys or on-time initiating girls (Madkour et al., 2010; Meier, 2007). The present research suggests that, even for early-initiating girls, sexual initiation does not carry lasting risks to mental health. In fact, within a year of early sexual initiation, girls' internalizing symptoms returned to levels that were similar to their on-time or non-initiating peers. Programs designed to prevent adolescent sexual initiation for the purposes of safeguarding girls' mental health may benefit from critical exploration of the rationale behind their curricula.

However, this is not to say that sexual education efforts should not aim to delay sexual intercourse. First, even a year-long change in internalizing symptoms associated with early sexual initiation impacts quality of life and may lead to behavioral changes, such as substance abuse and poor school performance (Diego, Field, & Sanders, 2003; Fröjd et al., 2008), that have lasting impacts. Second, some girls may experience longer-lasting changes in mental health than others, which may not be captured by statistical techniques like regression that average associations across individuals (Abbott et al., 2010). Third, the present research only examined internalizing symptoms. Early sexual initiation has been found to be associated with other negative outcomes, including increased risks of sexually transmitted infections, unintended pregnancy, and lower educational attainment (Coker et al., 1994; Kaestle, Halpern, Miller, & Ford, 2005; O'Donnell, O'Donnell, & Stueve, 2001; Spriggs & Halpern, 2008b). These outcomes have long-lasting impacts on multiple domains of well-being, and justify the need for efforts to prevent early sexual initiation in adolescents.

Although suggestive, the results presented in this paper must be interpreted in light of their limitations. One limitation is that age of sexual initiation was measured retrospectively. This measurement may have led to error in assessing timing of sexual initiation due to recall bias and matching age of reported initiation to age at each measurement occasion. It is impossible to determine whether measures of internalizing symptoms were taken before or after sexual initiation because we lacked the exact date of sexual initiation. This limits our ability to make causal inferences about the observed association between early female sexual initiation and internalizing symptoms. A second limitation is that data on internalizing symptoms were not collected before W5 for most of the sample, making it difficult to determine whether elevated internalizing symptoms for W5-initiators preceded or followed sexual initiation. Sensitivity analyses suggest that levels of internalizing symptoms increased with early sexual initiation. However, we acknowledge the possibility that participants in the

in-home sample in waves 2–5 responded differently to the internalizing symptoms measure due to being delivered in a home setting (versus classroom) or because the items in the scale may be differentially valid or reliable for younger individuals (Ebesutani, Bernstein, & Martinez, 2011). The validity of the sensitivity analyses may have been affected if students answered the items differently. Third, it should be noted that, although this paper used within-person analyses that eliminate time-stable confounding factors affecting the association between sexual initiation and internalizing symptoms, we cannot determine whether this association is an artifact of unobserved time-varying covariates. Some research has found that the association between early sexual initiation and depression can be explained by confounding factors such as co-occurring developmental processes (Donahue, Lichtenstein, Långström, & D'Onofrio, 2013). However, even if unobserved factors render the association between sexual initiation and internalizing symptoms spurious, internalizing symptoms decreased with age only among early-initiating girls, meaning that the effect of the unobserved factor must also decay for this group. It is important to recognize that other factors may simultaneously influence sexual initiation and mental health; for example, forced sexual contact is associated with both early sexual intercourse and internalizing symptoms (Basille et al., 2006; Nagy, Diclemente, & Adcock, 1995; Raghavan, Bogart, Elliott, Vestal, & Schuster, 2004), and therefore may be partially responsible for increases in levels of girls' internalizing symptoms after early sexual initiation. Early pubertal development may influence sexual initiation, internalizing symptoms, and the association between these factors (Benoit et al., 2013; Dupéré et al., 2008; Natsuaki et al., 2009). Although we were unable to measure these variables in the current study, future research should continue to clarify the nature of the association between girls' early sexual initiation and internalizing symptoms.

Finally, although the focus on rural youth was justified given the challenges of this population, the results of this paper may not generalize to other populations. In addition to being rural, our sample was predominantly White, partially due to attrition of ethnic/racial minority participants before W9. Therefore, the results may not be representative of rural youth, as well as not generalizing to urban adolescents. We recommend that future research replicate our findings in diverse populations.

Despite its limitations, the present research offers valuable insights into the association of sexual initiation with mental health. Although early-initiating girls experienced increases in levels of internalizing symptoms at the time of sexual initiation, their internalizing symptoms decreased within adolescence. By the end of high school, early-initiating girls were similar to their peers in internalizing symptoms, suggesting that early sexual initiation does not produce lasting detriments to girls' mental health. This finding can inform how researchers perceive sexual initiation, both as a developmental milestone and as a target of prevention efforts.

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References

Abbott DA, White JM, Felix DS. Not ready for sex: An endorsement for adolescent sexual abstinence. International Journal of Sociology of the Family. 2010; 36:159–179.

Achenbach, TM. Manual for the Child Behavior Checklist/4–18 and 1991 profile. Burlington, VT: University of Vermont, Department of Psychiatry; 1991.

Basile KC, Black MC, Simon TR, Arias I, Brener ND, Saltzman LE. The association between self-reported lifetime history of forced sexual intercourse and recent health-risk behaviors: findings from the 2003 National Youth Risk Behavior Survey. Journal of Adolescent Health. 2006; 39:752.e1–752.e7.

Benoit A, Lacourse E, Claes M. Pubertal timing and depressive symptoms in late adolescence: The moderating role of individual, peer, and parental factors. Development and Psychopathology. 2013; 25:455–471. [PubMed: 23627956]

Beyers JM, Loeber R. Untangling developmental relations between depressed mood and delinquency in male adolescents. Journal of Abnormal Child Psychology. 2003; 31:247–266. [PubMed: 12774859]

Centers for Disease Control and Prevention. Youth risk behavior surveillance—United States, 2013. Morbidity and Mortality Weekly Report. 2014; 63:1–168. [PubMed: 24402465]

Chara PJ, Kuennen LM. Diverging gender attitudes regarding casual sex: A crosssectional study. Psychological Reports. 1994; 74:57–58. [PubMed: 8153236]

Coker AL, Richter DL, Valois RF, McKeown RE, Garrison CZ, Vincent ML. Correlates and consequences of early initiation of sexual intercourse. Journal of School Health. 1994; 64:372–377. [PubMed: 7877279]

Conger R, Ge X, Elder G Jr. Lorenz F, Simons R. Economic stress, coercive family process, and developmental problems of adolescents. Child Development. 1994; 65:541–561. [PubMed: 8013239]

Davis EC, Friel LV. Adolescent sexuality: Disentangling the effects of family structure and family context. Journal of Marriage and Family. 2001; 63:669–681.

Dickson N, Paul C, Herbison P, Silva P. First sexual intercourse: Age, coercion, and later regrets reported by a birth cohort. British Medical Journal. 1998; 316:29–33. [PubMed: 9451263]

Diego MA, Field TM, Sanders CE. Academic performance, popularity, and depression predict adolescent substance use. Adolescence. 2003; 38:35–42. [PubMed: 12803452]

Diener E, Lucas RE, Scollon CN. Beyond the hedonic treadmill: Revising the adaptation theory of well-being. American Psychologist. 2006; 61:305–314. [PubMed: 16719675]

Donahue KL, Lichtenstein P, Långström N, D'Onofrio BM. Why does early sexual intercourse predict subsequent maladjustment? Exploring potential familial confounds. Health Psychology. 2013; 32:180–189. [PubMed: 22708520]

Dupere V, Lacourse E, Willms JD, Leventhal T, Tremblay RE. Neighborhood poverty and early transition to sexual activity in young adolescents: A developmental ecological approach. Child Development. 2008; 79:1463–1476. [PubMed: 18826536]

Ebesutani C, Bernstein A, Martinez JI, Chorpita BF, Weisz JR. The Youth Self Report: Applicability and validity across younger and older youths. Journal of Clinical Child & Adolescent Psychology. 2011; 40:338–346. [PubMed: 21391029]

Elgar FJ, Arlett C, Groves R. Stress, coping, and behavioural problems among rural and urban adolescents. Journal of Adolescence. 2003; 26:574–585.

Firebaugh, G., Warner, C., Massoglia, M. Fixed effects, random effects, and hybrid models for causal analysis. In: Morgan, SL., editor. Handbook of Causal analysis for social research. Dordrecht: Springer Netherlands; 2013. p. 113-132.

Finer LB, Philbin JM. Sexual initiation, contraceptive use, pregnancy among young adolescents. Pediatrics. 2013; 131:886–891. [PubMed: 23545373]

French DC, Dishion TJ. Predictors of early initiation of sexual intercourse among high-risk adolescents. The Journal of Early Adolescence. 2003; 23:295–315.

Fröjd SA, Nissinen ES, Pelkonen MU, Marttunen MJ, Koivisto AM, Kaltiala-Heino R. Depression and school performance in middle adolescent boys and girls. Journal of Adolescence. 2008; 31:485–498. [PubMed: 17949806]

Galaif ER, Sussman S, Chou CP, Wills TA. Longitudinal relations among depression, stress, and coping in high risk youth. Journal of Youth and Adolescence. 2003; 32:243–258.

Goodman E, Slap GB, Huang B. The public health impact of socioeconomic status on adolescent depression and obesity. American Journal of Public Health. 2003; 93:1844–1850. [PubMed: 14600051]

Griffith MA, Dubow EF, Ippolito MF. Developmental and cross-situational differences in adolescents' coping strategies. Journal of Youth and Adolescence. 2000; 29:183–204.

Haase CM, Landberg M, Schmidt C, Lüdke K, Silbereisen RK. The later, the better? Early, average, and late timing of sexual experiences in adolescence and psychosocial adjustment in young adulthood. European Psychologist. 2012; 17:199–212.

Hallfors DD, Waller MW, Ford CA, Halpern CT, Brodish PH, Iritani B. Adolescent depression and suicide risk: Association with sex and drug behavior. American Journal of Preventive Medicine. 2004; 27:224–231. [PubMed: 15450635]

Halpern CT, Waller MW, Spriggs A, Hallfors DD. Adolescent predictors of emerging adult sexual patterns. The Journal of Adolescent Health. 2006; 39/:e1, e10.

Harden KP. Genetic influences on adolescent sexual behavior: Why genes matter for environmentally oriented researchers. Psychological Bulletin. 2014; 140:434–465. [PubMed: 23855958]

Horne S, Zimmer-Gembeck MJ. Female sexual subjectivity and well-being: Comparing late adolescents with different sexual experiences. Sexuality Research and Social Policy. 2005; 2:25–40.

Kaestle CE, Halpern CT, Miller WC, Ford CA. Young age at first sexual intercourse and sexually transmitted infections in adolescents and young adults. American Journal of Epidemiology. 2005; 161:774–780. [PubMed: 15800270]

Kirby DB, Laris BA, Rolleri LA. Sex and HIV education programs: Their impact on sexual behaviors of young people throughout the world. Journal of Adolescent Health. 2007; 40:206–217. [PubMed: 17321420]

Kirby D, Lepore G, Ryan J. Sexual risk and protective factors. Factors affecting teen sexual behavior, pregnancy, childbearing and sexually transmitted disease: Which are important? Which can you change? ETR Associates. 2005

Kreager DA, Staff J, Gauthier R, Lefkowitz ES, Feinberg ME. The Double Standard at Sexual Debut: Gender, Sexual Behavior and Adolescent Peer Acceptance. Sex Roles (online first). 2016:1–16.

Lachenbuch PA. Stata tip 89: Estimating means and percentiles following multiple imputation. The Stata Journal. 2010; 10:496–499.

Lammers C, Ireland M, Resnick M, Blum R. Influences on adolescents' decision to postpone onset of sexual intercourse: A survival analysis of virginity among youths aged 13 to 18 years. Journal of Adolescent Health. 2000; 26:42–48. [PubMed: 10638717]

Lefkowitz ES. "Things have gotten better": Developmental changes among emerging adults after the transition to university. Journal of Adolescent Research. 2005; 20:40–63.

Loewenstein, G., Frederick, S. Hedonic adaptation: From the bright side to the dark side. In: Kahneman, D.Diener, E., Schwarz, N., editors. Well-being: The foundations of hedonic psychology. New York: Russell Sage Foundation; 1999. p. 302-329.

Madkour AS, Farhat T, Halpern CT, Godeau E, Gabhainn SN. Early adolescent sexual initiation as a problem behavior: A comparative study of five nations. Journal of Adolescent Health. 2010; 47:389–398. [PubMed: 20864009]

Manlove, J., Romano Papillio, A., Ikramullah, E. Not yet: Programs to delay first sex among teens. Washington, DC: National Campaign to Prevent Teen Pregnancy; 2004.

Mann MJ, Kristjansson AL, Sigfusdottir ID, Smith ML. The impact of negative life events on young adolescents: Comparing the relative vulnerability of middle level, high school, and college-age students. RMLE Online: Research in Middle Level Education. 2014; 38:1–14.

Martinez G, Copen CE, Abma JC. Teenagers in the United States: Sexual activity, contraceptive use, and childbearing, 2006–2010 National Survey of Family Growth. Vital and Health Statistics. 2011; 23:1–35.

Masten AS, Roisman GI, Long JD, Burt KB, Obradović J, Riley JR, Tellegen A. Developmental cascades: linking academic achievement and externalizing and internalizing symptoms over 20 years. Developmental Psychology. 2005; 41:733–746. [PubMed: 16173871]

Meier AM. Adolescent first sex and subsequent mental health. American Journal of Sociology. 2007; 112:1811–1847.

Milhausen RR, Herold ES. Reconceptualizing the sexual double standard. Journal of Psychology & Human Sexuality. 2002; 13:63–83.

Nagy S, DiClemente R, Adcock AG. Adverse factors associated with forced sex among southern adolescent girls. Pediatrics. 1995; 96:944–946. [PubMed: 7478840]

Natsuaki MN, Biehl MC, Ge X. Trajectories of depressed mood from early adolescence to young adulthood: The effects of pubertal timing and adolescent dating. Journal of Research on Adolescence. 2009; 19:47–74.

O'Donnell L, O'Donnell CR, Stueve A. Early sexual initiation and subsequent sex-related risks among urban minority youth: The reach for health study. Family Planning Perspectives. 2001; 33:268–275. [PubMed: 11804436]

Osgood DW, Feinberg ME, Gest SD, Moody J, Ragan DT, Spoth R, Redmond C. Effects of PROSPER on the influence potential of prosocial versus antisocial youth in adolescent friendship networks. Journal of Adolescent Health. 2013; 53:174–179. [PubMed: 23885960]

Paul C, Fitzjohn J, Herbison P, Dickson N. The determinants of sexual intercourse before age 16. Journal of Adolescent Health. 2000; 27:136–147. [PubMed: 10899475]

Peen J, Schoevers RA, Beekman AT, Dekker J. The current status of urban-rural differences in psychiatric disorders. Acta Psychiatrica Scandinavica. 2010; 121:84–93. [PubMed: 19624573]

Probst JC, Laditka SB, Moore CG, Harun N, Powell MP, Baxley EG. Rural-urban differences in depression prevalence: Implications for family medicine. Family Medicine. 2006; 38:653–660. [PubMed: 17009190]

Raghavan R, Bogart LM, Elliott MN, Vestal KD, Schuster MA. Sexual victimization among a national probability sample of adolescent women. Perspectives on Sexual and Reproductive Health. 2004; 36:225–232. [PubMed: 15687080]

Ream GL. Reciprocal effects between the perceived environment and heterosexual intercourse among adolescents. Journal of Youth and Adolescence. 2006; 35:771–785.

Rector, RE., Johnson, KA., Noyes, LR. A report of the Heritage Center for Data Analysis. Washington, DC: The Heritage Foundation; 2003. Sexually active teenagers are more likely to be depressed and to attempt suicide.

Rostosky SS, Dekhtyar O, Cupp PK, Anderman EM. Sexual self-concept and sexual self-efficacy in adolescents: A possible clue to promoting sexual health? Journal of Sex Research. 2008; 45:277–286. [PubMed: 18686156]

Rudolph KD, Troop-Gordon W, Lambert SF, Natsuaki MN. Long-term consequences of pubertal timing for youth depression: Identifying personal and contextual pathways of risk. Development and Psychopathology. 2014; 26:1423–1444. [PubMed: 25422971]

Sabia JJ, Rees DI. The effect of adolescent virginity status on psychological well-being. Journal of Health Economics. 2008; 27:1368–1381. [PubMed: 18635278]

Santelli JS, Robin L, Brener ND, Lowry R. Timing of alcohol and other drug use and sexual risk behaviors among unmarried adolescents and young adults. Family Planning Perspectives. 2001; 33:200–205. [PubMed: 11589540]

Sbarra DA, Emery RE. The emotional sequelae of nonmarital relationship dissolution: Analysis of change and intraindividual variability over time. Personal Relationships. 2005; 12:213–232.

Spoth R, Greenberg M, Bierman K, Redmond C. PROSPER community–university partnership model for public education systems: Capacity-building for evidence-based, competence-building prevention. Prevention Science. 2004; 5:31–39. [PubMed: 15058910]

Spoth R, Redmond C, Shin C, Greenberg M, Clair S, Feinberg M. Substance-use outcomes at 18 months past baseline: The PROSPER community–university partnership trial. American Journal of Preventive Medicine. 2007; 32:395–402. [PubMed: 17478265]

Spriggs AL, Halpern CT. Sexual debut timing and depressive symptoms in emerging adulthood. Journal of Youth and Adolescence. 2008a; 37:1085–1096. [PubMed: 19802319]

Spriggs AL, Halpern CT. Timing of sexual debut and initiation of postsecondary education by early adulthood. Perspectives on Sexual and Reproductive Health. 2008b; 40:152–161. [PubMed: 18803797]

Symons K, Vermeersch H, Van Houtte M. The emotional experiences of early first intercourse: A multi-method study. Journal of Adolescent Research. 2014; 29:533–560.

Tubman JG, Windle M, Windle RC. The onset and cross-temporal patterning of sexual intercourse in middle adolescence: Prospective relations with behavioral and emotional problems. Child Development. 1996; 67:327–343. [PubMed: 8625716]

Vasilenko, SA., Lefkowitz, ES., Welsh, DP. Is sexual behavior healthy for adolescents? A conceptual framework for research on adolescent sexual behavior and physical, mental, and social health. In: Lefkowitz, ES., Vasilenko, SA., editors. New Directions for Child and Adolescent Development: Positive and negative outcomes of sexual behavior. Vol. 144. San Francisco: Jossey-Bass; 2014. p. 3-19.

Viner RM, Ozer EM, Denny S, Marmot M, Resnick M, Fatusi A, Currie C. Adolescence and the social determinants of health. The Lancet. 2012; 379:1641–1652.

Waller MW, Hallfors DD, Halpern CT, Iritani BJ, Ford CA, Guo G. Gender differences in associations between depressive symptoms and patterns of substance use and risky sexual behavior among a nationally representative sample of U.S. adolescents. Archives of Women's Mental Health. 2006; 9:139–150.

Walsh JL, Ward LM, Caruthers A, Merriwether A. Awkward or amazing: Gender and age trends in first intercourse experiences. Psychology of Women Quarterly. 2011; 35:59–71.

Wang J. Rural–urban differences in the prevalence of major depression and associated impairment. Social Psychiatry and Psychiatric Epidemiology. 2004; 39:19–25. [PubMed: 15022042]

Wheeler SB. Effects of self-esteem and academic performance on adolescent decision-making: an examination of early sexual intercourse and illegal substance use. Journal of Adolescent Health. 2010; 47:582–590. [PubMed: 21094435]

Wight D, Parkes A, Strange V, Allen E, Bonell C, Henderson M. The quality of young people's heterosexual relationships: A longitudinal analysis of characteristics shaping subjective experience. Perspectives on Sexual and Reproductive Health. 2008; 40:226–237. [PubMed: 19067936]

Zimmer-Gembeck MJ, Helfand M. Ten years of longitudinal research on US adolescent sexual behavior: Developmental correlates of sexual intercourse, and the importance of age, gender and ethnic background. Developmental Review. 2008; 28:153–224.

Zolkoski SM, Bullock LM. Resilience in children and youth: A review. Children and Youth Services Review. 2012; 34:2295–2303.

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Table 1

Descriptive statistics by gender and early-initiation status across multiply imputed datasets

		Female adolescents		Male adolescents	
		Early initiators mean (*SE*) or %	**On-time and non-initiators mean (*SE*) or %**	**Early initiators mean (*SE*) or %**	**On-time and non-initiators mean (*SE*) or %**
	Wave				
Mean internalizing symptoms	5	0.68 (0.04)	0.47 (0.02)	0.29 (0.05)	0.24 (0.01)
	6	0.58 (0.04)	0.47 (0.02)	0.30 (0.05)	0.24 (0.01)
	7	0.58 (0.04)	0.46 (0.02)	0.31 (0.05)	0.28 (0.02)
	8	0.54 (0.05)	0.40 (0.02)	0.22 (0.05)	0.24 (0.02)
	9	0.54 (0.03)	0.48 (0.02)	0.32 (0.04)	0.31 (0.01)
Mother-child warmth (lagged by one wave)	5	3.65 (0.09)	4.03 (0.04)	3.70 (0.11)	3.89 (0.04)
	6	3.44 (0.09)	3.90 (0.04)	3.51 (0.13)	3.83 (0.04)
	7	3.55 (0.09)	3.86 (0.04)	3.48 (0.14)	3.75 (0.04)
	8	3.60 (0.10)	3.82 (0.05)	3.44 (0.12)	3.78 (0.04)
	9	3.64 (0.09)	3.83 (0.05)	3.60 (0.13)	3.73 (0.05)
Father-child warmth (lagged by one wave)	5	3.23 (0.10)	3.75 (0.05)	3.52 (0.13)	3.63 (0.05)
	6	3.10 (0.10)	3.57 (0.05)	3.28 (0.14)	3.53 (0.05)
	7	3.11 (0.11)	3.47 (0.05)	3.30 (0.15)	3.44 (0.05)
	8	3.15 (0.11)	3.46 (0.05)	3.25 (0.15)	3.46 (0.05)
	9	3.21 (0.10)	3.49 (0.05)	3.38 (0.13)	3.41 (0.05)
Frequency of drunkenness (lagged by one wave)	5	1.56 (0.07)	1.18 (0.02)	1.60 (0.10)	1.20 (0.03)
	6	2.20 (0.10)	1.41 (0.03)	2.18 (0.14)	1.44 (0.04)
	7	2.60 (0.11)	1.69 (0.04)	2.75 (0.17)	1.77 (0.05)
	8	2.75 (0.10)	1.89 (0.05)	2.77 (0.17)	1.95 (0.05)
	9	2.90 (0.11)	2.11 (0.05)	2.97 (0.18)	2.18 (0.05)

		Female adolescents		Male adolescents	
		Early initiators mean (*SE*) or %	**On-time and non-initiators mean (*SE*) or %**	**Early initiators mean (*SE*) or %**	**On-time and non-initiators mean (*SE*) or %**
	Wave				
Delinquency (lagged by one wave)	5	1.31 (0.04)	1.11 (0.01)	1.39 (0.06)	1.20 (0.02)
	6	1.35 (0.04)	1.16 (0.01)	1.48 (0.06)	1.22 (0.02)
	7	1.38 (0.04)	1.18 (0.02)	1.55 (0.07)	1.28 (0.02)
	8	1.47 (0.05)	1.21 (0.02)	1.64 (0.08)	1.33 (0.02)
	9	1.41 (0.05)	1.22 (0.02)	1.59 (0.09)	1.35 (0.02)
Grades (lagged by one wave)	5	3.25 (0.07)	3.46 (0.03)	2.88 (0.10)	3.24 (0.03)
	6	3.05 (0.07)	3.35 (0.03)	2.74 (0.10)	3.12 (0.03)
	7	3.18 (0.06)	3.36 (0.03)	2.72 (0.10)	3.13 (0.03)
	8	3.12 (0.07)	3.36 (0.03)	2.76 (0.10)	3.11 (0.03)
	9	3.20 (0.06)	3.42 (0.03)	2.81 (0.09)	3.16 (0.04)
Free lunch	5	30%	21%	28%	18%
	6	27%	19%	28%	17%
	7	26%	19%	23%	16%
	8	23%	16%	23%	16%
	9	21%	16%	22%	14%
Two-parent family	5	74%	80%	73%	84%
	6	76%	81%	78%	83%
	7	71%	80%	71%	83%
	8	69%	78%	65%	80%
	9	67%	76%	65%	81%

Notes. Possible ranges: internalizing symptoms, 0–2; mother-child warmth, father-child warmth, frequency of drunkenness, grades, delinquency, 1–5

Although logged scores of internalizing symptoms were used in analyses, raw scores are presented here for ease of interpretation

Descriptive statistics were obtained across all multiply imputed datasets using the mi estimate command in STATA (Lachenbruch, 2010)

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Table 2

Random effects models of (logged) internalizing symptoms across wave of initiation

	Model 1: Sexual initiation			
	Boys		Girls	
	β	Robust SE	β	Robust SE
Wave	−0.006	0.004	−0.024***	0.005
Wave^2	0.003*	0.001	0.005***	0.001
Mean transition value	−0.032*	0.016	0.038*	0.016
Sexual initiation	0.002	0.008	−0.001	0.009
Number of waves after initiation				
Times drunk in past year lagged	−0.002	0.003	0.003	0.004
Mother warmth lagged	0.001	0.005	−0.011*	0.004
Father warmth lagged	−0.011*	0.005	−0.006	0.004
Two-parent family	0.002	0.011	0.002	0.011
Free/reduced price lunch	0.022*	0.011	0.017+	0.010
Delinquency	0.013	0.008	0.010	0.011
Grades	−0.003	0.005	−0.012+	0.006
Black	0.008	0.040	0.004	0.045
Hispanic	−0.001	0.040	0.015	0.026
Other race	0.014	0.010	−0.012	0.026
Condition (intervention or control)	0.014	0.010	0.011	0.010
Variance components				
Within-person		0.106		0.132
Between-person		0.136		0.139
ICC		0.376		0.475
F statistic		3.45***		4.02***
df		15, 3296.8		15, 2832.4

Notes:

+ $p < .10$

* $p < .05$,

** $p < .01$,

*** $p < .001$.

Table 3

Random effects models of (logged) internalizing symptoms with an indicator for initiation at W5 and decay measure

	Boys				Girls			
	Model 2: Sexual initiation		Model 3: Decay of sexual initiation		Model 2: Sexual initiation		Model 3: Decay of sexual initiation	
	β	Robust SE	β	Robust SE	β	Robust SE	β	Robust SE
Wave	−0.006	0.006	−0.007	0.006	−0.024***	0.005	−0.020***	0.006
Wave^2	0.003*	0.001	0.004**	0.001	0.005***	0.001	0.007***	0.001
Sexual initiation, early initiators	−0.011	0.016	0.004	0.021	0.047***	0.015	0.087***	0.018
Number of waves after initiation, early initiators			−0.007	0.006			−0.019***	0.005
Mean transition value, on-time initiators	−0.053**	0.018	−0.037+	0.019	0.011	0.020	0.045*	0.022
Sexual initiation, on-time initiators	0.002	0.008	0.002	0.006	−0.001	0.009	−0.010	0.001
Number of waves after initiation, on-time initiators			−0.011*	0.005			−0.018***	0.006
Times drunk in past year lagged	−0.002	0.003	−0.001	0.003	−0.003	0.004	<-0.001*	0.004
Mother warmth lagged	0.001	0.005	0.001	0.005	−0.011**	0.004	−0.011*	0.004
Father warmth lagged	−0.011*	0.005	−0.011*	0.005	−0.006	0.004	−0.005	0.004
Two-parent family	0.003	0.011	0.002	0.011	0.002	0.011	0.001	0.011
Free/reduced price lunch	0.021+	0.011	0.021+	0.011	0.017+	0.010	0.015	0.010
Delinquency	0.013	0.008	0.013	0.008	0.010	0.011	0.010	0.011
Grades	−0.002	0.005	−0.002	0.005	−0.012+	0.006	−0.012+	0.006
Black	0.015	0.040	0.015	0.040	0.001	0.045	0.001	0.045
Hispanic	0.002	0.040	0.003	0.040	0.017	0.026	0.018	0.026
Other race	0.013	0.024	0.013	0.024	−0.012	0.026	−0.013	0.026
Condition (intervention or control)	0.013	0.010	0.013	0.010	0.012	0.010	0.012	0.010
Variance components								
Within-person		0.105		0.106		0.131		0.131
Between-person		0.136		0.136		0.139		0.138
ICC		0.375		0.376		0.473		0.475

	Boys				Girls			
	Model 2: Sexual initiation		Model 3: Decay of sexual initiation		Model 2: Sexual initiation		Model 3: Decay of sexual initiation	
	β	Robust SE	β	Robust SE	β	Robust SE	β	Robust SE
F statistic		3.62***		3.48***		4.14***		4.38***
df		16, 3751.6		18, 4504.9		16, 3243.0		18, 4055.9

Notes:

+ $p < .10$

* $p < .05$,

** $p < .01$,

*** $p < .001$.

Table 4

Lagged random effects models of (logged) internalizing symptoms across wave of initiation

	Model 1: Sexual initiation			
	Boys		Girls	
	β	Robust SE	β	Robust SE
Wave	−.040 **	.014	−.052 **	.014
Wave^2	.009 **	.003	.011 ***	.003
Mean transition value	−.029	.019	−.025	.019
Sexual initiation lagged	.008	.009	−.003	.009
Times drunk in past year lagged	−.006	.004	−.001	.003
Mother warmth lagged	−.001	.006	−.010 +	.005
Father warmth lagged	−.010 *	.005	−.009 *	.004
Two-parent family	−.001 *	.013	.010	.012
Free/reduced price lunch	.026	.013	−.010	.013
Delinquency	−.019	.008	−.011	.012
Grades	<.001	.005	.014	.007
Black	−.010	.038	.023	.052
Hispanic	−.013 *	.033	.010	.027
Other race	.011	.025	−.012	.027
Condition (intervention or control)	.011	.010	.007	.010
Variance components				
Within-person	.109		.130	
Between-person	.134		.138	
ICC	.399		.469	
F statistic	2.92 ***		3.62 ***	
df	15, 1708.5		15, 2398.8	

Notes:

+ $p < .10$

* $p < .05$,

** $p < .01$,

*** $p < .001$.

Table 5

Lagged random effects models of (logged) internalizing symptoms with an indicator for initiation at W5 and decay measure

	Boys				Girls			
	Model 2: Sexual initiation		Model 3: Decay of sexual initiation		Model 2: Sexual initiation		Model 3: Decay of sexual initiation	
	β	Robust SE	B	Robust SE	β	Robust SE	β	Robust SE
Wave	−.041**	.014	−.043**	.014	−.052**	.014	−.052**	.014
Wave^2	.009**	.003	.011***	.003	.011***	.003	.011***	.003
Lagged sexual initiation, early initiators	−.007	.016	.020	.022	.023	.014	.037+	.019
Lagged number of waves after initiation, early initiators			−.004	.009			−.004	.008
Mean transition value, on-time initiators	−.078**	.027	−.055+	.029	−.003	.028	.012	.032
Lagged sexual initiation, on-time initiators	.009	.010	.006	.010	−.003	.009	−.006	.010
Lagged number of waves after initiation, on-time initiators			−.017**	.006			−.010+	.006
Times drunk in past year lagged	−.006	.004	−.006	.004	−.001	.003	−.001	.003
Mother warmth lagged	−.001	.006	−.001	.006	−.010*	.012	−.010+	.005
Father warmth lagged	−.010+	.005	−.010+	.005	−.009*	.013	−.009*	.004
Two-parent family	−.001	.013	−.001	.013	.008	.011	.008	.012
Free/reduced price lunch	.024+	.014	.025+	.014	.019	.007	.019	.013
Delinquency	.019*	.008	.019*	.008	.010	.011	.011	.011
Grades	<.001	.005	<.001	.005	−.011	.007	−.011	.007
Black	−.003	.040	−.002	.040	.012	.052	.011	.052
Hispanic	−.013	.034	−.013	.034	.025	.027	.024	.027
Other race	.009	.027	.009	.027	−.012	.027	−.011	.027
Condition (intervention or control)	.010	.010	.010	.010	.008	.010	.007	.010
Variance components								
Within-person	.109		.109		.130		.130	
Between-person	.134		.134		.138		.138	
ICC	.397		.398		.469		.469	

	Boys				Girls			
	Model 2: Sexual initiation		Model 3: Decay of sexual initiation		Model 2: Sexual initiation		Model 3: Decay of sexual initiation	
	β	Robust SE	Β	Robust SE	β	Robust SE	β	Robust SE
F statistic	3.18***		3.44***		3.62***		3.43***	
df	16, 1906.4		18, 2454.6		16, 2812.2		18, 3534.1	

Notes:

+ $p < .10$

* $p < .05$,

** $p < .01$,

*** $p < .001$.