

# Age-Varying Associations Between Nonmarital Sexual Behavior and Depressive Symptoms Across Adolescence and Young Adulthood

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Research has demonstrated associations between adolescent sexual behavior and depressive symptoms, but no single study has examined individuals at different ages throughout adolescence and young adulthood in order to determine at what ages sexual behavior may be associated with higher or lower levels of depressive symptoms. Using nationally representative longitudinal data and an innovative method, the time-varying effect model (TVEM), which examines how the strength of an association changes over time, this study examines how nonmarital sexual intercourse is associated with depressive symptoms at different ages, which behaviors and contexts may contribute to these associations, and whether associations differ for male and female participants. Findings indicate that sexual behavior in adolescence is associated with a higher level of depressive symptoms, particularly for female adolescents, and this association is relatively consistent across different partner types and adolescent contexts. Associations between sexual behavior and depressive symptoms in young adulthood are more dependent on partner factors and adolescent contexts; sexual behavior in young adulthood is associated with fewer depressive symptoms for women who have sex with a single partner and for men whose parents did not strongly disapprove of adolescent sexual behavior. Findings suggest that delaying sexual behavior into young adulthood may have some benefits for mental health, although contextual and relationship factors also play a role.

**Keywords:** sexual behavior, mental health, adolescence, young adulthood, gender differences

The meaning attached to sexual behavior changes with age, and thus the consequences of sexual behavior are likely age-varying (Vasilenko & Lanza, 2014). For example, sexual behavior in adolescence is often viewed from a risk perspective, which focuses on its associations with negative outcomes like STIs and depressive symptoms (Russell, 2005). In adulthood, however, sexual behavior is viewed as an important component of marriage, with sexual frequency and satisfaction associated with increased relationship satisfaction (Edwards & Booth, 1994; Sprecher & Cate, 2004). Despite this age-varying nature of sexual behavior, little work has systematically examined how the association between

sexual behavior and well-being changes by age. However, understanding the developmental nature of sexual behavior has important implications for sexuality education programs. Many programs emphasize waiting to engage in sexual behavior, with some abstinence-focused programs asserting that any sexual behavior outside of marriage is detrimental to mental health. There is relatively little research to support or refute this idea, and thus a greater understanding of when sexual behavior may be harmful (or beneficial) to mental health is needed. In this study, I use a new analytic method, the time-varying effect model (TVEM), to examine how associations between sexual behavior and depressive symptoms change across adolescence and young adulthood, using four waves of data from the National Longitudinal Study of Adolescent to Adult Health (Add Health). Because these associations may differ based on a number of different factors, I also examine the moderating role of biological sex, partner factors, and parental disapproval of sex.

## Sexual Behavior and Depressive Symptoms by Age

Research on adolescent sexuality has traditionally focused on risks of adolescent sexual behavior, treating it as part of a syndrome of problem behaviors (Jessor & Jessor, 1975). However, development of sexuality is also an important and normative developmental task (Brooks-Gunn & Paikoff, 1993; Tolman & McClelland, 2011; Welsh, Rostosky, & Kawaguchi, 2000). The vast majority of individuals engage in sexual behavior prior to marriage, and most do so in adolescence or young adulthood (Finer, 2007). In order to promote healthy sexual development, it is important to understand when and under what circumstances sexual behavior is more problematic or beneficial (Halpern, 2010;

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Vasilenko, Lefkowitz, & Welsh, 2014). Thus, a more complete understanding of healthy sexual development necessitates research about the ages at which sexual behavior may be associated with better or worse mental health outcomes, and how this may differ for individuals with different characteristics or in different contexts.

A number of theoretical approaches provide insight into how sexual behavior may be associated with mental health at different ages. Unlike some outcomes like pregnancy or transmission of STIs, sexual behavior does not lead directly to depressive symptoms, but instead may occur due to some sort of cognitive meaning-making process. Cognitive theories of depression (Abramson, Metalsky, & Alloy, 1989; Beck, 1987; Kovacs & Beck, 1978; Oatley & Bolton, 1985) and work on subjective well-being (Diener, Oishi, & Lucas, 2003; Lyubomirsky, 2003; Schwarz & Stack, 1991) state that events by themselves may not be associated with mental health, but that associations may depend on how individuals perceive and evaluate these events. In the realm of sexual behavior, one individual may evaluate their sexual behaviors negatively and feel guilt or shame about them, which could lead to depressive symptoms, whereas another individual may interpret them more positively and experience better mental health (Vasilenko et al., 2014). These evaluations may be influenced by external cultural messages about the appropriateness of sexual behavior (Vasilenko & Lanza, 2014). Thus, if cultural norms suggest that sexual behavior is more or less appropriate for individuals at different ages, this could impact how individuals interpret their behaviors, and ultimately how their behaviors are associated with their mental health.

The idea that mental health outcomes of sexual behavior may differ by age is also supported by life course theory, which states that the outcomes of events may differ depending on when they occur in a person's life (Elder, 1998). In particular, experiencing events at times that are off-time relative to peers may be associated with greater distress. In the area of sexual behavior and mental health, for example, adolescent sexual behavior may be associated with increased depressive symptoms if it occurs early relative to peers, because the behavior is not normative and individuals may lack the ability to adequately deal with it (Meier, 2007). However, in emerging adulthood, the period from ages 18–25, sexual behavior may be associated with more positive outcomes, as individuals may be in environments that are more accepting of sexual behavior (Arnett, 2000; Lefkowitz, 2005). Sexual behavior in this period may be seen as more developmentally normative than in adolescence and, therefore, may be associated with more positive mental health outcomes (Vasilenko, Ram, & Lefkowitz, 2011). As individuals move out of this exploratory life stage, serious relationships, including marriage and cohabitation, become more normative, which could lead to increased pressure for intimate relationships. Research has shown that abstinence in adulthood is stigmatized (Gesselman, Webster, & Garcia, 2016), which suggests that during this period, individuals who are sexually active may have better mental health than those who do not.

Research provides some evidence for such age-graded experiences of sexual intercourse. Cross-sectional studies suggests that early or late timing of intercourse is associated with negative psychological outcomes (Bingham & Crockett, 1996; Tubman, Windle, & Windle, 1996). Longitudinal studies have found that female adolescents under age 16 who had transitioned to first

intercourse experienced a greater increase in depressive symptoms a year later than those who had never engaged in first intercourse (Meier, 2007; Spriggs & Halpern, 2008), although these effects may not last into early adulthood (Monahan & Lee, 2008; Spriggs & Halpern, 2008). Thus, there is some evidence that early sexual behavior may be associated with increased depressive symptoms for adolescent girls. On the other hand, recent work suggests that, on average, emerging adults experience a decrease in symptoms of psychological distress after engaging in first intercourse (Vasilenko, 2011), and that male adolescents' body image becomes more positive after first intercourse (Vasilenko et al., 2011). Less work has focused on mental health outcomes of sexual behavior beyond the emerging adulthood period, but existing work has suggested better mental health for those who are sexually active. Engaging in first intercourse late relative to peers is associated with sexual problems in adulthood, suggesting there may be some detrimental effects of abstinence into adulthood (Sandford, Orr, Hirsch, & Santelli, 2008). Individuals who are abstinent in young adulthood may have issues with social relationships and suffer from shyness and body image issues; these factors suggest that abstaining from sexual behavior in young adulthood may not be entirely voluntary, and may be associated with psychological distress (Boislard, van de Bongardt, & Blais, 2016; Donnelly, Burgess, Anderson, Davis, & Dillard, 2001). Other work has examined short-term effects of sexual behavior (daily reports or ecological momentary assessments) and suggests that older adolescents and emerging adults feel less negative affect, more positive affect, and more positive than negative consequences shortly after having sex (Fortenberry et al., 2005; Shrier, Shih, Hacker, & de Moor, 2007; Vasilenko, Lefkowitz, & Maggs, 2012). Similarly, adult women experienced more positive affect and less negative affect and stress after engaging in sexual behavior (Burelson, Trevathan, & Todd, 2007). As a whole, this research suggests that early adolescent sexual behavior may be associated with more negative mental health outcomes, whereas young adult sexual behavior may be associated with more neutral or positive outcomes.

Despite a growing literature on mental health outcomes of sexual behavior, little research has examined the effects of sexual behavior at different ages across adolescence and young adulthood, making it difficult to precisely pinpoint what ages are associated with more or less problematic mental health outcomes. One recent study suggests an approach for examining this topic. Vasilenko and Lanza (2014) used a novel innovative method that examines how associations between two variables differ at every point in continuous time to examine how having multiple sexual partners (2 + compared to 0 or 1) in the past year was associated with depressive symptoms at different ages. They found that having multiple sexual partners was significantly associated with depressive symptoms until age 28 for women and age 18 for men. This study provides more direct evidence for age-varying associations between sexual behavior and mental health. However, the coding of the multiple partners variable does not make it possible to tease apart whether the associations are driven by merely being sexually active or by having multiple partners. In addition, this study did not examine how factors that shape sexual behavior, such as parental messages, may moderate this association. Examining these questions could help elucidate the process by which sexual behavior is associated with depressive symptoms. In addition, it

could provide information to inform sexuality education programs about when sexual behavior may be more problematic or beneficial, and how messages of disapproval of sex may be associated with depressive symptoms when individuals are sexually active.

### Differences by Behavior and Contextual Factors

There may be factors related to individuals' sexual experiences that predict depressive symptoms beyond whether or not intercourse occurred. For example, associations between early sexual initiation and depressive symptoms may be present only for female adolescents who were not in a romantic relationship with their sexual partner (Grello, Welsh, Harper, & Dickson, 2003; Meier, 2007). Engaging in a higher level of sexual activity with nonrelationship, but not relationship, partners was associated with increasing depressive symptoms at a 3-month follow-up for female adolescents (Shulman, Walsh, Weisman, & Schelyer, 2009). Event-level analyses suggest college students feel more guilt about sex with a friend or stranger compared to an individual with whom they were in a romantic relationship with or dating (Vasilenko et al., 2012). Having a larger number of sexual partners is also associated with greater depressive symptoms for adolescents (Kosunen, Kaltiala-Heino, Rimpelä, & Liappala, 2003). Thus, it is important to look at relationship factors to determine which aspects of sexual behavior may be associated with depressive symptoms and how this association may change over time.

Ecological theories of development suggest that sexual development is influenced by environmental context at a number of levels of influence, including parents, school, and religious organizations (Bronfenbrenner, 2005; Shoveller, Johnson, Langille, & Mitchell, 2004). Drawing from theories of social control, DeLamater (1981) suggests the family serves as an important source of socialization regarding the acceptability of particular sexual behaviors. The family context can influence adolescents' sexual behavior through direct means, such as communication about parental approval/disapproval of adolescent sexual behavior, as well as through more indirect means such as family structure or monitoring (Bersamin et al., 2008; Kotchick, Shaffer, Miller, & Forehand, 2001; Miller, 2002). A number of studies have documented a link between parental disapproval of sexual behavior and decreased adolescent sexual intercourse (Dittus & Jaccard, 2000; Jaccard, Dittus, & Gordon, 1996; McNeely et al., 2002). Although these factors are usually studied in terms of how they protect against adolescent sexual behavior, they may also be associated with more negative perceptions of sexual behavior when individuals do have sex and, subsequently, may be associated with more negative mental health outcomes (Vasilenko & Lanza, 2014). To my knowledge no study has examined whether factors like parental disapproval of sex moderate associations between sexual behavior and mental health outcomes.

### Differences by Gender

As shown above, associations between depressive symptoms and sexual behavior may differ by gender. One possible explanation for this is the influence of sexual double standards, which suggest that sexual behavior, particularly outside of marriage or a committed relationship, is more problematic for women, and may

be encouraged for men (Crawford & Popp, 2003). Subsequently, women may feel more guilt or shame about their sexual behavior, which could lead to more negative mental health outcomes. In general, research has supported this idea, showing that women have more negative or less positive mental health outcomes of sexual behavior, including a greater increase in depressive symptoms after first intercourse (Meier, 2007; Spriggs & Halpern, 2008). However, there is some evidence that the transition to sex during the college years (Vasilenko, 2011) and recent sexual behavior among late adolescents and young adults (Fortenberry et al., 2005; Shrier et al., 2007) are associated with more positive outcomes for women compared to sexual behavior earlier in adolescence. In addition, relationship context may moderate this association, with negative outcomes mostly a result of sexual behavior with a nonrelationship partner (Grello et al., 2003; Meier, 2007; Shulman et al., 2009).

In this paper, I examine how engaging in sexual intercourse in the past year is associated with past-week depressive symptoms from adolescence into young adulthood (ages 14 to 32). The focus of this paper is on depressive symptoms, rather than a clinical diagnosis, consistent with efforts to understand sexual behavior and its consequences from a normative developmental perspective (Tolman & McClelland, 2011; Welsh et al., 2000). I also examine how these associations differ by biological sex, partner factors (number of partners and nonrelationship sex), and parental disapproval of sex. I have four aims:

1. To examine how engaging in sexual intercourse in the past year is associated with past-week level of depressive symptoms across ages 14 to 32. Based on life course theory (Elder, 1998) and prior research (e.g., Meier, 2007; Spriggs & Halpern, 2008; Vasilenko et al., 2011), I predict that sexual intercourse early in adolescence will be associated with greater depressive symptoms, and this association will weaken into early adulthood, where sexual intercourse will be associated with fewer depressive symptoms.
2. To examine how number of sexual partners and engaging in nonrelationship sexual intercourse are associated with depressive symptoms across these ages for adolescents who are sexually active. Based on prior research (Grello et al., 2003; Meier, 2007; Shulman et al., 2009; Kosunen et al., 2003), I predict that sex with multiple or nonrelationship partners will be associated with a higher number of depressive symptoms than sex with a single or relationship partner, and that this association will be stronger in early adolescence than in adulthood.
3. To test how parental disapproval of sex in adolescence moderates associations between past-year sexual intercourse and depressive symptoms at these ages. Based on ecological (Bronfenbrenner, 2005) and social control (DeLamater, 1981) theories, I predict that individuals whose parents strongly disapprove of sex will have stronger associations between sexual intercourse and depressive symptoms, and these associations will weaken over time.

4. To examine differences in these associations by biological sex. Based on theory of the sexual double standard (Crawford & Popp, 2003) and past research (Meier, 2007; Vasilenko et al., 2011), I predict that sexual intercourse will be more strongly associated with depressive symptoms for female, compared to male, participants, and this difference will weaken as individuals transition to adulthood.

## Method

### Participants and Procedures

Data are from the contractual sample of Add Health (Harris, 2011). Eighty high schools and associated middle schools were sampled, employing a clustered sampling design to ensure that the sample was representative of schools in the United States. Participants completed in-school and in-home interviews in 1994–1995 (Wave I), when they were in seventh through 12th grade, with follow-up interviews during 1995–1996 (Wave II; 12th graders not interviewed), 2001–2002 (Wave III) and 2007–2008 (Wave IV). The Add Health data can be viewed as a cohort sequential or accelerated cohort design (Duncan, Duncan, & Hops, 1996; Nesselroade & Baltes, 1979) in which multiple cohorts are followed over time in order to more efficiently sample across a larger age range (Natsuaki, Biehl, & Ge, 2009). I included only individuals from the core sample, which was designed to obtain a representative sample of the school-age population and is essentially self-weighting (Harris, 2011). The resulting sample contained 11,963 individuals (52.2% female, 18.3% African American, 11.9% Hispanic, 3.5% Asian, 2.6% other race,  $M$  age at Wave I = 16.1 years,  $SD = 1.8$ ).

About 80% of participants from the Wave I sample participated in each of the later waves (89% Wave II, 77% Wave III, and 80% Wave IV), and less than 5% of data from individuals who completed the survey was missing on all variables of interest. I include person-waves of data from any measurement occasion in which an individual completed data on the relevant variables. However, I excluded all measurement occasions where an individual was married, as cultural and religious messages, and subsequently the psychological impact of sexual behavior, may be different for married individuals. In addition, I restricted the data to occasions collected after age 14 and prior to age 32, due to the sparseness of

data outside this range. Thus, I included 31,485 person-waves of data. Age in months was used as the time variable.

### Measures

Descriptive statistics for the study variables are presented in Table 1.

**Outcome.** The primary outcome was *depressive symptoms*, a measure of the mean score on nine items that parallel items in the Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977). A sample item was “You felt sad.” Items were rated on a 0–3 scale measuring how often (*Never/rarely* to *Most/all of the time*) participants felt this way in the past week. A score measuring each individual’s mean averaged across all items was created ( $M = 0.6$ ,  $SD = 0.5$ , range 0–3). Reliability was adequate at all waves ( $\alpha = .76$ –.81).

**Predictors.** Our primary predictor was *past-year intercourse*, a measure of whether a participant engaged in sexual intercourse in the past year (0 = *no*, 1 = *yes*). In Waves I and II, participants who reported ever having sexual intercourse were asked a follow-up question about date of most recent sex; if this date was in the past year, participants were coded 1. In Waves III and IV, participants were asked if they ever had intercourse, and if so, completed a series of follow-up questions, including how many partners they had in the past year. Responses were coded 1 if they reported at least 1 partner in the past year, and 0 if they had never had sex or had 0 partners in the past year.

In addition, I examined the effects of two other facets of sexual behavior on occasions when individuals were sexually active. *Multiple partners* was a measure of whether an individual engaged in sexual behavior with more than one partner in the past year. At Waves I and II, this measure was computed using two measures. First, participants were asked whether they engaged in series of behaviors with up to three relationship partners they had named previously, including “We had sexual intercourse.” This was followed by the item: “In addition to {\_\_\_\_} and anyone whose initials you gave as a romantic relationship partner, have you had a sexual relationship with anyone else?” At Wave III, participants reported: “With how many different partners have you had vaginal intercourse in the past 12 months?” At Wave IV, participants were asked “Considering all types of sexual activity, with how many male/female partners have you had sex in the past 12 months?” about both their male and female partners; only opposite-sex

Table 1  
Descriptive Statistics and Correlations for Primary Study Variables

Variables	Mean	SD	Range	1	2	3	4	5	6	7	8
1. Male	.48	.50	0, 1	1.0							
2. Depressive symptoms	.60	.6	0–3	-.12***	1.0						
3. Parent disapproval of sex	.65	.48	0, 1	-.07***	-.05***	1.0					
4. Past-year sex	.55	.50	0, 1	-.02**	.4***	-.13***	1.0				
5. Single partner	.32	.47	0, 1	-.08***	-.01	-.06***	NA	1.0			
6. Multiple partners	.23	.42	0, 1	.6***	.04***	-.09***	NA	NA	1.0		
7. Relationship sex	.36	.47	0, 1	-.08***	.01	-.07***	NA	NA	NA	1.0	
8. Nonrelationship sex	.18	.39	0, 1	.05***	.04***	-.08***	NA	NA	NA	NA	1.0

Note. All correlations show within-wave associations between variables from across Waves I–IV of Add Health, excluding correlations with nonrelationship sex, which include measures from Waves I–III.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ .



partners were included to make the measures more comparable across waves. Scores were dichotomized (0 = 0–1 partner, 1 = 2+ partners). Across the study, multiple partners in the past year were reported on about 30% of person-waves when participants were sexually active.

*Nonrelationship sex* was a measure of whether participants reported sex in the past year with a partner they were not in a romantic relationship with. In Waves I and II, participants were asked how many people other than romantic partners they had sex with in the past year. In Wave III, this variable was constructed from a series of questions asking each of the participants about their sexual partners in the past year, with only opposite-sex partners included in these analyses. Note that items about nonrelationship behavior were not asked in a comparable way in Wave IV, and thus analyses examining nonrelationship sex focus only on ages up to 26. Nonrelationship sex was reported on 22% of occasions when participants were sexually active.

**Moderators.** I examined two moderators, which were assessed at Wave I. *Biological sex* was a self-report item asking whether the participant was male or female. *Parental disapproval of sex* during adolescence was calculated from two Wave I items asking individuals the extent to which each of their parents approved of their engaging in sexual behavior during this time in their life. These questions were rated on a 5-point scale from *strongly disapprove* to *strongly approve*. Because the majority of respondents reported strong perceived parental disapproval of sex (54% of mothers, 58% of fathers), I dichotomized the measure as strongly disapprove/not strongly disapprove. Since about a third of participants reported no resident father, I coded an individual as perceiving strong parental disapproval of sex if they reported any parent as a value of 1 (*strongly disapprove*), and a 0 if all parents they reported on were scored as any nonmissing value other than strongly disapprove. 58% of participants reported that at least one of their parents strongly disapproved of them having sex at the time of Wave 1 interview.

**Covariates.** I included several covariates in these models that may be associated with sexual intercourse and depressive symptoms. All covariates were measured at Wave I. *Race/ethnicity* was measured with four dummy-coded variables (Hispanic/Latino (HL); non-HL Black; non-HL Asian; non-HL other, with non-HL White as the reference group). Family structure was a dichotomous indicator of whether an adolescent lived with both parents (63%). Mother's education indicated whether or not the adolescent's mother had completed any schooling after high school (47%), and was used as a proxy for SES.

## Statistical Analyses

We used TVEM (Lanza, Vasilenko, Liu, Li, & Piper, 2014) to examine how sexual intercourse was associated with level of depressive symptoms over time from ages 14–32. TVEM is a flexible, nonparametric method that estimates the associations between a predictor and an outcome as a function of continuous time. TVEM has been used successfully to examine developmental changes in longitudinal panel data (Evans-Polce, Vasilenko, & Lanza, 2015; Vasilenko & Lanza, 2014). The use of TVEM for developmental changes is particularly useful for informing prevention programs, as it can determine risk factors to intervene on at particular ages (Coyle & DiClemente, 2014). As TVEM is an

extension of traditional regression approaches, it can accommodate concurrent or lagged effects in longitudinal data. Due to the large and uneven spacing between measurement occasions, as well as the specific measures used (past-year sexual intercourse, past-week depressive symptoms) we examine how within-wave associations vary at different ages (e.g., how an individual's Wave 1 past-year behavior predicts their Wave 1 past-week depressive symptoms). Thus, each individual contributes up to four of these within-wave measures from adolescence into young adulthood. Although we used data from across all waves, our time measure is age, as in other cohort-sequential analyses using Add Health (e.g., Natsuaki et al., 2009).

Our analyses proceeded in three stages, all of which used the SAS TVEM macro (Li et al., 2015). First, in order to document how rates of sexual behavior change by age, I used intercept-only models in logistic TVEM to estimate rates of any sexual intercourse, sex with multiple partners, and nonrelationship sex. Intercept-only models flexibly estimate how a level or rate of a particular variables changes over time. The following equation specified the intercept-only model for past-year sex:

$$(PYSEX_{ij}) = \frac{\exp\beta_0(t_{ij})}{1 + \exp\beta_0(t_{ij})}$$

In this equation, the estimated probability of sex in the past year for an individual  $i$  at an age  $t$  is calculated from  $\beta_0(t_{ij})$ , which is a continuous function representing the occurrence of past year sex at different ages.

I then used the TVEM macro to estimate how these time-varying behaviors were associated with depressive symptoms over time. Models were run separately for male and female participants to allow for full time-varying moderation. As an example, the following model represents the effect of past-year sex on depressive symptoms:

$$(Dep\ Sympt_{ij}) = \beta_0(t_{ij}) + \beta_1(t_{ij}) * PY\ SEX_{ij} + \epsilon_{ij}$$

Here, the estimated level of depressive symptoms experienced at a given age  $t$  is calculated from a time-varying intercept  $\beta_0(t_{ij})$ , the time-varying effect of past-year sex  $\beta_1(t_{ij})$ , and an error term.

Finally, I ran models assessing how parental disapproval of sex moderated associations between past-year sexual intercourse and depressive symptoms; these models were also run separately by groups based on parental disapproval of sex (high v. not high), as well as by biological sex. Demographic covariates were entered as time-invariant predictors. In all Models I used the B-spline method for model estimation, and used AIC and BIC criteria to select the optimal number of knots for each parameter. I included a random effect for the intercept to account for nesting of data within participants. Results are presented as figures, because time-varying coefficients are estimated in continuous time leading to a large number of coefficients. Periods where age-specific 95% confidence intervals do not include 0 indicate statistical significance at the  $p < .05$  level; a conservative estimate of significant differences between groups can be ascertained by when their confidence intervals do not overlap. Note that TVEM uses listwise deletion by measurement occasion, but can handle different numbers and spacing of measurement occasions. Thus, the analyses retained all measurement occasions in which an individual had complete data.

## Results

Figure 1 shows results for intercept-only models, which show the estimated percentage of participants reporting any sexual intercourse in the past year, as well as the percentage of sexually active participants reporting multiple partners or nonrelationship partners. Rates of sexual intercourse in the past year increased sharply through the teenage years; at age 14, only about 10% of participants reported sex in the past year, whereas about 70% did at age 20 and more than 80% did at age 32. Among sexually active participants, the rate of multiple partners was relatively stable at about 40% of participants. A larger proportion of sexually active adolescents (40–50% at age 18) had nonrelationship partners compared to sexually active young adults (about 20% at age 26).

Figure 2 shows how engaging in sexual intercourse in the past year is associated with depressive symptoms. In general, being sexually active was associated with a higher level of depressive symptoms early in adolescence, with this association declining by age. In addition, the association was significantly stronger for female participants than male participants during adolescence. At age 15, sex in the past year was associated with a nearly .4 increase (equivalent to .8 *SD*) in depressive symptoms for adolescent girls, and a .1 (equivalent to .1 *SD*) increase for adolescent boys. This association remained significant for male participants until age 17, and for female participants until age 20 (confidence intervals that do not include 0 indicate statistical significance). For male participants aged 28 to 31, being sexually active was associated with lower depressive symptoms; for female participants, sexual intercourse was not associated with depressive symptoms after age 20, and was never associated with lower depressive symptoms.

Next, I examined the effect of partner factors (multiple and single partner, romantic relationship and nonrelationship sex) on depressive symptoms, with no past-year sex as the reference group. As shown in Figure 3, associations were somewhat stronger for multiple partners than for a single sexual partner in the teen years, with this difference being statistically significant for female

participants between ages 16 and 19. In addition, for female participants the association between having multiple partners and depressive symptoms was significant until age 22, whereas the association between having a single partner and depressive symptoms was significant until age 19. For female participants, sex with a single partner predicted fewer depressive symptoms from ages 20–24. Sex with a single partner was associated with fewer depressive symptoms during ages 26–30 for males, whereas having multiple partners was associated with greater depressive symptoms from ages 15–18 and fewer depressive symptoms from ages 29–32. Because the measure of multiple partners was considerably different in Wave IV, I ran these models including only data from individuals under age 25 as a sensitivity analysis; all results were substantively identical between the two sets of models for these ages. As shown in Figure 4, patterns of associations by age were similar for individuals who had sex with only relationship partners and those who had sex with a nonromantic partner, with confidence intervals overlapping at all age periods. There was a significant difference between male and female participants in the effects of sex with a nonrelationship, but not a relationship, partner prior to age 16. For example, at age 16, sex with a nonrelationship partner was associated with a .5 (1 *SD*) increase in depressive symptoms for adolescent girls, but no increase for adolescent boys.

Finally, I examined the moderating effect of parental disapproval of sex on the association between past year sex and depressive symptoms (see Figure 5). For female participants, there was little difference in the association between sexual intercourse and depressive symptoms between those who perceived high parental disapproval compared to those who did not. For male participants who perceived their parents were highly disapproving, past-year sex was not significantly associated with depressive symptoms at any age, with the exception of a brief period around age 15. For those whose parents did not strongly disapprove of sex, past-year sex was associated with fewer depressive symptoms from ages 22–30.

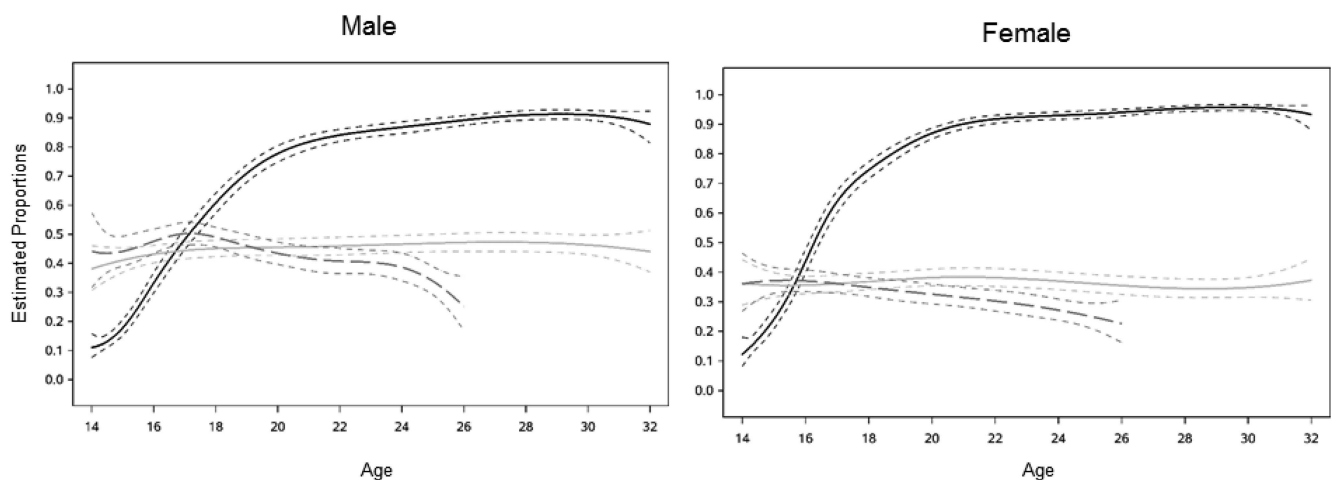


Figure 1. Estimated rates of past-year sexual intercourse (black), multiple sexual partners (light gray), and nonrelationship sex (dashed dark gray) at ages 14–32, by gender. Multiple partners and nonrelationship sex are calculated only for individuals who are sexually active at a given measurement occasion. Questions about nonrelationship sex were not asked at the final measurement occasion, and thus no information is available after age 26. Dashed lines indicate 95% confidence intervals.

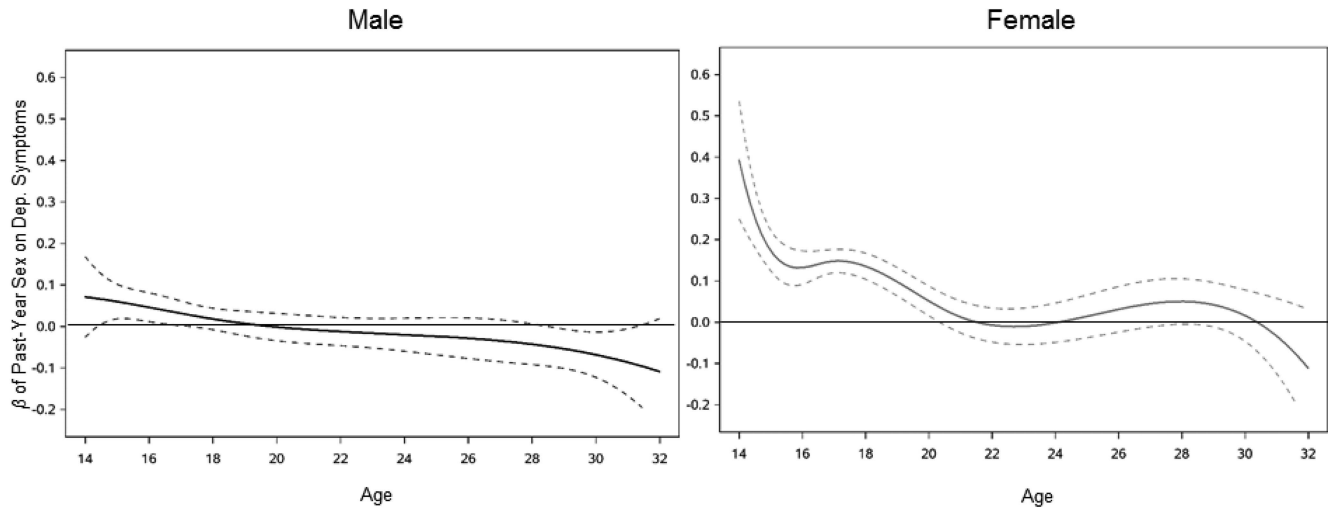


Figure 2. Associations between sexual intercourse and recent depressive symptoms over ages 14–32, by gender. Coefficients (solid lines) represent within-wave associations between past-year sexual intercourse and past-week depressive symptoms. Dashed lines indicate 95% confidence intervals. Periods where confidence intervals do not include 0 indicate significance at the  $p < .05$  level.

## Discussion

Results of this study demonstrate that associations between sexual intercourse and mental health change by age. Overall, being sexually active in the past year was associated with a higher level of recent depressive symptoms in adolescence, but this association became weaker or nonexistent as individuals moved into adulthood. Although sex with multiple or nonrelationship partners was associated with a higher level of symptoms than sex with a single partner or only romantic relationship partners, this general developmental trend was consistent across different sexual partner factors. There are a number of potential explanations for these findings. Earlier in adolescence, sexual behavior is less developmentally normative, and individuals may encounter more negative messages about sex and have fewer friends who are sexually active, which may lead to individuals feeling more guilt or shame when they engage in sexual intercourse. In addition, they may be less developmentally ready to deal with sexual and romantic relationships. However, associations between sexual intercourse and depressive symptoms weaken as individuals move into emerging adulthood. In fact, at some ages and under some circumstances, sexual intercourse is associated with fewer depressive symptoms in the emerging and young adult years. Specifically, sexual intercourse was associated with significantly lower depressive symptoms for men after age 28. Although this association was not found for women as a whole, women who had sex with a single partner had lower depressive symptoms when sexually active from ages 21–24. Emerging adulthood is a period during which exploration of sexuality is normative, and many individuals may be in contexts, such as college campuses, that have more positive norms about sexual behavior (Arnett, 2000; Lefkowitz, 2005). This acceptability of sexual behavior may create a context in which emerging adults feel comfortable exploring their sexual behavior and experience more positive mood as a result of these behaviors.

Although a similar developmental trend was present for both male and female participants, there were some notable differences by biological sex. First, although sexual intercourse at earlier ages

was associated with a higher level of depressive symptoms for both male and female participants, this association was considerably stronger for female adolescents. This is consistent with prior work (Meier, 2007; Spriggs & Halpern, 2008) that has found that an early transition to sexual intercourse is associated with depressive symptoms only for female adolescents. Second, sexual intercourse was associated with fewer depressive symptoms during young adulthood for men, but not for women, with the exception of women having sex with a single partner during a brief period in the early twenties. For women in all other circumstances studied, sex was associated with a small increase in depressive symptoms until at least the early twenties, after which there was no association between sex and depressive symptoms. Taken together, these findings suggest that although there are clear changes in the association between sex and depression over time for both male and female participants, there is also a consistent pattern of sex being less negative or even more positive on mental health for sexually active men than for sexually active women.

Despite these trends in the associations between sexual intercourse and depressive symptoms by age and biological sex, I did find some evidence of differences by relationship status and parental disapproval of sex, which suggests that these age-varying patterns are not fixed, but instead influenced by contextual factors. For example, the only circumstance in which sexual intercourse was associated with fewer depressive symptoms for women in this study was for women who had sex with a single partner. This may reflect double standards in which sex, even with multiple or nonrelationship partners, is accepted for men, but in which women may be viewed as “slutty” for engaging in sex with multiple partners (Crawford & Popp, 2003; Tolman, 2002). For men, sexual intercourse was associated with fewer depressive symptoms during much of emerging and young adulthood, but only for men who had grown up with parents who were not highly disapproving of sex. Research suggests that sexual abstinence in young adulthood may be voluntary, due to factors like personal beliefs, or involuntary,

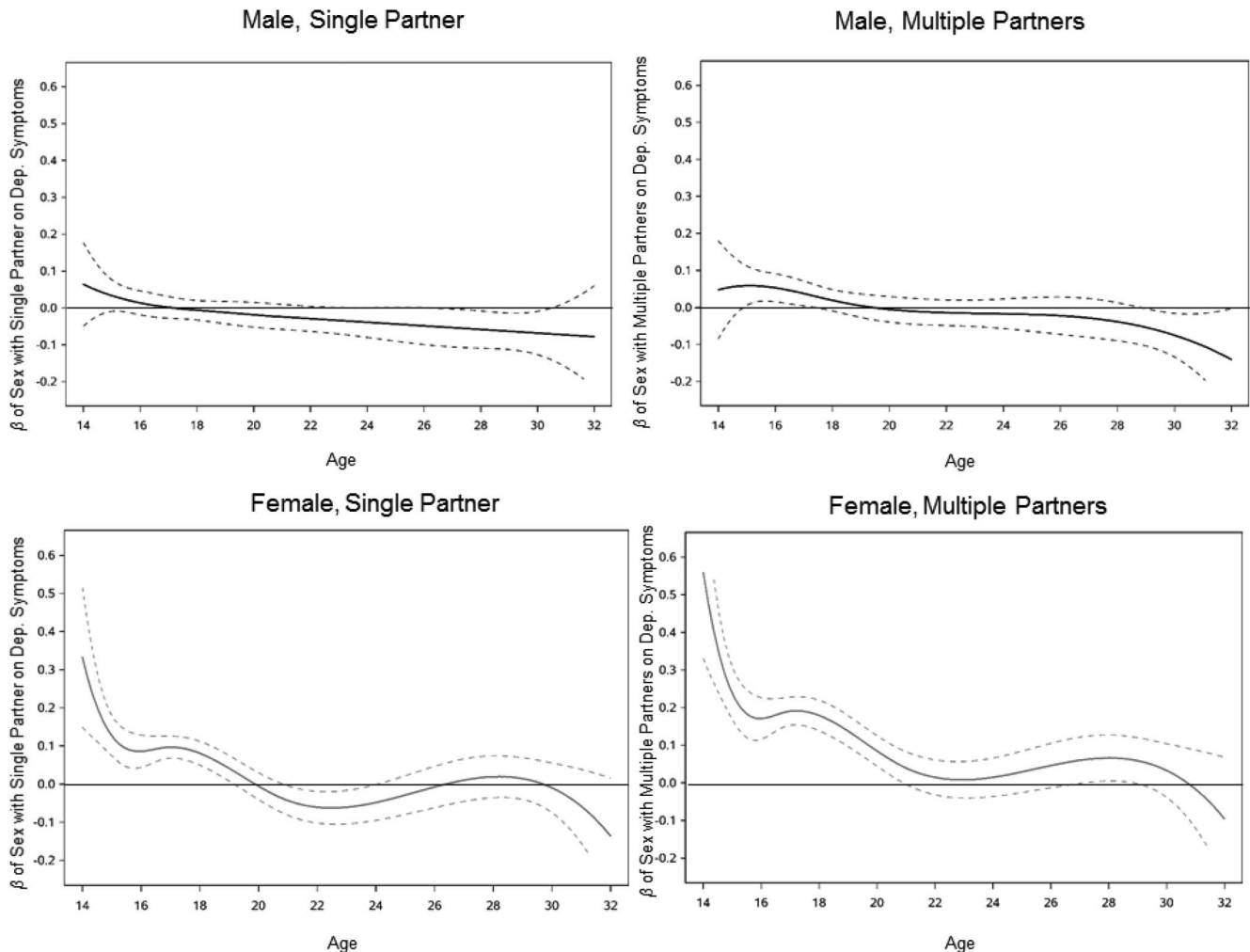


Figure 3. Associations between sex with a single partner (left) and multiple partners (right) and depressive symptoms over ages 14–32, by gender. Coefficients (solid lines) represent within-wave associations between past-year sexual behavior and past-week depressive symptoms. Dashed lines indicate 95% confidence intervals. Periods where confidence intervals do not include 0 indicate significance at the  $p < .05$  level.

due to difficulties with social relationships of unattractiveness (Donnelly et al., 2001; Haydon, Cheng, Herring, McRee, & Halpern, 2014). It is possible that men who grew up in more sexually restrictive households internalized personal beliefs that place less emphasis on sexual behavior, and thus may not experience changes in mental health dependent on whether they have sex. However, men in more permissive households may be more approving of nonmarital sexual behavior, and thus may be more susceptible to cultural messages which view sexuality as an important component of masculinity (Marsiglio, 1988), or may feel distress as they feel their abstinence is not voluntary. Future research should attempt to better understand the mechanisms underlying these associations.

There are a number of implications of this study for sexuality education or prevention programs. These findings suggest that sexual behavior is associated with depressive symptoms in adolescence. However, they also suggest that contextual and relationship factors may moderate these associations, and these differences

may last into or start to appear in adulthood. Given these findings, programs must strike a balance between promoting delay of sexual behavior and presenting sexuality as a normative and acceptable part of development. This is particularly important given that research has found that abstinence-only programs do not effectively delay sexual behavior (Kirby, 2008). Thus, programs with a strong emphasis on the importance of abstinence, may not help to promote adolescents' physical health and may have long-term negative implications for their mental health, particularly if such programs present sexual behavior outside of marriage as a shameful behavior in all circumstances.

It is important to recognize that these analyses only examined American adolescents and young adults, and that findings may be different in other countries that have different cultural norms about sexual behavior. For example, in European countries like the Netherlands, France, Germany, and Sweden, sexual behavior is seen as a normal and healthy part of development, whereas the United States is more conservative about nonmarital sex in general



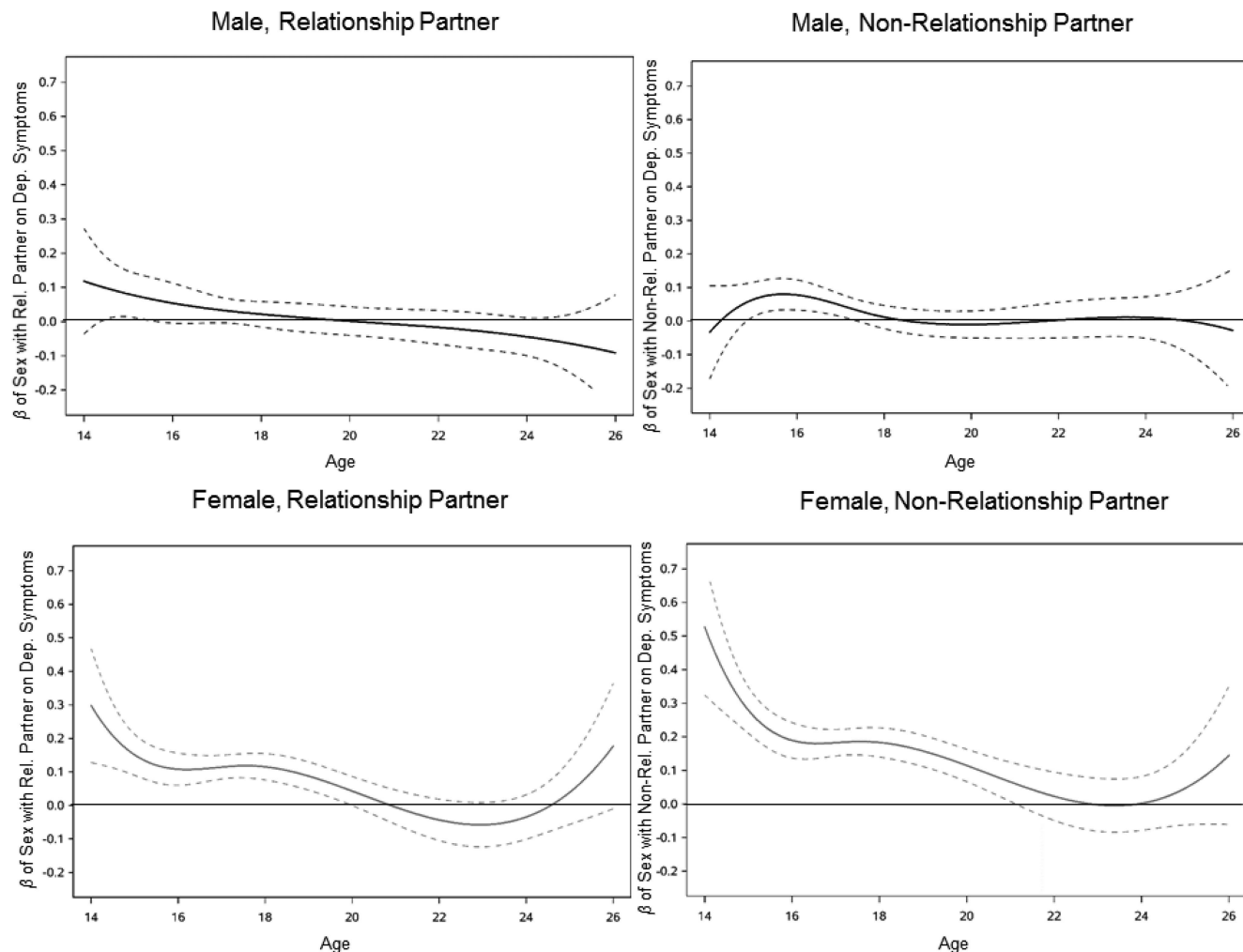


Figure 4. Associations between sex with only relationship partners (left) and with nonrelationship partners (right) and depressive symptoms over ages 14–26, by gender. Coefficients (solid lines) represent within-wave associations between past-year sexual behavior and past-week depressive symptoms. Dashed lines indicate 95% confidence intervals. Periods where confidence intervals do not include 0 indicate significance at the  $p < .05$  level.

and teen sex specifically (Berne & Huberman, 1999; Schwartz, 1993; Widmer, Treas, & Newcomb, 1998). According to the theory of relative consequences (Christensen, 1969), affective consequences of nonmarital sexual behavior are likely to be more negative in countries with more restrictive attitudes about sexual behavior, as there is a greater discrepancy between behavior and cultural norms. Sexual intercourse before age 16 is associated with depressive symptoms for adolescents in the United States and Poland, but not in Scotland, Finland, or France (Madkour, Farhat, Halpern, Godeau, & Gabhainn, 2010). In addition, American adolescents are more likely to report negative reactions like guilt and anxiety about their first sexual behavior than their Swedish counterparts (Schwartz, 1993). Future cross-cultural research could help to better understand the developmental nature of sexual behavior in different contexts.

It is also important to note that this analysis examines time-varying associations, but not causal effects. Thus it is possible that

associations are bidirectional, or may be explained by third variables. For example, individuals who engage in sexual behavior likely differ from individuals who do not, and underlying personality traits or risk factors may predict both sexual behavior and depressive symptoms. Some of these associations may also be due to relationship factors rather than sexual behavior itself. The finding that multiple sexual partners is associated with greater depressive symptoms, particularly in adolescence, could reflect moving in and out of relationships with multiple sexual and romantic partners, and these breakups may be associated with depressive symptoms (Joyner & Udry, 2000; Natsuaki et al., 2009). In addition, as sexual behavior becomes more common in young adulthood, being sexually active may be highly confounded with relationship status, as sex occurs in most romantic relationships. Research has documented that being married is more beneficial to men's mental health than women's (Gove, Hughes, & Style, 1983; Horwitz, White, & Howell-White, 1996; Kessler & McRae, 1984).

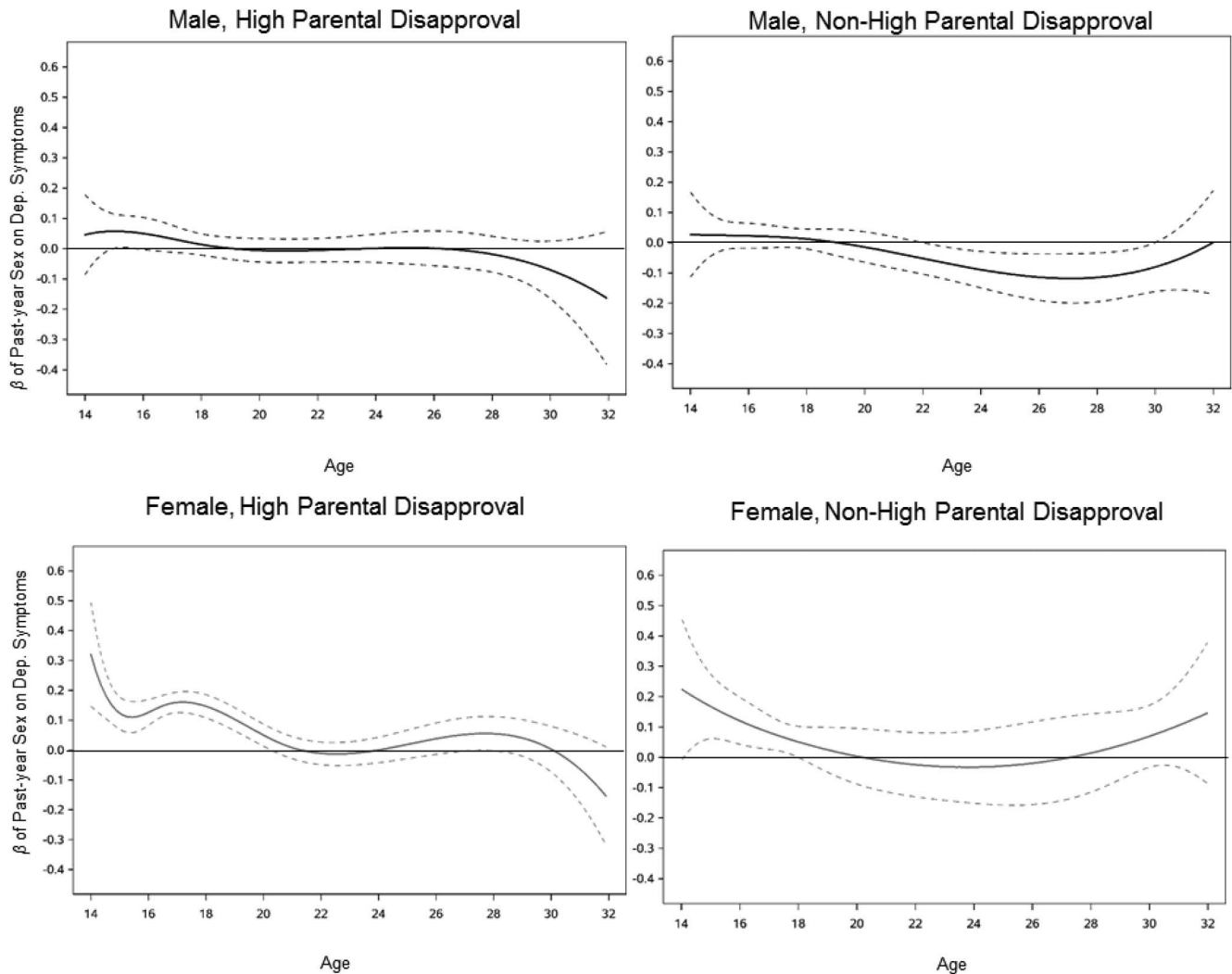


Figure 5. Associations between sexual intercourse and recent depressive symptoms over ages 14–32, moderated by gender and parental disapproval of sex (high v. nonhigh). Coefficients (solid lines) represent within-wave associations between past-year sexual behavior and past-week depressive symptoms. Dashed lines indicate 95% confidence intervals. Periods where confidence intervals do not include 0 indicate significance at the  $p < .05$  level.

A similar process may be occurring in early adult nonmarital relationships, and thus men's lower depressive symptoms when sexually active could be explained in part due to a greater likelihood of being in a romantic relationship. Thus, although this study suggests that sexual intercourse predicts depressive symptoms at different ages, future research should aim to better untangle the effects of sexual behavior, romantic relationships and other variables. However, methods, such as propensity score weighting, that allow for stronger causal inference have not been developed for time-varying effect models, and there are challenges in applying such approaches to the current data.

There are a number of other limitations of this study. First, a number of items, including the question about past-year sexual behavior at Wave IV and items related to nonrelationship sex and multiple partners, differed over the course of the four waves of the study, which may have influenced the results. These measures of

sexual intercourse also did not measure all aspects of this behavior, such as frequency of sex. In addition, I only focused on vaginal intercourse in this study. Future research should examine how other types of behavior, such as oral or anal sex, are associated with mental health. This research should also include a focus on same-sex sexual behaviors, as gay and lesbian youth may experience psychological outcomes of sexual behavior that are both similar to those of heterosexual youth and unique due to the influence of stigma (Morgan, 2014). The variable assessing parental disapproval of sex was asked of adolescents in the study at different ages. The single-item measures of parental disapproval also may not have captured all nuances of this construct, and we did not have measures of disapproval from other sources, such as peers or school sexuality education programs. Effects may have been influenced by attrition, as TVEM uses listwise deletion and procedures for missing data have yet to be developed in TVEM.

However, the response rate across waves was relatively high, potentially limiting these effects. In addition, sampling weights cannot be used in the current version of TVEM, limiting the generalizability of results. This study was limited to measurement occasions where individuals were not married in order to make more meaningful comparisons by age; however, this limited the generalizability of the study and could have biased the results, as individuals who married early may differ from those who do not. Because the study used a cohort sequential design and recruited people at different ages, it is possible that some results observed could be due in part to cohort effects. This study focused on the occurrence of sexual behavior in the past year and past-week depressive symptoms, which means the sexual behavior may have occurred a considerable time before the measure of depression and associations between the two may have dissipated over time. Future research with a shorter time between waves or a measure of more recent sexual behavior may help to better understand these associations and their timing. There was relatively little variability in the past-year sexual behavior variable for the youngest adolescents and for young adults, which may have limited the ability to detect some small effects. It is also important to note that although significant associations between sexual behavior and depressive symptoms were found in a number of models, the size of these differences were small in many cases and may not be practically meaningful. Finally, although this study examined the association between sexual behavior and depressive symptoms on average, people likely vary in this association. New methods are being developed that can uncover groups with different patterns of associations over time (Dziak, Li, Tan, Shiffman, & Shiyko, 2015), and such an approach could help to uncover groups of individuals with positive, negative and no effects of sexual behavior on mental health at different ages, and what factors predict these different trajectories of associations.

Despite these limitations, this study makes a number of contributions to knowledge of the links between sexual behavior and mental health in adolescence and young adulthood. It is, to my knowledge, the first study that attempts to empirically determine at which ages sexual behavior is or is not associated with greater depressive symptoms. This research can both aid in the understanding of sexual development across the life span and help to provide information to guide sexuality education and prevention programs. Findings suggest clear age-varying patterns in which sexual behavior is most clearly linked to depressive symptoms in adolescence, but that contextual factors may play an important role in how individuals differ in their outcomes of sexual behavior.

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