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Implications of Pubertal Timing for Romantic Relationship Quality among Heterosexual and Sexual Minority Young Adults

Bianka M. Reese, MSPH^{a,b}, Sarah L. Trinh, PhD^c, and Carolyn T. Halpern, PhD^{a,b}

^aDepartment of Maternal and Child Health, Gillings School of Global Public Health, University of North Carolina—Chapel Hill; 135 Dauer Drive, 401 Rosenau Hall CB#7455, Chapel Hill, NC, USA, 27599-7455

^bCarolina Population Center, University of North Carolina—Chapel Hill; 206 West Franklin St., Rm 208, Chapel Hill, NC, USA, 27516

^cDepartment of Psychology, University of Michigan—Ann Arbor; 530 Church St., Ann Arbor, MI, USA, 48109-1043

Abstract

Purpose—Relative to on-time or late-maturing peers, girls who begin puberty early typically begin romantic and sexual experiences earlier; however, advanced pubertal status does not necessarily coincide with commensurate interpersonal skills necessary for healthy, romantic relationships. Research is limited on the long-term implications of early puberty for relationship quality, and virtually nothing is known about the social implications of early timing for sexual minority females.

Methods—Using linear regression, we examine longitudinal associations between two measures of girls' pubertal timing (self-perceived timing and menarcheal age) and romantic relationship quality in young adulthood, stratified by sexual orientation, among 5,568 females in Waves I and IV of the National Longitudinal Study of Adolescent to Adult Health. We also examine whether identified associations are mediated by parent-adolescent relationship quality.

Results—Among sexual minorities, early self-perceived pubertal timing was associated with lower adult romantic relationship quality compared to on-time maturers ($\beta = -2.32$; $SE = 1.44$; $p = 0.05$); this association was mediated by parent-adolescent relationship quality. Among heterosexuals, girls experiencing menarche before age 12 (early maturers) reported lower adult relationship quality compared to on-time maturers ($\beta = -0.43$; $SE = 0.22$; $p = 0.03$); parent-adolescent relationship quality did not mediate this association.

Conclusions—Early maturation is associated with lower romantic relationship quality in young adulthood. However, evidence of the association varies by measure of pubertal timing, and the

Corresponding Author: Bianka M. Reese, MSPH, bmreese@live.unc.edu, Phone: 919-358-8949, Fax: 919-445-0740.

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processes by which pubertal timing is linked to later relationship quality may be different for sexual minority and heterosexual females. Potential explanations and public health implications are discussed.

Keywords

Pubertal timing; menarche; relationship quality; parental relationship quality; sexual minorities; longitudinal

Puberty represents a biopsychosocial life course transition with potential short- and long-term implications for sexual well-being. The physical transformations of puberty move youth into different social positions and contexts, changing how they see themselves and how others see them. As noted by Cavanagh (2011), “puberty marks the moment when the cultural meanings, expectations, opportunities and limitations of gender, sexuality and romance become real for girls and boys and the moment when others—boys, girls, adults—perceive girls as sexual actors, laying the foundation for opposite-sex relationships in adolescence and beyond” [1, p. 1220].

The timing of puberty and its implications have long been topics of scientific interest and research. Multiple perspectives are relevant to this topic, including the maturation disparity hypothesis (developmental readiness), which proposes that the potential adverse consequences of early puberty emerge from a psychosocial-physical developmental mismatch [2]. Early physical and sexual maturation precede the cognitive and psychosocial maturity needed to accommodate hormonal [3] and bodily changes, and the responses they elicit from others [4,5]. Cognitive development, and executive functioning in particular, continues throughout adolescence into early adulthood [4–6]. Girls with adult bodies may elicit attention from potential romantic and/or sexual partners, and consequently, opportunities for romance and sex may emerge earlier for them than for girls with younger-looking bodies [7,8]. These adolescent romantic/sexual relationships may provide occasions to build interpersonal skills and resilience, or may burden the adolescent with “relationship baggage [9];” either scenario likely has long-term implications for romantic relationships in young adulthood. Early maturing girls may be at elevated risk for poorer adjustment because, relative to on-time or late maturing peers, they experience romantic/sexual relationships before they develop the skills to successfully manage them [10].

Early pubertal timing may also have adverse effects on parent-child relationships. According to the “self-in-relation” theory, puberty is a challenging developmental process for girls because female development centers on “deepening capacity for relationship and relational competence” [9, p. 53], which competes with developmental norms of agency and independence. Therefore, balancing independence and close relationships in the context of pubertal changes could be distressing and lead to conflict in families, particularly for early maturing girls with less time to adapt to new expectations. Based on attachment theory, impaired parent-child relationships may in turn negatively affect concurrent and future romantic relationships as the former serves as a working model for the latter [12]. Low-quality parental bonds provide limited opportunities for youth to practice important interpersonal skills (e.g., listening, empathy, conflict resolution). Longitudinal evidence

supports the link between parental relationships and future relationships (e.g., [13,14]); for example, Johnson and Galambos (2014) found a positive association between parent-adolescent relationship quality and romantic relationship quality in young adulthood [15]. Given associations between parent-adolescent relationship quality and both pubertal timing and later romantic relationship quality, we investigate whether parent-adolescent relationship quality mediates any identified link between pubertal timing and later romantic relationships.

Measurement of Pubertal Timing

There are multiple ways to assess pubertal timing, and measurement method may reveal different implications for girls' health. Age of menarche is the most commonly used index [16], and perceived pubertal timing relative to peers is also widely used. Across studies, early menarche and early perceived pubertal timing (i.e., perceiving one's development to be more advanced than same-age peers) are each associated with early sexual initiation, more coital and noncoital experiences, and sexual risk-taking [7,17]. Although related to some behaviors similarly, each index captures different aspects of pubertal timing. Menarche is a discrete, typically private event occurring relatively late in puberty, after secondary sex characteristics are already evident. In contrast, perceived pubertal timing is a self-assessment that, while influenced by actual physical change, may serve as a proxy for viewing oneself as adult-like. Moore et al. (2014) argue the subjective nature of perceived timing holds psychological significance that could influence sexual health behavior [17]. As such, girls who see themselves as "mature" and adult-like, even if they are pre-menarcheal, may be more responsive to romantic/sexual relationship opportunities.

Sexual Minorities

There are investigations, with mixed findings, of associations between sexual orientation and pubertal timing [18–20]. However, to our knowledge, studies on the implications of pubertal timing are all based on heterosexual youth or simply do not take sexual orientation into account. The fact that early puberty affords earlier opportunities for sex and romance may present additional challenges for sexual minority (SM) youth. According to Rich (1980), heterosexuality is an institution that privileges heterosexual relationships as the only "natural and normal" intimate relationship [21]. Because SM youth experience lower levels of well-being and social support relative to their heterosexual peers [22,23] and poorer relationship quality with parents [24], early puberty may elicit challenges in relationship formation. Previous research, however, has not addressed whether early puberty has similar implications for parent-adolescent relationships (e.g., closeness, warmth, and communication) and future romantic relationship quality among SM youth.

Current Study

The current study is the first to examine longitudinal associations between two distinct measures of adolescent girls' pubertal timing and romantic relationship quality in young adulthood. We focus on relationship quality because high-quality relationships buffer against stress and promote wellness, thereby contributing to health [25]. We also examine parent-

adolescent relationship quality as a potential mediator of any identified associations between pubertal timing and young adult romantic relationship quality. Lastly, we examine these associations among heterosexual and sexual minority women using a diverse, population-based sample of adolescents.

Based on theory and empirical findings described above, we hypothesize that compared to “on-time” maturers, early maturers (regardless of measure) will have lower romantic relationship quality in young adulthood. However, we also expect that early maturation, as assessed by perceived pubertal timing, will show a larger association (in absolute value) because of the greater psychological significance of perceiving oneself as more mature. Given that menarche occurs relatively late in the pubertal process, other observable indicators of physical maturity (e.g., breast, pubic hair development) precede it. Perceived maturity may lead early maturing youth to seek out or respond to romantic opportunities that “match” their (older) appearance regardless of chronological age or menarcheal status. We also hypothesize that perceived early timing may be especially relevant for SM females. In a heteronormative society, SM youth are sensitive to and vigilant about how they are perceived by others [26]. We suggest that this salience about how one is perceived by others encompasses the morphological changes of puberty, as puberty is linked to sexuality physically, psychologically, and socially. Finally, we hypothesize that poor relationships with parents during adolescence reflect instability and interpersonal difficulties that may underlie the association between early puberty and poor romantic relationship quality in young adulthood among both SM and heterosexual women.

Methods

Sample

Analyses were based on in-home data from Waves I, II, and IV of the National Longitudinal Study of Adolescent to Adult Health (Add Health). Add Health is a probability-based, nationally representative survey of 20,745 US adolescents enrolled in grades 7 through 12 in the 1994–1995 school year (Wave I). (See Harris et al., 2009 for more detail [27].) Add Health procedures were approved by the Institutional Review Board for the Protection of Human Subjects at the University of North Carolina—Chapel Hill. Present analyses were deemed exempt from full-committee review.

Analyses are limited to respondents interviewed at Waves I and IV (2008, ages 24–32, 80% response rate, $n=15,701$) with valid grand sample weights ($n=14,800$), who reported details on a current relationship ($n=11,297$), are female ($n=6,114$), and had complete data on pubertal timing measures, parent-adolescent relationship quality, romantic relationship quality, sexual orientation, and all other covariates ($n=5,568$).

Measures

Romantic relationship quality—Respondents’ current romantic relationship quality at Wave IV was assessed using a 7-item, [28] five-point Likert scale from “strongly disagree” to “strongly agree.” Respondents rated characteristics such as enjoying doing ordinary, day-

to-day things together; handling problems and disagreements; and expressing love and affection. Higher summed scores indicate higher relationship quality (range 7–35).

Pubertal timing—At Waves I and II respondents reported whether they had experienced menstruation, and menarcheal age if so. Most respondents reported their menarcheal age at Wave I, however for 241 girls who were premenarcheal, a Wave II report was used. A *menarcheal age of 12 or younger* was defined as “early,” “on-time” if between ages 12 and 14, and “late” if after age 14. Premenarcheal respondents age 15 and older at Wave II were classified as “late” (n=68).

We used the respondents’ answers to the following question from Wave I or Wave II (matched with time of menarcheal age report) to measure *self-perceived pubertal timing*: “How advanced is your physical development compared to other girls your age? I look younger than most; I look younger than some; I look about average; I look older than some; and, I look older than most.” Looking “older than most/some” was classified as “early.” Looking “younger than most/some” was classified as “late.” All others were “on-time.”

Parent-adolescent relationship quality was assessed at Waves I or II (matched with time of menarcheal age report) by respondents’ ratings of closeness, satisfaction with communication, overall relationship satisfaction, and the extent to which they felt their parent was warm and loving toward them; all questions used a five-point Likert response scale. Ratings for each parent were summed across items. When both parents were present in the household, the higher of the two scores was used. Values ranged from 5 to 20; higher values indicate better parental relationship quality.

Sexual orientation—At Wave IV, respondents were asked to choose “the description that best fits how you think about yourself: 100% heterosexual (straight), mostly heterosexual (mostly straight), but somewhat attracted to your own sex; bisexual, that is, attracted to men and women equally; mostly homosexual (mostly gay), but somewhat attracted to people of the opposite sex; or 100% homosexual (gay).” Those identifying as 100% gay, mostly gay, bisexual, or mostly heterosexual with at least one lifetime same-sex partner (based on Wave IV account) were classified as sexual minorities. Respondents identifying as 100% heterosexual, or mostly heterosexual with no lifetime same-sex partners, were classified as heterosexual.

Covariates (self-reported at Wave I/adolescence, unless otherwise indicated) included **race/ethnicity**, categorized as non-Hispanic white (referent), Hispanic (any race), non-Hispanic black, and non-Hispanic other race. **Parental education** was the highest level obtained by either of the respondent’s parents or caregivers (less than high school; high school graduate/general education diploma; some college or vocational school; college graduate or higher [referent]). **Family structure** was categorized as living with two biological parents (referent), other two-parent household, single parent, and all other structures. **Age** in years and **respondent education**, based on highest level of education completed (less than high school, high school graduate, some college, and college graduate [referent]), were self-reported at Wave IV/young adulthood. Covariates also included **current relationship type** (married, cohabiting, or dating/pregnancy partner who never married or cohabited as the

referent), **relationship duration** in years, and **sex of current partner** (same-sex or other-sex partner) at Wave IV, all factors that could impact young adult relationship quality.

We accounted for the following potential confounders because they could each contribute to pubertal timing and romantic relationship quality [29–31]: **Age at first sexual experience** (vaginal, oral-genital, or anal sex) was reported in whole years at Wave IV. **Childhood sexual abuse (CSA) history** was determined by the Wave IV question, “Before your 18th birthday, how often did a parent or other adult caregiver touch you in a sexual way, force you to touch him or her in a sexual way, or force you to have sexual relations?” Respondents reporting sexual abuse were asked the age of first occurrence. Final categories were CSA before or at the same age as menarche, CSA after menarche, or no reported CSA (referent). **Lifetime other-sex sexual partnering** was assessed with a standardized factor score (eigenvalue=2.926) comprised of number of lifetime other-sex partners, number of other-sex partners before age 18, and number of one-night stand partners, all reported at Wave IV. Values ranged from –0.77 to 6.47; higher values indicate more partners. Other partnering factor scores (life-time same-sex partnering, past year sexual activity) were not associated with pubertal timing or relationship quality, and were not included in models.

Analyses

Ordinary least square (OLS) regression models, stratified by sexual orientation, were run to determine associations between pubertal timing, parent-adolescent relationship quality, and young adult romantic relationship quality for heterosexual and SM women. To assess whether long-term associations of early puberty varied based on measurement, separate, parallel models were conducted for the two pubertal timing measures. In all models, **Model A** estimated the association between pubertal timing and romantic relationship quality at Wave IV controlling for all covariates. In accordance with the hypothesis that early pubertal timing would be inversely associated with romantic relationship quality, all tests of significance were one-tailed. **Model B** added the potential mediator of parent-adolescent relationship quality.

We followed Baron and Kenny’s approach to mediation (1986), first regressing parent-adolescent relationship quality on self-perceived pubertal timing and menarcheal age (separate models) [32]. Second, we regressed young adult romantic relationship quality on parent-adolescent relationship quality. Finally, where parent-adolescent relationship quality was significantly related to both the independent and dependent variables, we examined the reduction in the coefficient for pubertal timing when the mediator was added. Analyses were conducted in STATA version 14.0, using survey commands to adjust for Add Health’s complex survey design. Sampling weights were applied to yield national population estimates.

Results

Table 1 presents the distributions of demographic and relationship characteristics by sexual orientation. Approximately 90% of the sample identified as heterosexual and 10% as sexual minority. In adolescence, high percentages of both SM (53.7%) and heterosexual (43.8%) girls perceived themselves to look older than girls of the same age ($p=0.005$), yet most also

reported “on-time” ages of menarche (64.4% among SM women and 68.9% among heterosexual girls, $p=0.237$). Overall, levels of young adult romantic relationship quality were high for both SM and heterosexual women (mean=28.6, standard deviation [SD] = 5.58 and mean=29.5, SD=5.15, $p<0.001$, respectively). SM and heterosexual women also reported high parent-adolescent relationship quality (mean=17.0, SD=3.14 and mean=17.6, SD=2.84, $p=0.031$, respectively), though SM reports were more variable.

Table 2 shows the correspondence between self-perceived timing and menarcheal age. We found significant differences in endorsement of the two pubertal timing measures for both SM ($\chi^2(4) = 1691.33$, $p < 0.001$) and heterosexual women ($\chi^2(4) = 732.92$, $p < 0.001$). Among SMs, almost 54% reported “looking older” than peers. Among heterosexuals, approximately 44% reported “looking older” than peers. Overall, a slightly higher proportion of SMs had matching pubertal timing reports based on the two indicators (approximately 51% compared to 46% among heterosexuals). When an early age at menarche did not align with perception, heterosexuals were more likely to see themselves as “on-time” compared to same-aged peers.

Early timing was associated with lower romantic relationship quality in young adulthood among both SMs and heterosexuals. However, within these groups associations varied by timing measurement. Among SMs, only associations between self-perceived pubertal timing and romantic relationship quality were significant. Compared to on-time maturers, early maturers had lower young adult relationship quality (Table 3; Model A; $\beta = -2.32$; SE=1.44; $p=0.05$). Among heterosexuals, only associations between menarcheal age and romantic relationship quality were significant. Early maturers reported lower relationship quality in young adulthood compared to on-time maturers (Table 4; Model A; $\beta = -0.43$; SE=0.22; $p=0.03$). Comparisons of late vs. on-time and early vs. late were non-significant in all models. Although patterns of significance varied, patterns of means were consistent across timing measures and orientation groups.

Among both SM and heterosexual females, parent-adolescent relationship quality was positively associated with adult relationship quality. After accounting for parent-adolescent relationship quality, the coefficient for self-perceived pubertal timing among SMs lost statistical significance and was reduced by 18%, suggesting parent-adolescent relationship quality is a factor underlying the association (Table 3; Model B; $\beta = -1.92$; SE=1.47; $p=0.10$). Among heterosexuals, however, after accounting for parent-adolescent relationship quality, the coefficient for menarcheal age remained significant (Table 4; Model B; $\beta = -0.46$; $p=0.02$).

Discussion

We examined associations between pubertal timing and romantic relationship quality in young adulthood, and whether identified associations were mediated by parent-adolescent relationships among a national population sample of SM and heterosexual women. We find supportive evidence for the long-term implications of pubertal timing for well-being. Although we cannot test it directly, our findings are consistent with the maturation disparity hypothesis, which stipulates that early-maturing adolescents may become involved in sexual

and romantic relationships with inadequate cognitive and psychosocial skills to build and sustain a healthy relationship. Among SMs, mediation findings are also consistent with the “self-in-relation” hypothesis (distress or familial conflict might arise for girls who have less time to adjust to early pubertal social role changes), and with attachment theory, which acknowledges the importance of parent-adolescent relationships as a model for other social relationships.

Our findings also suggest that perceived pubertal timing and menarcheal age are both informative for understanding linkages to long-term well-being [33], however these measures may capture distinct facets of puberty that are differentially salient to SM and heterosexual women. Perceived timing, which was a significant predictor of relationship quality among SM girls, captures assessment of one’s self-presentation and how one is perceived by others, which may be especially important for early maturing SM girls who experience an early interest in same-sex partnerships within a heteronormative context. Social difficulties are amplified for SM youth, who are aware of societal biases in favor of heterosexuality. Anticipating and contending with prejudice and discrimination against sexual minorities, SM girls may evidence increased self-surveillance and attention to others’ perceptions of them (gay or straight). This possibility is consistent with our finding that SM girls are more likely to perceive themselves as maturing earlier, a perception that is more consistent with reported menarcheal age.

For SMs, mediation analyses suggest parent-adolescent relationship quality contributes to the relationship between early perceived pubertal timing and young adult romantic relationship quality. Realizing that one is attracted to the same sex likely adds more complexity for the adolescent and her relations with family. In fact, compared to their heterosexual peers and consistent with previous research, SM youth tend to report lower parental relationship quality [24]—often stemming from family rejection or conflict related to the adolescents’ sexual orientation. Even in 2015, almost 4 in 10 Americans said they would “be upset” if they learned their child is gay [34]. Add Health sample members were adolescents in the 1990s, when somewhere between 73% and 89% of parents were estimated to be “upset.” Accordingly, normative developmental stressors could be intensified for SM youth who have poorer working models for healthy relationships and greater unmet needs for social support, thereby placing early maturing SM girls at a greater risk for future poor-quality romantic relationships [35]. Improving parent-adolescent relationships may help to facilitate healthy romantic relationships for early maturing SM youth. In accordance with National Sexuality Education Standards, sex education curricula should include the needs of SMs, and incorporate developmentally- and age-appropriate information about how to successfully navigate and maintain healthy relationships with romantic partners, peers, and family [36].

Among heterosexuals, early menarche was associated with lower adult relationship quality. Why self-perception is unrelated is unclear. We speculate that for heterosexuals whose orientation is consistent with the assumptions of others, self-surveillance may be less critical. Unlike some previous studies where sexual orientation is not considered [17,35], parent-adolescent relationship quality did little to attenuate the link between menarche and relationship quality among heterosexuals. This may be a function of the lesser variance in

parental relationship quality among heterosexuals, and suggests that other mechanisms are more relevant for heterosexual girls.

Our study has limitations. First, sexual orientation identity was reported during young adulthood, and thus may not reflect participants' identity during adolescence. Sexual orientation identity can change over time [37]. Additionally, parent-adolescent relationship quality was collected during adolescence; for late maturers, parental relationship reports occurred before menarche and thus, because of data limitations, we may have missed relationship changes resulting from later pubertal development [38]. Lastly, there has been increased acceptance of sexual minorities in the United States since Add Health adolescent data collection. Analyses of more recent cohorts are needed.

Despite limitations, our study has multiple strengths that contribute to our understanding of the implications of pubertal processes for sexual minority girls. We used a diverse, population-based sample of heterosexuals and sexual minorities to examine the long-term implications of pubertal timing for relationship health, as assessed by two timing measures collected during adolescence. We also explored—for the first time—the timing implications for later relationship quality—and underlying mechanisms—among SM women. Our findings propose a need for greater attention to developmental processes by sexual orientation. Pubertal timing can have lasting implications for well-being, but the processes underlying the associations may be different for SM and heterosexual women who face varying stressors related to psychosocial development and romantic relationship experiences. Future research into the implications of subjective experiences with early puberty, taking both sexual orientation and sociodemographics into account [39,40], is needed to better understand developmental processes and interventions that foster healthy romantic relationships.

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Abbreviations

SM	Sexual Minority
SES	Socioeconomic Status

CSA Childhood Sexual Abuse

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Implications and Contributions

Pubertal timing can have lasting implications for intimate relationships among both sexual minority and heterosexual women, but the processes underlying the associations may differ. More research on the subjective experiences of early puberty, accounting for sexual orientation, is needed to better delineate avenues of intervention that foster healthy romantic relationships.

Table 1

Demographic and relationship characteristics of female respondents in the analysis sample (n=5,568), by sexual orientation.

Characteristic	Sexual orientation ^a		p value ^b
	Sexual minority (n=544)	Heterosexual (n=5,024)	
	% (n) / mean (SD)	% (n) / mean (SD)	
Romantic relationship quality, ^c mean	28.6 (5.58)	29.5 (5.15)	<.001
Menarcheal age, ^d %			
Early	32.4 (181)	27.8 (1,479)	
On-time	64.4 (340)	68.8 (3,368)	.237
Late	3.3 (23)	3.5 (177)	
Self-perceived pubertal timing, ^e %			
Earlier than peers	53.8 (276)	43.8 (2,091)	
On-time	30.5 (184)	38.8 (1,989)	.005
Later than peers	15.8 (84)	17.5 (944)	
Parent-adolescent relationship quality, ^f mean	17.0 (3.14)	17.6 (2.84)	.031
Race/ethnicity, %			
Non-Hispanic white	70.8 (329)	68.2 (2,771)	
Non-Hispanic black	10.4 (101)	14.4 (1,027)	.140
Hispanic	11.0 (70)	11.9 (812)	
Other	7.8 (44)	5.6 (414)	
Parental education, %			
Less than HS	10.1 (56)	11.6 (631)	
HS graduate/GED	27.7 (134)	27.9 (1,339)	.888
Some college	30.6 (161)	29.3 (1,442)	
College graduate	31.5 (193)	31.2 (1,612)	
Family structure, %			
Two biological parents	46.3 (234)	55.6 (2,690)	
Other two parent	17.8 (110)	16.9 (887)	
Single mother	21.9 (132)	20.1 (1,063)	.045

Characteristic	Sexual orientation ^a			p value ^b
	Sexual minority (n=544)	Heterosexual (n=5,024)		
	% (n) / mean (SD)	% (n) / mean (SD)		
Single father	3.3 (16)	2.1 (113)		
Other family structure	10.7 (52)	5.3 (271)		
Age at Wave IV interview, mean	27.9 (1.66)	28.4 (1.78)	<.001	
Respondent education, %				
Less than HS	11.3 (47)	5.8 (243)		
HS graduate/GED	14.9 (71)	13.0 (638)		
Some college	51.2 (286)	44.2 (2,214)	<.001	
College graduate	22.7 (140)	37.1 (1,929)		
Current relationship type, %				
Married	36.8 (201)	61.1 (3,014)		
Cohabiting	40.0 (200)	21.1 (1,033)	<.001	
Dating/Pregnancy	23.3 (143)	17.7 (977)		
Current relationship duration, ^c mean	4.5 (3.72)	6.1 (3.98)	<.001	
Sex of current partner, %				
Same-sex	17.4 (107)	0.50 (21)	<.001	
Opposite-sex	82.6 (437)	99.5 (5,003)		
Age at first sexual experience, mean	15.0 (2.40)	16.4 (2.77)	<.001	
Childhood sexual abuse history, %				
Sexual abuse before menarche	10.6 (55)	6.0 (286)		
Sexual abuse after menarche	3.7 (17)	1.3 (64)	<.001	
No sexual abuse	85.7 (472)	92.7 (4,674)		
Lifetime opposite-sex partnering ^d	0.44 (1.33)	−0.23 (0.55)	<.001	

Column percentages and means are weighted to yield national population estimates. Percentages may not add to 100% owing to rounding and weighting.

^aSexual Orientation based on identity and behavior self-report at Wave IV; sexual minority status given to those identifying as 100% homosexual, mostly homosexual, bisexual, or mostly heterosexual with at least one lifetime same-sex partner. Heterosexual orientation was defined as identifying as 100% heterosexual, or mostly heterosexual with no lifetime same-sex partners.

^bp-values indicate chi2-test [categorical variables]/F-tests [continuous variables] of significant difference in predictor distribution by sexual orientation.

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^c Romantic relationship quality is a 7-item summary scale ranging from 7 to 35. Higher values indicate better quality.

^d Menarcheal age based on report at Wave I or II and classified as “early” if occurring before age 12, “on-time” if between ages 12 and 14, and “late” if after age 14. Respondents who had not experienced their first menstruation by Wave II and were age 15 years or older, were classified as “late” maturers (n=68).

^e Self-perceived pubertal timing is based on the question at Wave I or II: “How advanced is your physical development compared to other girls your age?” Looking older than most/some (earlier than peers); Looking about average (on-time); Looking younger than most/some (later than peers).

^f Parent-adolescent relationship quality is a 4-item summary scale ranging from 4 to 20. Higher values indicate better quality.

^g Current relationship duration ranges from .02 years (approximately 2 months) to 17.95 years.

^h Lifetime opposite-sex partnering is a standardized factor score ranging from $-.78$ to 6.47 . Higher values indicate more sexual partnering.

Table 2

Correspondence between pubertal timing measures, menarcheal age and self-perceived timing, according to sexual orientation (n=5,568).

Sexual minority (n=544) ^a				
Self-perceived pubertal timing, % (n) ^b				
Menarcheal age, % (n) ^c	Earlier than peers	On-Time	Later than peers	Total
Early	24.6 (132)	4.9 (34)	2.9 (15)	32.4 (181)
On-Time	28.4 (139)	24.7 (142)	11.3 (59)	64.4 (340)
Late	0.8 (5)	0.9 (8)	1.6 (10)	3.3 (23)
Total	53.8 (276)	30.5 (184)	15.8 (84)	100.0 (544)
$\chi^2 (4) = 1691.33, p < 0.001$				
Heterosexual (n=5,024) ^a				
Self-perceived pubertal timing, % (n)				
Menarcheal age, % (n)	Earlier than peers	On-Time	Later than peers	Total
Early	16.0 (803)	8.8 (497)	3.0 (179)	27.8 (1,479)
On-Time	27.2 (1,258)	28.7 (1,421)	12.9 (689)	68.8 (3,368)
Late	0.6 (30)	1.3 (71)	1.6 (76)	3.5 (177)
Total	43.8 (2,091)	38.8 (1,989)	17.5 (944)	100.0 (5,024)
$\chi^2 (4) = 732.92, p < 0.001$				

Percentages are cell proportions and are weighted to yield national population estimates. Percentages may not add to 100% owing to rounding and weighting. P-values indicate Pearson's χ^2 test of significant differences in endorsement of two pubertal timing measures.

^aSexual Orientation based on identity and behavior self-report at Wave IV; sexual minority status given to those identifying as 100% homosexual, mostly homosexual, bisexual, or mostly heterosexual with at least one lifetime same-sex partner. Heterosexual orientation was defined as identifying as 100% heterosexual, or mostly heterosexual with no lifetime same-sex partners.

^bSelf-perceived pubertal timing is based on the question at Wave I or II: "How advanced is your physical development compared to other girls your age?" Looking older than most/some (earlier than peers); Looking about average (on-time); Looking younger than most/some (later than peers).

^cMenarcheal age based on report at Wave I or II and classified as "early" if occurring before age 12, "on-time" if between ages 12 and 14, and "late" if after age 14. Respondents who had not experienced their first menstruation by Wave II and were age 15 years or older, were classified as "late" maturers (n=68).

Table 3

Adjusted Beta coefficients (and standard errors) of associations between self-perceived pubertal timing, parent-adolescent relationship quality, and young adult romantic relationship quality among female respondents (n=5,568), stratified by sexual orientation.

Variable (Referent)	Sexual minority ^a (n=544)						Heterosexual ^a (n=5,024)					
	Model A ^b			Model B ^c			Model A ^b			Model B ^c		
	β	SE	p Value	β	SE	p Value	β	SE	p Value	β	SE	p Value
Self-perceived pubertal timing (On-time)^d												
Earlier than peers	-2.32	1.44	0.05	-1.92	1.47	0.10	0.15	0.17	0.20	0.15	0.17	0.19
Later than peers	-0.64	1.65	0.35	-0.38	1.70	0.41	0.20	0.29	0.25	0.21	0.29	0.23
Earlier versus later than peers	0.20	0.37	0.20	0.22	0.43	0.22	0.95	0.27	0.22	0.94	0.26	0.28
Parent-adolescent relationship quality												
				0.36	0.19	0.03				0.21	0.04	0.01
Race/ethnicity (Non-Hispanic white)												
Non-Hispanic black	0.52	1.47	0.36	0.76	1.42	0.30	-1.66	0.25	0.00	-1.70	0.25	0.01
Hispanic	-5.64	2.67	0.02	-5.44	2.61	0.02	-0.58	0.33	0.04	-0.51	0.33	0.06
Other	0.84	1.86	0.33	0.77	1.68	0.32	-0.50	0.41	0.11	-0.32	0.40	0.22
Parental education (College graduate)												
Less than HS	0.69	2.14	0.38	0.91	2.15	0.34	-0.96	0.45	0.02	-0.94	0.45	0.02
HS graduate/GED	0.99	1.57	0.27	0.68	1.63	0.34	-0.22	0.25	0.20	-0.23	0.25	0.18
Some college	-0.41	1.88	0.41	-0.63	1.81	0.36	-0.59	0.23	0.01	-0.58	0.23	0.01
Family structure (Two biological parents)												
Other two parent	2.72	2.45	0.14	2.31	2.50	0.18	-1.85	1.10	0.05	-1.80	1.13	0.06
Single mother	-0.08	1.44	0.48	0.02	1.46	0.49	-0.45	0.26	0.04	-0.27	0.26	0.15
Single father	-0.23	2.82	0.47	1.59	2.63	0.27	-0.45	0.50	0.18	-0.21	0.49	0.34
Other family structure	2.27	2.23	0.16	0.98	2.22	0.33	-0.18	0.39z	0.32	-0.40	0.39	0.16
Age at Wave IV	-0.15	0.35	0.33	-0.07	0.34	0.42	-0.08	0.06	0.07	-0.06	0.06	0.15
Respondent education (College graduate)												
Less than HS	-0.28	2.17	0.45	0.20	2.14	0.46	-1.02	0.46	0.02	-0.91	0.47	0.03
HS graduate/GED	1.84	1.46	0.11	1.59	1.51	0.15	-0.91	0.30	0.20	-0.87	0.30	0.01
Some college	-2.05	1.40	0.07	-1.90	1.36	0.08	-0.74	0.20	0.01	-0.68	0.20	0.01
Current relationship type (Dating/pregnancy)												

Variable (Referent)	Sexual minority ^a (n=544)						Heterosexual ^a (n=5,024)					
	Model A ^b			Model B ^c			Model A ^b			Model B ^c		
	β	SE	p Value	β	SE	p Value	β	SE	p Value	β	SE	p Value
Married	-1.36	1.70	0.21	-1.96	1.70	0.13	0.47	0.28	0.05	0.44	0.28	0.06
Cohabiting	-0.36	1.27	0.39	-0.51	1.28	0.35	0.47	0.32	0.07	0.44	0.31	0.08
Current relationship duration	-0.04	0.02	0.03	-0.04	0.02	0.04	-0.01	0.01	0.18	-0.01	0.01	0.19
Sex of current partner (Opposite-sex)												
Same-sex	1.72	1.23	0.08	1.34	1.24	0.21	-0.78	2.06	0.35	-1.00	2.05	0.31
Age at first sexual experience	0.21	0.22	0.18	0.17	0.22	0.14	0.02	0.04	0.25	0.01	0.04	0.40
Childhood sexual abuse history (No sexual abuse)												
Sexual abuse before menarche	-2.44	1.62	0.07	-1.61	1.81	0.19	-0.94	0.38	0.01	-0.89	0.39	0.01
Sexual abuse after menarche	1.13	2.00	0.29	1.63	2.08	0.22	-2.00	0.91	0.02	-2.10	0.92	0.01
Lifetime opposite-sex partnering	-0.44	0.48	0.18	-0.39	0.49	0.21	-1.00	0.17	0.00	-0.97	0.16	0.01

All significance tests are one-tailed. Results are weighted to reflect Add Health sample design.

^aSexual Orientation based on identity and behavior self-report at Wave IV; sexual minority status given to those identifying as 100% homosexual, mostly homosexual, bisexual, or mostly heterosexual with at least one lifetime same-sex partner. Heterosexual orientation was defined as identifying as 100% heterosexual, or mostly heterosexual with no lifetime same-sex partners.

^bModel A: OLS regression model estimating the association between self-perceived timing at Wave I or II and current young adult relationship quality at Wave IV controlling for all covariates (race/ethnicity, family structure, parental education, age at Wave IV, respondent educational attainment, current relationship type, current relationship duration, sex of current partner, age at first sexual experience, childhood sexual abuse history, and lifetime opposite-sex partnering).

^cModel B: OLS regression model adding parent-adolescent relationship quality score as a mediator in the association between self-perceived timing and adult romantic relationship quality, controlling for all covariates.

^dSelf-perceived pubertal timing is based on the question at Wave I or II: "How advanced is your physical development compared to other girls your age?" Looking older than most/some (earlier than peers); Looking about average (on-time); Looking younger than most/some (later than peers). "On-time" is the referent for the first two rows; row 3 shows a post-estimation pairwise comparison that assesses the difference in the magnitude and significance of associations between early and late maturers (non-referent groups).

Table 4

Adjusted Beta coefficients (and standard errors) of associations between menarcheal age, parent-adolescent relationship quality, and young adult romantic relationship quality among female respondents (n=5,568), stratified by sexual orientation.

Variable (Referent)	Sexual minority ^a (n=544)						Heterosexual ^a (n=5,024)					
	Model A ^b			Model B ^c			Model A ^b			Model B ^c		
	β	SE	p Value	β	SE	p Value	β	SE	p Value	β	SE	p Value
Menarcheal age (On-time) ^d												
Early	0.34	1.32	0.40	0.39	1.31	0.38	-0.43	0.22	0.03	-0.46	0.21	0.02
Late	-1.04	2.47	0.34	-0.72	2.24	0.37	0.10	0.42	0.41	0.11	0.44	0.41
Early versus late	0.33	0.81	0.33	0.25	0.68	0.31	1.75	0.88	0.14	1.68	0.81	0.14
Parent-adolescent relationship quality												
				0.40	0.19	0.02				0.21	0.04	0.01
Race/ethnicity (Non-Hispanic white)												
Non-Hispanic black	0.05	1.42	0.49	0.39	1.33	0.38	-1.62	0.25	0.01	-1.65	0.24	0.01
Hispanic	-5.47	2.86	0.03	-5.25	2.80	0.03	-0.53	0.32	0.05	-0.46	0.32	0.08
Other	1.36	1.84	0.23	1.28	1.64	0.22	-0.47	0.40	0.12	-0.27	0.39	0.24
Parental education (College graduate)												
Less than HS	0.58	2.08	0.39	0.82	2.09	0.35	-0.91	0.4	0.02	-0.89	0.45	0.03
HS graduate/GED	1.24	1.71	0.24	0.88	1.75	0.31	-0.21	0.25	0.01	-0.22	0.25	0.19
Some college	-0.01	1.85	0.50	-0.32	1.76	0.43	-0.58	0.23	0.01	-0.57	0.23	0.01
Family structure history (Two biological parents)												
Other two parent	2.23	3.09	0.24	1.81	3.03	0.28	-1.78	1.09	0.05	-1.73	1.12	0.06
Single mother	0.13	1.38	0.46	0.22	1.37	0.44	-0.44	0.27	0.05	-0.25	0.26	0.17
Single father	-0.23	2.83	0.47	1.84	2.64	0.24	-0.44	0.50	0.19	-0.19	0.50	0.35
Other family structure	2.12	2.07	0.15	0.71	2.12	0.37	-0.17	0.39	0.33	-0.39	0.40	0.16
Age at Wave IV interview	-0.15	0.35	0.37	-0.07	0.34	0.45	-0.10	0.06+	0.05	-0.08	0.06	0.10
Respondent educational attainment (College graduate)												
Less than HS	-1.01	1.99	0.31	-0.35	1.93	0.43	-1.02	0.46	0.02	-0.91	0.47	0.03
HS graduate/GED	1.51	1.50	0.16	1.31	1.51	0.19	-0.91	0.3	0.00	-0.87	0.30	0.01
Some college	-1.68	1.49	0.13	-1.54	1.42	0.14	-0.74	0.20	0.00	-0.68	0.20	0.01
Current relationship type (Dating/pregnancy)												

Variable (Referent)	Sexual minority ^a (n=544)						Heterosexual ^a (n=5,024)					
	Model A ^b			Model B ^c			Model A ^b			Model B ^c		
	β	SE	p Value	β	SE	p Value	β	SE	p Value	β	SE	p Value
Married	-1.47	1.71	0.20	-2.12	1.74	0.11	0.45	0.28	0.05	0.42	0.28	0.07
Cohabiting	-0.17	1.37	0.45	-0.35	1.37	0.40	0.46	0.32	0.07	0.43	0.31	0.09
Current relationship duration	-0.04	0.02	0.05	-0.04	0.02	0.05	-0.01	0.01	0.20	-0.01	0.01	0.21
Sex of current partner (Opposite-sex)												
Same-sex	1.75	1.29	0.09	1.29	1.28	0.16	-0.74	2.06	0.36	-0.95	2.05	0.32
Age at first sexual experience	0.29	0.22	0.10	0.23	0.22	0.14	0.02	0.04	0.34	0.00	0.04	0.49
Childhood sexual abuse history (No sexual abuse)												
Sexual abuse before menarche	-2.61	1.64	0.06	-1.68	1.80	0.18	-0.95	0.38	0.01	-0.90	0.39	0.01
Sexual abuse after menarche	1.91	1.85	0.15	2.32	1.90	0.11	-1.93	0.92	0.02	-2.03	0.92	0.01
Lifetime opposite-sex partnering	-0.48	0.48	0.16	-0.42	0.48	0.19	-0.99	0.16	0.01	-0.97	0.16	0.01

All significance tests are one-tailed. Results are weighted to reflect Add Health sample design.

^aSexual Orientation based on identity and behavior self-report at Wave IV; sexual minority status given to those identifying as 100% homosexual, mostly homosexual, bisexual, or mostly heterosexual with at least one lifetime same-sex partner. Heterosexual orientation was defined as identifying as 100% heterosexual, or mostly heterosexual with no lifetime same-sex partners.

^bModel A: OLS regression model estimating the association between menarcheal age at Wave I or II and current young adult relationship quality at Wave IV controlling for all covariates (race/ethnicity, family structure, parental education, age at Wave IV, respondent educational attainment, current relationship type, current relationship duration, sex of current partner, age at first sexual experience, childhood sexual abuse history, and lifetime opposite-sex partnering).

^cModel B: OLS regression model adding parent-adolescent relationship quality score as a mediator in the association between menarcheal age and adult romantic relationship quality, controlling for all covariates.

^dMenarcheal age based on report at Wave I or II and classified as "early" if occurring before age 12, "on-time" if between ages 12 and 14, and "late" if after age 14. Respondents who had not experienced their first menstruation by Wave II and were age 15 years or older, were classified as "late" maturers (n=68). "On-time" is the referent for the first two rows; row 3 shows a post-estimation pairwise comparison that assesses the difference in the magnitude and significance of associations between early and late maturers (non-referent groups).