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Attachment to Conventional Institutions and Adolescent Rapid Repeat Pregnancy: A Longitudinal National Study among Adolescents in the United States

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Abstract

Introduction—There is limited research on rapid repeat pregnancies (RRP) among adolescents, especially using nationally representative samples. We examine distal factors—school, family, peers, and public/private religious ties—and their associations with RRP among adolescent mothers.

Methods—Guided by social development theory, we conducted multivariate logistic regression analyses, adjusted for sociodemographic characteristics, to examine associations between RRP and attachment to school, family, peers, and religion among 1,158 female respondents from the National Longitudinal Study of Adolescent to Adult Health (Add Health) who reported at least one live birth before age 20.

Results—Attachments to conventional institutions were associated with lower likelihood of RRP. Adolescent mothers who had a stronger relationship with their parents had reduced odds of RRP (adjusted odds ratio [aOR] 0.83, 95% CI 0.71-0.99). Increased odds of RRP were associated with anticipating fewer negative social consequences of sex (aOR 1.18, 95% CI 1.02-1.35), never praying (versus praying daily; aOR 1.47, 95% CI 1.10-1.96), and never participating in church-related youth activities (versus participating once a week; 1.04, 95% CI 1.01-1.07).

Discussion—After an adolescent birth, social support from family, peers, and the community can benefit young mothers. Private aspects of religiosity may be especially important. Understanding the processes by which these distal factors are linked to the likelihood of RRP is needed to create multifaceted intervention programs that provide diverse methods of support customized to specific circumstances of adolescent mothers.

Keywords

Repeat pregnancy; adolescent; family; peers; school; religion

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Introduction

Despite declining rates for almost two decades, and a record low in 2014 of 24.2 births per 1,000 adolescents aged 15-19 (Hamilton et al. 2015), the United States (U.S.) continues to have the highest adolescent birth rate among most other developed countries (United Nations Statistics Division 2015). Although a few scholars have proposed that not all adolescent births are harmful (Furstenberg 2007; SmithBattle 2009), most research suggests that secondary births remain a public health concern (Hamilton et al. 2014). A rapid repeat pregnancy (RRP) among adolescent mothers (aged 19 and younger), defined as a pregnancy occurring within 24 months of a previous birth, compounds the already great challenges faced by an adolescent mother and her family. Historically, RRP rates among adolescents in the U.S. have been high, with 30% of adolescent mothers becoming pregnant in their first postpartum year and another 25% to 50% becoming pregnant in their second year (Mosher et al. 2012).

Adolescent childbearing has negative consequences for mother and child, as both generally complete less education, have lower socioeconomic status, and have poorer health compared to individuals who did not have an adolescent birth (Raneri & Wiemann 2007; Rosengard 2009). These challenges increase when a second birth occurs. Over the past 40 years, there has been considerable research examining the determinants and consequences of early motherhood (Klein 2005; Klerman 2004). By contrast, there has been limited research on RRP, especially using nationally representative samples (Klein 2005; Klerman 2004). Of the research that has addressed RRP, many studies focus solely on sociodemographic factors, contraceptive use, pregnancy intentions, and other proximal individual level characteristics (Boardman et al. 2006; Crittenden et al. 2009; Gillmore et al. 1997; Kelly et al. 2005; Kershaw et al. 2003; Klerman 2004; Nelson 1990; Pfitzner 2003; Stevens-Simon et al. 2005). Although clearly important, these studies ignore distal, sociocontextual factors that also influence adolescent behavior.

Of the few studies that have examined aspects of adolescents' social context, factors most consistently associated with RRP include attachment to school, family and/or peers, and church. Adolescent mothers who drop out of school prior to (Kalmuss & Namerow 1994; Manlove et al. 2000; Van Horne et al. 2009) or directly after (Barnet et al. 2004; Kalmuss & Namerow 1994; Raneri & Wiemann 2007; Stevens-Simon et al. 1986; Stevens-Simon 1996) first birth are more likely to have an RRP. In their investigation of the social ecological predictors of repeat adolescent pregnancy, Raneri and Wiemann (2007) found one of the strongest community-level predictors was "not being in school at three months postpartum (Raneri & Wiemann 2007)." Given the significant responsibility of raising a child, some adolescent mothers may find it difficult to maintain student status after the initial birth. Further, for some young women, family is a higher priority than school (Bull & Hogue 1998), as low educational and occupational aspirations are associated with RRP (Barnet et al. 2010; Klerman 2004; Manlove et al. 2000; Raneri & Wiemann 2007; Stevens-Simon et al. 1998; Van Horne et al. 2009).

In addition to school attachment, previous research suggests that family and peer attachment is also associated with likelihood of RRP among adolescent mothers. Specifically, poor maternal relationships (Bull & Hogue 1998), and the lack of family (Raneri & Wiemann 2007; Stevens-Simon, 1996) or peer support (Rigsby 1998), have been linked to multiple pregnancies during adolescence. For adolescent mothers who receive inadequate social support from their families or peer networks, childbearing could be perceived as a pathway to achieving a better sense of belonging and empowerment. A lack of family and peer connectedness may encourage an adolescent mother to seek sexual intimacy or to bear additional children to fulfill her desire to be loved (Raneri & Wiemann 2007; Rigsby 1998; Stevens-Simon et al. 2001). Previous research has found that adolescents who are able to seek and receive emotional and financial support from their parents during a first pregnancy are less likely to become pregnant again than those who find little support at home (Klerman 2004; Manlove et al. 2000).

Evidence regarding the potential role of attachment to religion in RRP is relatively limited, and findings to date are inconsistent (Klerman 2004; Manlove et al. 2000). For example, using the National Education Longitudinal Study (NELS) of 1988, a nationally-representative study of youth, Manlove et al. (2000) found that religious involvement (defined as attending church and school religious clubs more than once a month) is unrelated to “closely spaced births” (Manlove et al. 2000). Contrastingly, Van Horne et al. (2009) found that low religiosity (defined as never attending weekly services) is associated with never or only sometimes using condoms among adolescent mothers (Van Horne et al. 2009). The failure to find other associations between religiosity and RRP in previous studies may be an artifact of limited measures of religiosity. Focusing on attending church or participating in school religious clubs ignores subjective and private religious experiences, such as how often one prays, that may be important to adolescent mothers. Because studies using more comprehensive measures of attachment to religion have found that greater religiosity is associated with a reduced likelihood of first adolescent pregnancy (Jeynes 2003), it seems plausible that the same patterns are associated with RRP.

Despite the increased attention to the determinants of repeat pregnancy among adolescent mothers, the current literature is limited in that many studies do not examine diverse sociocontextual predictors of adolescent RRP. Further, of the studies noted above, only one (Manlove et al. 2000) utilized a nationally representative sample of U.S. adolescents; most studies rely on convenience samples of adolescent mothers, for example adolescents at a delivery unit in Texas (Raneri & Wiemann 2007; Van Horne et al. 2009) or low-income adolescents participating in a maternity care program in Colorado (Stevens-Simon et al. 1996; Stevens-Simon 1998). Providing empirical evidence of the contributors to RRP, based on a nationally representative and diverse sample, would be useful for the development of comprehensive sexual health promotion efforts for adolescent mothers throughout the U.S.

The current literature is also limited in that few studies applied theory to guide investigation of adolescent risk-taking, especially in relation to adolescent mothers’ school, family, peer, and religious ties. In the current study, we use social development theory (Catalano & Hawkins 1996) to select distal potential determinants of adolescent RRP. Social development theory suggests that social bonds, consisting of attachment to others and

commitment to conventional values and behaviors, promotes healthy development and protects against adolescent risk behaviors, including sexual risk behaviors (Catalano et al. 2004). Conversely, associating with antisocial peers and receiving social rewards from these interactions can promote risk behaviors (Catalano et al. 2004). The theory also asserts that key sources of social ties—family, peers, school, and community—influence adolescent behavior by modeling socially desired behaviors, and providing opportunities for youth to develop positive social skills that build resiliency (Catalano et al. 2004). Given significant biosychosocial changes during adolescence and challenging parenting responsibilities among adolescent mothers, positive social attachments have the potential to help adolescent mothers manage competing responsibilities and promote healthy behavior.

To address past limitations of atheoretical analyses of data from small, homogenous samples of adolescent mothers, we examined whether attachments to conventional institutions of family, peers, school, and religion/church—factors highlighted in social development theory—are associated with RRP among adolescent mothers in a nationally representative sample of U.S. adolescents. We hypothesized that adolescent mothers with strong social bonds (attachment) to family, peers, school, and religion are less likely to experience an RRP, compared to those with weaker social bonds.

Methods

Data

We used data from Waves I and IV of the National Longitudinal Study of Adolescent to Adult Health (Add Health), an ongoing prospective study of a U.S. nationally representative probability sample of 20,745 adolescents in grades 7–12 during the 1994–1995 school year (see Harris et al [2013] for study design details). To date, one in-school and four in-home interviews have been completed; data for present analyses came from the Wave I/baseline in-home adolescent and parent (usually the resident mother) interviews, and the Wave IV respondent in-home interview (2008; respondents aged 24-32). Add Health procedures were approved by the University of North Carolina, Chapel Hill IRB. Present analyses were deemed exempt and were conducted in accord with prevailing ethical principles.

Inclusion criteria for the current study were participation in Waves I and IV (n=15,701), valid sampling weight (n=14,800), female biological sex (n=8,352), reporting at least one birth before the age of 20 (n=1,259), and non-missing data on analytic variables (n=1,158).

Measures

Because of their sensitive nature, all pregnancy and sexual behavior questions were self-administered using computer-assisted self-interviewing (CASI).

Rapid repeat pregnancy (RRP)—A complete pregnancy and childbearing history for each respondent was collected during the Wave IV in-home interview. RRP was defined as a pregnancy that occurred within 24 months of the first adolescent birth.

Unless otherwise indicated, all attachment variables described below are self-reported in the adolescent Wave I/baseline interview. Variables were selected based on their use in prior

studies of the distal/sociocontexual factors associated with adolescent pregnancy (e.g., Raneri and Wiemann 2007) and relevance to social development theory (Catalano & Hawkins 1996).

Attachment to family and peers—*Parent-adolescent relationship quality* was measured by summing answers to four questions about perceptions of closeness, communication, relationship satisfaction and warmth with each resident parent. In households with two parents, we selected the higher of the two scores; scores ranged from 4 to 20, and higher values reflect better relationship quality (Cronbach's alpha=0.85).

Adolescents were asked to indicate their perceptions of their mothers' attitudes toward their engaging in sexual activity and toward their education attainment. Three items measuring *adolescent perception of maternal disapproval of sex* were, "How would your mother feel about your having sex at this time in your life?"; "How would your mother feel about your having sex with someone who was special to you and whom you knew well-like a steady boyfriend?"; and "If you had sexual intercourse, it would upset your mother." Responses for each ranged from 1 to 5, from "strongly approve/agree" to "strongly disapprove/disagree." Scores were summed across items and assigned such that higher values indicated greater perceived maternal disapproval of sex (range: 3–15; Cronbach's alpha=0.95).

Two items measuring *adolescent perception of maternal attitudes toward education* were, "On a scale of 1 to 5, where 1 is low and 5 is high, how disappointed would she [resident mother] be if you did not graduate from high school [graduate from college]?" Scores were combined such that higher values reflect greater perceived maternal disappointment (range: 2–10; Cronbach's alpha=0.71). *Anticipated social consequences of sex* were evaluated by four items: "If you had sexual intercourse, your friends would respect you more;" "If you had sexual intercourse, your partner would lose respect for you;" "If you had sexual intercourse, it would make you more attractive to men/women;" and "If you had sexual intercourse, you would feel less lonely." Responses for each item ranged from 1 to 5, from "strongly disagree" to "strongly agree." Scores were summed across items and assigned such that higher values indicate fewer negative social consequences (and more anticipated rewards) of having sex (range: 3–15; Cronbach's alpha=0.68).

Attachment to school—*School connectedness* (Cronbach's alpha=0.78) was a summary score measuring adolescents' feelings of being close to people at school, feeling a part of school, feeling happy to be at school, and feeling safe at school. Each item was measured on a five-point Likert scale and summed to create an overall measure of school connectedness (range=4–20; higher values indicate greater attachment to school).

For two indicators of adolescent educational aspirations, the *desire to attend college*, and the *perceived likelihood of attending college*, scores on each item ranged from 1 to 5, "strongly disagree" to "strongly agree." Lastly, we included dichotomous indicators for *ever repeated a grade*, *received an out-of-school suspension*, and *expulsion from school*.

Attachment to religion/church—Attachment to religion and church include indicators of subjective religious experiences, as well as public dimensions of religiosity. Measures of

religious subjective experiences include *how important religion* is to the adolescent (scores range from 1 to 5, “not important at all” to “very important”) and *frequency of prayer* (“at least once a day [referent],” “once a week,” “once a month,” “less than once a month” and “never”). Public dimensions of religiosity include *frequency of religious services attendance* and *participation in church-related youth activities* in the past 12 months; response options for each were “once a week or more (referent),” “once a month or more,” “less than once a month” and “never.”

Control variables—(self-reported in the Wave I adolescent in-home interview, unless otherwise indicated): *Race/ethnicity*, categorized as non-Hispanic white (referent), Hispanic (any race), non-Hispanic black, and non-Hispanic Asian/Pacific Islander, and other. *Age at Wave IV interview* is a continuous variable in years. *Family of origin structure*, categorized as living with two biological parents (referent), other two parent household, single mother, single father, and all other structures. *Parental education attainment*, used as a proxy for socioeconomic status, consists of the highest level of education obtained by either of the respondent's parents or caregivers (less than high school; high school graduate/general education diploma; some college or post-high school business, trade, or vocational school; or college graduate or more [reference category]) and was reported by the resident mother in the parent wave I in-home interview and supplemented by adolescent report if the parent information was missing.

Neighborhood poverty, defined as the proportion of families in the respondents’ Census block group with dependents younger than 18 years and income below the federal poverty level (FPL) in 1989, was categorized as low (< 11.6% of families below FPL; referent), medium (between 11.6% and 23.9% below FPL), and high (> 23.9% below FPL) (Billy et al. 1998).

Neighborhood connectedness has been identified as a protective factor for adolescent pregnancy and childbearing (Desikan 2011; Small & Luster 1994) and was defined by two questions assessing neighborhood social ties and perceptions of safety: “People in this neighborhood look out for one another” and “Do you usually feel safe in your neighborhood?” (affirmative responses were coded as 1, and negative as 0). Reponses were summed to create an aggregate measure of neighborhood connectedness, with scores ranging from 0 to 2; higher values indicate greater neighborhood connectedness.

We also controlled for *age at first pregnancy, adoption status of first child*, and *marriage status at time of adolescent birth*. Further, we controlled for *birth control use before first pregnancy*, determined by whether the respondent used any kind of birth control, including condoms, in the month before her first pregnancy (yes/no). *Wanted first birth* was based on the question, “Thinking back to the time just before this pregnancy with {initials}, did you want to have a child then?” (yes/no).

Additionally, we controlled for self-reported *childhood sexual abuse* (“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?”), dichotomized as never/ ≥1 times before age 18).

Lastly, *self-esteem* was evaluated by a composite of seven items from Rosenberg's self-esteem scale (range=7–35; Cronbach's alpha=0.95) (Rosenberg 1965).

Statistical Analyses

Bivariate analyses (Pearson chi-square test for categorical variables and 2-sample t-tests for continuous variables) were used to identify variables potentially associated with RRP. Those significant at $p < 0.10$ were retained and entered into one multivariate logistic regression model to test whether indicators of attachment to family, peers, school, and church are associated with the outcome, odds of RRP among adolescent mothers, controlling for all covariates. We used Stata's (version 14.0) *margins* command to calculate the predicted probability of an adolescent reporting an RRP for each significant variable in the multivariate model, by averaging probabilities across cases (College Station, TX, USA). All results were adjusted to account for Add Health sampling weights and study design.

Results

Descriptive Analyses

Table 1 presents weighted sample characteristics, by RRP status. Approximately one third of the adolescent mothers (n=367) reported an RRP. Of adolescents with an RRP, approximately 53% were non-Hispanic white, 27.5% were non-Hispanic black, 14% were Hispanic, and 2% were non-Hispanic Asian/pacific islander. On average, adolescent mothers with an RRP reported slightly lower parent-adolescent relationship quality, lower ratings of perceived maternal disapproval of sex, and fewer social consequences (or more rewards) from sex compared to adolescent mothers who did not have an RRP. Additionally, adolescents with an RRP prayed and attended religious services and youth activities more often than adolescents without an RRP.

Multivariate Analyses

Table 2 presents results of multivariate logistic regression models. Overall, two measures of family and peer connectedness, as well as two measures of private and public dimensions of religiosity, were associated with RRP. Adolescent mothers who had stronger parent-adolescent relationships had reduced odds of RRP (adjusted odds ratio [AOR]: 0.83; 95% confidence interval [CI]: 0.71-0.99), whereas adolescents who anticipated fewer negative social consequences of having sex had increased odds of RRP (AOR: 1.18; 95% CI: 1.02-1.35). For religious attachment variables, adolescents who never prayed had increased odds of RRP compared to those who prayed every day (AOR: 1.47; 95% CI: 1.10-1.96). Adolescents who never participated in church-related youth activities had increased odds of RRP compared to respondents who participated in youth activities once a week (AOR: 1.04; 95% CI: 1.01-1.07). No school attachment variable was associated with odds of RRP among adolescent mothers in either bivariate or multivariate models.

Figure 1 shows the predicted probabilities of an RRP for each significant attachment variable in the multivariate logistic regression model, with other variables held at their means. Adolescent mothers who never prayed had a 50% chance of reporting an RRP compared to 21% for mothers who prayed once a day or more. Likewise, adolescent mothers

who anticipated fewer negative consequences and high social rewards from sex (defined as one standard deviation [SD] [2.68] above the mean [9.89]) had a 37% chance of having an RRP, compared to 26% for adolescent mothers who anticipated low social rewards from sex (one SD below the mean). Adolescent mothers who reported weak parent-adolescent relationships (one SD [3.05] below mean [17.9]) had a 35% chance of reporting an RRP, compared to 27% for adolescent mothers with strong (1 SD above the mean) parental bonds.

Discussion

Guided by social development theory, this study examined associations between attachment to conventional institutions (i.e., family, peers, school, and religion/church) and the likelihood of RRP among adolescent mothers. As hypothesized, we found that attachment to conventional institutions is associated with the likelihood of an RRP. Specifically, adolescent mothers who never prayed, never participated in church-related youth activities, or adolescents who anticipated more peer-related social rewards from having sex were more likely to have an RRP. By contrast, adolescent mothers who had strong parent-adolescent bonds were less likely to report an RRP. We did not find significant associations between school attachment and RRP.

Present findings support the importance of private aspects of religion; frequency of prayer yielded the largest probability difference in the likelihood of RRP, a relationship not evident in previous studies. Private religiosity may increase self-esteem or a sense of self-efficacy, as well as openness to social support (Nonnemaker et al. 2003). Private religiosity might also buffer the effects of life stress and provide a coping mechanism for new adolescent mothers (Wills et al. 2003). Adolescent mothers who never pray might not experience these buffers, putting them at an increased risk of RRP. Attachment to public aspects of religion also plays an important role in the likelihood of RRP. Involvement in youth activities within a religious setting may provide some protection against RRP by motivating adolescents to remain abstinent or to use contraception after their initial adolescent birth. The findings of this study suggest that fostering spirituality or associating with pro-social peers in youth groups may promote positive behaviors, although we could not test that idea directly.

We also found adolescents who reported better relationships with their parents were less likely to have an RRP, suggesting the importance of communication between adolescent mothers and their parents, especially in conversations about sexual activity and birth control. Literature addressing early childbearing seldom mentions adolescents in the context of their families, and programs directed at pregnant and childbearing adolescents are frequently individualized without consideration of their family environments (Barnet et al. 2010). RRP prevention efforts should involve the parents (or guardians) of the adolescent mother, if possible, as a means to strengthen families' ability to provide support, communicate effectively, and increase involvement in the adolescent mother's life (Markham et al. 2010). Prevention efforts could also help parents become better prepared in discussing contraception, childrearing, and goal-setting with adolescent mothers. Further, our findings suggest that adolescent perceptions of peers' reactions to sexual activity might have an influence on RRP risk, therefore prevention programs could create networks of pro-social

peers who provide positive attitudes about contraception and family planning for adolescent mothers, and work to support one another (Markham et al. 2010).

Although no true consensus exists among previous studies, the lack of significant associations between RRP and any school attachment indicator was unexpected. Prior evidence has shown that adolescents uninvolved in school may seek parenthood as an alternative route to "success." However most of these findings are based on non-representative convenience samples (Barnet et al. 2004; Barnet et al. 2010; Bull & Hogue 1998; Kalmuss & Namerow 1994; Klerman 2004; Raneri & Wiemann 2007; Stevens-Simon et al. 1998; Stevens-Simon et al. 1986; Stevens-Simon 1996; Van Horne et al. 2009). More research using nationally representative samples is needed to replicate present findings. In addition, different indicators of school attachment might reveal associations not evident with our measures (Barnet et al. 2010; Klerman 2004; Manlove et al. 2000; Raneri & Wiemann 2007; Stevens-Simon et al. 1998; Van Horne et al. 2009). Future research could examine whether other school attachment indicators (e.g., school club participation or career aspirations) affect the likelihood of RRP.

Limitations

This study has the strength of a large and diverse national sample and theoretically driven hypotheses, however the findings should be considered with certain limitations in mind. First, we relied on adult retrospective reports of pregnancy and childbirth histories, which are subject to recall error and bias. Second, pregnancy and childbearing during adolescence are sensitive topics that may be under-reported. Although the use of computer-assisted self-interviewing (CASI) in Add Health in-home interviews' diminishes these concerns, the influence of social connections cannot wholly be understood without qualitative inquiry. Future qualitative studies could explore the specific processes and experiences by which connections to family and church serve as protective or risk factors for RRP among adolescent mothers. Third, with the exception of marital status at the time of the first adolescent birth, we have not taken into account the respondent's relationship with the father(s) of the first child or second pregnancy. The existence and quality of this relationship could influence likelihood of RRP. Fourth, for some respondents (20% of our analysis sample) who had their first and/or second pregnancies before the Wave I interview, measures of adolescent attachment were collected after the pregnancies. However, we conducted a sensitivity analysis eliminating these respondents; findings were similar to those reported here. Finally, not all potential correlates of adolescent RRP were examined, and because of sample sizse limitation, interactions among variables were not tested. Future research should consider moderating and mediating processes for key associations identified in this study.

Conclusion

This study is among the first theoretically grounded investigations to examine adolescent's family, peer, school, and religious ties and their associations with RRP among adolescent mothers using nationally representative data. Intervention efforts should be geared toward building on individual needs and strengths of these mothers' environments. Present findings suggest that many adolescent mothers might become pregnant again because they lack a firm

connection to supportive social institutions like family and religion. Increasing engagement with these institutions might contribute to postponing second births.

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Significance

Despite downward trends over time, the United States has the highest rate of adolescent pregnancy among western countries. Given that a repeat pregnancy to adolescent mothers compounds the already great challenges faced by an adolescent mother and her family, it is important to identify the factors that might reduce the odds of a repeat pregnancy, and to use this knowledge to inform intervention efforts. This study is among the first to examine distal factors—school, family, peer, and religious ties—and their association with rapid repeat pregnancies (RRP) among adolescent mothers using a nationally representative sample of adolescents.

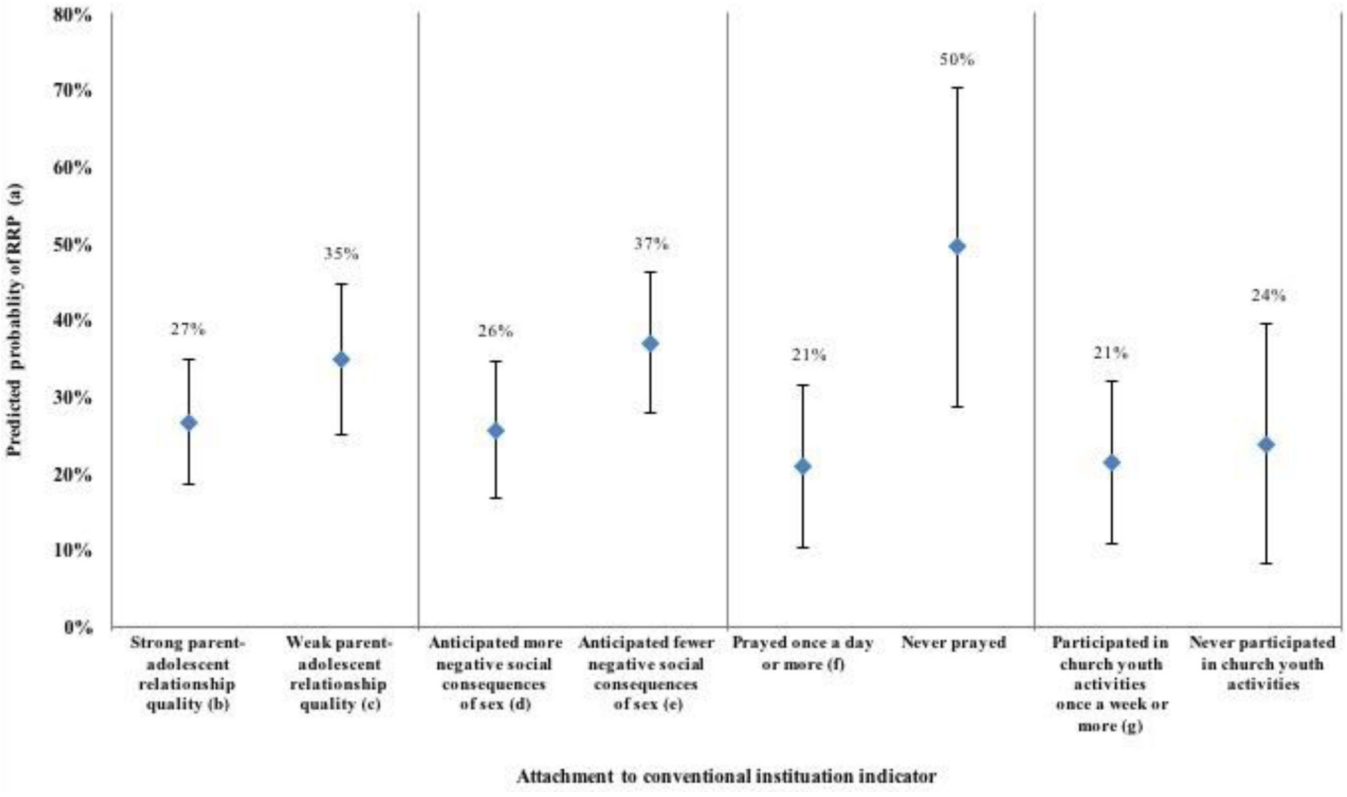

Figure 1.

Predicted probability of reporting a rapid repeat pregnancy (RRP) among adolescent mothers in the United States (n=1,158).

(a) Predicted probabilities represent illustrative values of the average probability of having an RRP across cases, with the following control variables held at their means: race/ethnicity, family of origin structure, parental education attainment, age at Wave IV, neighborhood poverty, neighborhood connectedness, age at first pregnancy, adoption status of adolescent birth, marriage status at adolescent birth, adoption status of first child, marriage status at adolescent birth, birth control use before first pregnancy, wanted first birth, childhood sexual abuse history, and self-esteem. Only predictors that were statistically significant in the multivariate model are included in the figure.

(b) Strong parent-adolescent relationship quality is 1 SD (3.05) above the mean for the sample (17.9). Parent-adolescent relationship quality measures adolescent perceptions of closeness, communication, relationship satisfaction, and warmth with each resident parent as reported by the adolescent at the Wave I in-home interview, and is a summed scale ranging from 4–20.

(c) Weak parent-adolescent relationship quality is 1 standard deviation (SD) (3.05) below the mean value for the sample (17.9).

(d) Anticipated more negative social consequences of sex is 1 SD (2.68) above the mean value for the sample (9.89). Adolescent anticipated social consequences of sex measures adolescent perceptions of the negative social consequences (and anticipated rewards) from having sex among peers at reported at the Wave I in-home interview, and is a summed scale ranging from 2–10.

(e) Anticipated fewer rewards negative social consequences of sex is 1 SD (2.68) below the mean for the sample (9.89).

(f) Frequency of participation in youth activities within church, as reported by the adolescent at the Wave I in-home interview.

(g) Frequency of prayer, as reported by the adolescent at the Wave I in-home interview.

Table 1

Weighted sample characteristics of adolescent mothers in the United States, by rapid repeat pregnancy (n=1,158).

	Rapid repeat pregnancy [a]		
Characteristic	**No (n=791)**	**Yes (n=367)**	**p-value [b]**
Attachment to Family and Peers			
Parent-adolescent relationship quality [c], *mean (SE)*	18.1 (0.10)	17.0 (0.16)	0.081
Adolescent perceived maternal disapproval of sex [d], *mean (SE)*	6.38 (0.11)	6.05 (0.16)	0.090
Adolescent perceived maternal attitudes toward education [e], *mean (SE)*	8.93 (0.85)	8.84 (0.13)	0.599
Anticipated social consequences of sex [f], *mean (SE)*	9.70 (0.11)	9.97 (0.17)	0.031
Attachment to School			
Adolescent desire to attend college [g], *mean (SE)*	4.25 (1.33)	4.25 (1.17)	0.731
Adolescent perceived likelihood of attending college [h], *mean (SE)*	3.86 (1.28)	3.84 (1.28)	0.692
School connectedness [i], *mean (SE)*	14.3 (0.12)	14.2 (0.18)	0.780
Ever repeated a grade, *n (%)*	183 (26.0)	114 (30.7)	0.207
Ever received out-of-school suspension, *n (%)*	300 (38.1)	158 (42.3)	0.257
Ever been expelled, *n (%)*	56 (7.5)	25 (7.1)	0.810
Attachment to Church			
Importance of religion [j], *mean (SE)*	3.40 (0.72)	3.41 (0.67)	0.222
Frequency of prayer, *n (%)*			
Once a day or more	341 (44.6)	169 (55.0)	0.062
Once a week	184 (29.2)	76 (24.2)	
Once a month	65 (11.1)	33 (11.2)	
Less than once a month	65 (9.0)	19 (7.1)	
Never	39 (6.1)	8 (2.5)	
Frequency of religious services attendance, *n (%)*			
Once a week or more	263 (36.1)	137 (44.1)	0.093
Once a month or more	187 (27.6)	70 (19.2)	
Less than once a month	152 (23.5)	64 (22.2)	
Never	86 (12.7)	38 (14.5)	
Frequency of participation in youth activities, *n (%)*			
Once a week or more	156 (20.0)	92 (30.8)	0.012
Once a month or more	103 (13.0)	52 (15.0)	
Less than once a month	125 (20.6)	47 (15.6)	
Never	303 (46.5)	119 (38.7)	
Sociodemographic Characteristics			
Race/ethnicity, *n (%)*			
Non-Hispanic white	318 (52.9)	177 (52.6)	0.377

Characteristic	Rapid repeat pregnancy [a] No (n=791)	Yes (n=367)	p-value [b]
Non-Hispanic black	279 (25.9)	111 (27.5)	
Hispanic	157 (17.1)	52 (14.4)	
Non-Hispanic Asian/pacific islander	19 (1.3)	12 (1.9)	
Other race	20 (2.8)	15 (3.6)	
Family of origin structure, *n* (%)			
Two biological Parents	352 (35.5)	79 (33.9)	0.327
Other two parent	133 (17.5)	61 (16.6)	
Single mother	247 (30.6)	112 (31.4)	
Single father	15 (1.9)	10 (2.6)	
Other family structure	99 (14.5)	53 (15.5)	
Highest parental education attainment, *n (%)*			
Less than HS	160 (21.2)	66 (20.5)	0.860
HS graduate/GED	267 (37.3)	128 (39.1)	
Some college	143 (28.4)	76 (29.4)	
College graduate or more	141 (13.1)	58 (11.1)	
Neighborhood poverty, *n (%)*			
Low poverty	314 (32.0)	150 (35.5)	0.860
Medium poverty	203 (26.1)	96 (24.9)	
High poverty	274 (37.9)	121 (39.6)	
Neighborhood connectedness [k], *mean (SE)*	1.50 (0.02)	1.54 (0.03)	0.356
Other Individual Characteristics			
Age at time of Wave IV interview in years, *mean (SE)*	28.9 (0.06)	28.8 (0.09)	0.211
Age at first pregnancy in years, *mean (SE)*	17.7 (0.52)	17.6 (0.67)	0.139
Adoption of first child, *n (%)*	8 (31.7)	-- (0.04)	<0.001
Married at time of adolescent birth, *n (%)*	239 (30.2)	135 (36.8)	0.578
Birth control use before pregnancy, *n (%)*	406 (51.7)	193 (50.0)	0.725
Wanted first birth, *n (%)*	202 (25.9)	97 (26.1)	0.940
History of childhood sexual abuse, *n (%)*	80 (11.0)	53 (13.9)	0.189
Self-esteem [l], *mean (SE)*	27.2 (0.15)	26.8 (0.22)	0.152

SE=Standard error

Percentages and means are weighted to reflect Add Health sample design (Ns are unweighted). Column percentages may not add to 100% owing to rounding and weighting.

[a] Rapid repeat pregnancy (RRP) defined as pregnancy that occurred within 24 months of the first adolescent birth.

[b] p-values indicate Pearson chi2-test [categorical variables]/2 sample *t*-test [continuous variables] of significant differences in sample characteristics by RRP status. Significant differences between groups at p<0.10 were considered for inclusion in multivariate models.

[c] Parent-adolescent relationship quality, summed scale ranges from 4–20.

[d] Adolescent perceived maternal attitudes toward sex, summed scale ranges from 3–15

[e] Adolescent perceived maternal attitudes toward education, summed scale ranges from 2–10

[f] Anticipated social consequences of sex, summed scale ranges from 3–15

[g] Adolescent desire to attend college, Likert scale ranges from 1–5

[h] Adolescent perceived likelihood of attending college, Likert scale ranges from 1–5

[i] School connectedness, summed scale ranges from 4–20

[j] Importance of religion, summed scale ranges from 4–20

[k] Neighborhood connectedness, summed scale ranges from 0–2

[l] Self-esteem, summed scale ranges from 7–35

-- Indicates cell size too small to report, owing to Add Health reporting requirements.

Table 2

Multivariate logistic regression analysis of the association between attachment to conventional institutions and the likelihood of rapid repeat pregnancy among adolescent mothers, variables selected from significant bivariate associations (n=1,158).

	Rapid repeat pregnancy [a]	
Attachment to conventional institutions	**Adjusted OR [b]**	**95% CI**
Attachment to Family and Peers		
Parent-adolescent relationship quality [c]	0.83 *	(0.71, 0.99)
Adolescent perceived maternal disapproval of sex [d]	1.06	(0.88, 1.26)
Anticipated social consequences of sex [e]	1.18 **	(1.02, 1.35)
Attachment to Church		
Frequency of prayer		
Once a day or more		
Once a week	0.47	(0.18, 1.24)
Once a month	0.79	(0.49, 1.29)
Less than once a month	1.33	(0.88, 2.02)
Never	1.47 **	(1.10, 1.96)
Frequency of participation in youth activities		
Once a week or more		
Once a month or more	0.96	(0.94, 1.02)
Less than once a month	1.08	(0.71, 1.89)
Never	1.04 *	(1.01, 1.07)

OR=Odds ratio; CI= Confidence interval; REF=Reference category

* p<0.05,

** p<0.01,

*** p<0.001.

All results weighted to reflect Add Health sampling design.

[a] Rapid repeat pregnancy (RRP) defined as pregnancy that occurred within 24 months of the first adolescent birth.

[b] Logistic regression model reflects odds of rapid repeat pregnancy (relative to none) associated with indicators of attachment to conventional institutions (family and peers, and church), controlling for the following variables: race/ethnicity, family of origin structure, parental education attainment, age at Wave IV, neighborhood poverty, neighborhood connectedness, age at first pregnancy, adoption status of adolescent birth, marriage status at adolescent birth, adoption status of first child, marriage status at adolescent birth, birth control use before first pregnancy, wanted first birth, childhood sexual abuse history, and self-esteem.

[c] Parent-adolescent relationship quality, summed scale ranges from 4–20.

[d] Adolescent perceived maternal attitudes toward sex, summed scale ranges from 3–15.

[e] Anticipated social consequences of sex, summed scale ranges from 2–10.