

**EDUCATIONAL ATTAINMENT IN EMERGING ADULTHOOD:
LINKS WITH SEXUAL DEBUT TIMING**

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BACKGROUND

The prevention of adolescent sexual activity is a central focus of U.S. reproductive health policy.¹ Advocates promoting adolescent sexual abstinence often cite research that correlates adolescent sexual activity with negative health outcomes during adolescence, including substance use and poor mental health.²⁻⁴ Sexual debut during adolescence is also thought to affect educational attainment, both directly (through decreased college aspirations and academic performance in high school) and indirectly (through associations with other risk behaviors that endanger educational trajectories).⁵⁻⁷ Given the importance of educational attainment for long-term socioeconomic opportunities, health and well-being, it is important to understand factors that may jeopardize such attainment.

Despite the apparent negative effects adolescent sexual debut has on adolescent health and functioning, research to date has a number of limitations. First, because many studies utilize short follow-up times, negative associations between sexual activity and health may be attributable to normative short-term developmental disruptions, rather than long-term developmental risk.^{8,9} For example, one recent study by Kaestle et al. (2005) found that associations between early sexual debut and sexually transmitted infections decreased with age.¹⁰ Second, many studies fail to control for background factors which are correlated with both early sexual initiation and poor educational outcomes, including experience of childhood maltreatment and coerced sex.¹¹ Third, negative associations between adolescent sexual activity and health are not universal. For example, associations between drug use and sexual activity are weaker for Black than White adolescents;^{12, 13} further, associations between depression and intimate relationship initiation (as well as adolescent sexual activity) have been found stronger for females than for males.¹⁴ These differences by race/ethnicity, gender, as well as across

countries^{15, 16} cast doubt on the appropriateness of making general claims of harm caused by adolescent sexual debut. Finally, another limitation of the research on adolescent sexual transition is inconsistency in the characterization of “early” sexual debut. A number of studies have used cutoffs of age 14¹⁷⁻²⁰ or 15,^{12, 21-23} while others have implicitly characterized any sexual initiation during adolescence as “early.” In sum, the implications of adolescent sexual debut for adolescent development remain unclear; exploration of outcomes in emerging adulthood may shed light on the longer-term impacts of this transition.

RESEARCH QUESTIONS AND HYPOTHESES

Building upon past research findings, the present study addressed three research questions: (1) Is adolescent sexual debut negatively associated with educational attainment in emerging adulthood, and do effects vary by relative timing during adolescence (early or typical)? (2) Is the relationship between sexual debut timing and emerging adult educational attainment similar for males and females? (3) Is the relationship between sexual debut timing and emerging adult educational attainment consistent across race/ethnicity? Given past research findings associating sexual debut with adolescent health risks, it was expected sexual debut during adolescence would be associated with lower educational attainment in emerging adulthood. However, it was also expected that early but not typical debut would demonstrate this association. Further, given past studies finding both gender and racial/ethnic differences in debut effects during adolescence, it was expected that the association between sexual debut timing and educational attainment would vary by both gender (i.e., negative associations stronger for females than males) and race/ethnicity (i.e., negative associations stronger for White and Hispanic than Black adolescents).

DATA AND METHODS

Data

Data from three waves of the National Longitudinal Study of Adolescent Health (Add Health) contractual dataset were analyzed to address these questions.²⁴ Add Health is a probability-based, nationally representative survey of U.S. adolescents enrolled in grades seven through twelve in the 1994-95 school year (Wave I). Participants were re-interviewed in 1995/96 (Wave II) and in 2001/02 (Wave III). The research design and sampling process are detailed elsewhere.²⁵ Data at all three waves were collected via in-home interviews; at Waves I and II, A-CASI was utilized for sensitive subjects (e.g., sexual activity and drug use). Further, Census data regarding neighborhood context were linked to respondent records.

Measures

The main outcome, educational attainment, was specified as an ordinal categorical variable. Data from questions asking respondents' highest grade level completed and degrees received at Wave III were combined to form a four-category outcome variable: less than high school diploma, high school diploma/GED, some postsecondary education, and 4-year college degree or more.

The main predictor variable, sexual debut timing, was derived from Wave III self-report of age (in years) when the respondent first had sexual intercourse, defined for respondents as vaginal intercourse. This variable was transformed into an ordinal indicator of timing earliness, given the non-normality of the distribution and right-censorship of the data (not all respondents had debuted by Wave III). The specification was based on design-corrected and weighted tertiles of reported debut age in the entire Wave III sample (n=10,828), such that the "early"

debut category included those aged 10-15 at debut (29%), the “typical” debut category included those aged 16-18 at debut (44%), and the “late” debut category included those aged >18 at debut and those who have not initiated sexual intercourse by Wave III (27%). Use of Wave III report was necessary because many respondents initiated sexual intercourse between Waves II and III; further, Wave III report of sexual debut age has been used in other Add Health analyses.¹⁰

Covariates controlled in multivariate analyses were those variables supported in the literature and in preliminary bivariate analyses as potential confounders of the relationship between sexual debut timing and educational attainment. *Demographic and background variables* included age at Wave III interview, gender, race/ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic, Other), and intelligence (Wave I Add Health Picture Vocabulary Test score, categorized as below average, average, and above average). Gender and race/ethnicity were also examined as potential effect modifiers. *Adolescent family characteristics*, all measured at Wave I, included living arrangement (with both biologic parents vs. not), parental education (higher of either residential mother or father: less than high school diploma, high school diploma/GED, some postsecondary, bachelors degree or more), parental educational expectations (adolescent expects high parent disappointment if he/she does not graduate from college), and parental disapproval of sex (high disapproval versus not, lower of mother or father report). Two variables characterizing *adolescents' neighborhoods* were also included: neighborhood education (percent of population with less than a high school education) and poverty (percent of population below federal poverty line); both neighborhood variables were categorized into quartiles. Finally, controls for respondents' *other negative experiences* included adolescent substance use (any cigarette and any marijuana use in past 30 days, at Wave I), report of coercive sex experience (defined as physical force, at either Wave I or II), and childhood

maltreatment before the 6th grade (supervisory neglect, physical neglect, and sexual abuse, retrospectively reported at Wave III).

Analytic Sample Inclusion Criteria

Inclusion criteria for the present analysis were availability of Wave III longitudinal sample weights, age of 22 to 24 years at Wave III, and complete data on all variables of interest (n=4,350; see Figure 1). Age limitations were necessary due to the expected age-dependence of the outcome of interest, and the wide range of ages at all three waves of Add Health. The choice of age limits was based on the criterion of potential to complete a four-year college degree by Wave III data collection.

Analyses

All analyses were conducted in Stata version 9, with corrections for survey design and utilizing weights to yield nationally-representative estimates. Descriptives (weighted proportions) of the sample's personal, family, and neighborhood characteristics were run for the analytic sample. Further, chi-square analyses were performed to test associations between control variables and both sexual debut timing and educational attainment. Finally, the relevance of sexual debut timing for educational outcomes was tested with a multivariable generalized ordinal logistic regression model, using `gologit2` commands in Stata.²⁶

The generalized ordinal logistic regression model is a hybrid of the proportional odds model and the multinomial logistic regression model. The procedure individually tests independent variables for parallelism across levels of the dependent variable. For variables where the parallelism assumption is not significantly violated, beta coefficients are constrained to be the same across the levels of the dependent variable, similar to a proportional odds model. For variables where parallelism is violated, betas are allowed to vary across the levels of the

dependent variable, as in a multinomial logistic model. The use of generalized ordered logistic was preferable to the proportional odds model because preliminary analyses indicated the fully constrained model violated parallelism assumptions; this model was also preferable to a multinomial logistic regression model because it maximized efficiency and interpretability of results.²⁶

One model including all control variables, the main independent variable, gender*debut timing interaction terms, and race*debut timing interaction terms tested (1) whether debut timing was significantly associated with educational attainment net of background characteristics, (2) whether this relationship was consistent for males and females, and (3) whether this association varied by race/ethnicity. Variables were tested for parallelism across levels of the dependent variable at $\alpha=0.15$; beta coefficients with p-values >0.15 were constrained to be the same across levels of the outcome, while beta coefficients with p-values ≤ 0.15 were allowed to vary.ⁱ Hypothesis testing was conducted at $\alpha=0.05$. Estimated coefficients for debut timing were transformed into risk estimates (i.e., predicted probabilities) using prvalue statements.^{27,28}

RESULTS

Descriptive Results

Demographic and background characteristics are presented in Table 1. The majority of respondents reported White race (67%), 16% identified as Black/African American, 12% as Hispanic, and 5% as other race/ethnicity. Males and females were equally represented in the sample. The distribution of debut timing was slightly different in the analytic subsample than in

ⁱ The parallelism alpha level was set at the lowest level resulting in an insignificant Wald parallelism test for the overall model. Variables that did not meet the parallelism assumption were gender, race/ethnicity, parent education, and childhood supervisory neglect.

the full Wave III sample, but the majority of respondents still reported sexual debut during adolescence – almost three out of ten adolescents (28%) experienced sexual initiation prior to age 16, 45% experienced debut between ages 16-18, and 27% debuted after age 18 or had not debuted by Wave III. By emerging adulthood, the vast majority of respondents had at least graduated from high school or earned a GED (92%); 39% of respondents had initiated some postsecondary education by Wave III follow-up, and 18% had earned a Bachelor's degree.

Bivariate Results

In crude bivariate analyses, a significant and strong relationship between sexual debut timing and educational attainment was observed: those who experienced late debut timing were almost 3 times as likely as those with early timing, and almost twice as likely as those with typical debut timing, to have a Bachelors degree by Wave III (Figure 2). The contention that associations between sexual debut timing and educational attainment are partially attributable to variation in risk and protective factors was also supported in bivariate analyses. Persons who debuted late had more protective factors and fewer risk factors than those with early and typical debut times (Figures 3 and 4). For example, while almost three quarters of those with late debut lived with both biologic parents in adolescence, only 60% of those with typical and 45% of those with early debut experience this same living arrangement. Also, those with early debut were more than three times as likely to smoke cigarettes in adolescence compared to those with late debut.

Multivariate Results

In multivariate analyses controlling for personal, family and neighborhood characteristics, the association between sexual debut timing and educational attainment, though attenuated, was still significant. Further, estimated effects of adolescent sexual debut varied by

relative timing during adolescence: early debut timing was more strongly negatively related to educational attainment than was typical debut timing. Although both gender and race/ethnicity were directly associated with educational attainment, interactive effects with sexual debut timing were evident only for gender. As such, results are presented separately for females and males (Figures 5 and 6).

For females, both early and typical debut timing were negatively associated with educational attainment by emerging adulthood, although the magnitude of differences was modest and varied by level of education. For example, holding all else constant, females with late debut were only 5.4% (95% CI 1.6-9.3%) more likely than those with early debut and 2.9% (95% CI 0.5-5.3%) more likely than those with typical debut to have some postsecondary education by emerging adulthood. However, late initiators were 11.9% (95% CI 6.9-17.0%) more likely than early initiators and 9.4% (95% CI 4.3-14.6%) more likely than typical initiators to have finished a Bachelor's degree by emerging adulthood.

For males, only early debut was significantly negatively related to educational attainment by emerging adulthood; those with typical and late debut timing evidenced statistically similar educational outcomes. As with females, the magnitude of differences between early and late initiators was modest and varied by educational level. For example, those with late debut were 8.2% (95% CI 2.6-13.8%) more likely than early initiators to have some postsecondary education, but only 4.5% (95% CI 1.4-7.6%) more likely to have earned a Bachelor's degree by emerging adulthood.

One possible concern with present analyses is that some control variables included in the model capture effects of sexual debut rather than pre-debut heterogeneity, since about 80% of early initiators and about 50% of typical initiators experienced debut before Wave I (data not

shown). To address this possibility, analyses were re-run dropping time-varying covariates (perceived parental attitudes toward sex and education, substance use at Wave I) from the model. This adjustment had little effect on substantive findings – debut timing was still a significant predictor of educational attainment. Early debut was directly negatively associated with educational attainment, and typical debut was negatively associated with educational attainment for females only. Interactions between debut timing and race/ethnicity again were not significant.

Although the primary aim of this analysis was to examine whether associations between adolescent sexual debut and educational attainment held after adjustment for potential confounding factors, findings of negative effects leave unanswered the question of *how* sexual debut timing exerts influence. One likely explanatory factor is childbearing, given the links between early sexual activity and pregnancy risk, as well as early childbearing and educational attainment.^{29,30} In post hoc analyses, the mediating effect of childbearing was examined by adding two indicator variables to the model: having children but not living with them at Wave III, and having children and living with them at Wave III.ⁱⁱ After adding these indicators to the model, estimated negative effects of early and typical debut timing, as well as gender interactions, were no longer significant.

DISCUSSION

Adolescent reproductive health policy in the U.S. centers on the supposition that sexual debut during adolescence causes physical, behavioral and psychological harm. However, most

ⁱⁱ In the present sample, 35% of early, 25% of typical, and 7% of late initiators reported having children by Wave III. Further, 30% of females and 15% of males reported having at least one child by Wave III. The majority of all three debut timing groups had their first child when they were age 20 or older (56% of early initiators with children, 67% of typical initiators with children, and 89% of late initiators with children).

prior research examining long-term effects of adolescent sexual activity has focused on effects of adolescent childbearing.³⁰⁻³² In the present study, we examined the relationship between adolescent sexual debut and educational attainment in emerging adulthood, controlling for common antecedents. Further, we examined whether such relationships varied by relative timing during adolescence, gender and race/ethnicity. There are three main findings from the present study.

First, relative sexual debut timing was associated with a range of risk and protective factors that were also correlated with educational attainment. Generally, those with early and typical debut timing evidenced more educational risk factors and fewer educational protective factors than those with late debut timing. After controlling for these variables in multivariate models, associations between debut timing and educational attainment were greatly attenuated. This suggests that part of the crude estimated effect of sexual debut timing is attributable to background and experiential characteristics that exist *prior* to sexual debut. However, significant associations were still observed after control for these variables, supporting an independent relationship between debut timing and emerging adult educational attainment.

Second, early sexual debut had a similar moderate negative association with emerging adult educational attainment across race/ethnicity and gender, after control for confounders. This finding extends past research that has linked adolescent sexual debut with short term negative changes in educational performance and goals, implying such short-term effects may have lasting implications.^{5, 6, 33} Other research suggests that transition to sexual experience is a non-reversible social act – that is, adolescents' relationship with parents and bonding with school worsen after sexual initiation and do not improve even if sexual activity is ceased.³³ Subsequent to perceived rejection by conventional institutions, adolescents may turn to less conventional

peer groups for affirmation and support, which in turn are unsupportive of academic achievement.³⁴ The perceived and/or actual rejection of sexually-initiated adolescents by conventional institutions thus can place them at risk for both early pregnancy and lower educational attainment.

The third major finding is that typical debut timing is negatively associated with educational attainment for females only. Although past research has found adolescent sexual debut related to negative short-term educational consequences for both females and males,^{5,6} gender differences in other consequences of sexual debut are apparent in the literature. Qualitative studies have found females are subject to more negative social sanctions after debut than males, including pejorative labeling by peers and problem-focused parental interactions.³⁴ Such negative environmental feedback has likewise been connected to post-debut depressive symptom changes,³³ which other studies have found to be greater for females than males.^{14, 35, 36} As adolescent depressive symptomatology is also a risk factor for early pregnancy,^{37, 38} it is possible the higher likelihood of childbearing and worse educational attainment for females with typical versus late debut are related to these social and psychological intermediates. Future research with both pre-debut measures of depressive symptoms and frequent short-term follow-up interviews is needed to better explicate these mechanisms.³⁹

The present analysis builds upon past research examining effects of adolescent sexual debut by investigating longer-term outcomes in emerging adulthood, and by differentiating adolescents with typical and early sexual debut timing. However, a number of study limitations must also be acknowledged. First, many respondents (29%) were still in school at the time of the Wave III interview. As such, findings of associations between sexual debut timing and educational outcomes may reflect differences in the timing of educational attainment, rather than

final educational level achieved. Analyses using later follow-up data are warranted, especially given past findings of late educational attainment among adolescent parents.⁴⁰ Second, although current analyses found that adolescent sexual debut was negatively associated with emerging adult educational attainment, other research (especially on reproductive health outcomes) has found sexual debut timing to have minimal to no effects.^{10, 19} Future research should explore the specificity of effects of sexual debut timing across a broader range of health, behavioral and relational outcomes. Third, because the present study only includes U.S. respondents, making universal claims regarding negative effects of adolescent sexual debut are premature. Other studies have found that despite similar levels of sexual activity, adolescents in other developed countries have much lower rates of STDs and pregnancy, thus diminishing one significant pathway to poorer educational outcomes.^{16, 41} Thus it is possible that negative educational effects of adolescent sexual debut are U.S.-specific. Replicating the current analysis using data from multiple countries would shed light on this question. Finally, despite the use of family, neighborhood and demographic control variables, it is possible the observed association between sexual debut timing and educational attainment resulted from residual unmeasured heterogeneity. Future analyses using the Add Health twin sample will permit testing of this issue.

CONCLUSION

In the present study, adolescent sexual debut was found to be negatively associated with emerging adult educational attainment, though the magnitude of such effects were modest and varied according to relative timing and gender. If such effects are still apparent after examining educational attainment later in adulthood, the findings suggest sexual debut during adolescence may have lasting implications for some health indicators. Given over 90% of the U.S.

population experiences sexual debut before marriage by emerging adulthood,⁴² a policy response based solely on postponement of sexual debut until marriage is unlikely to succeed in protecting educational attainment. Targeting mediators of the sexual debut-education relationship seems both a more realistic and appropriate response. Findings of gender differences in effects of typical sexual debut timing, in combination with past qualitative studies' findings, suggest that social scripts of adolescent sexuality could be an important potential intervention target. Further international comparative research may also help identify effects specific to U.S. culture.

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Figure 1. Analytic sample inclusion criteria

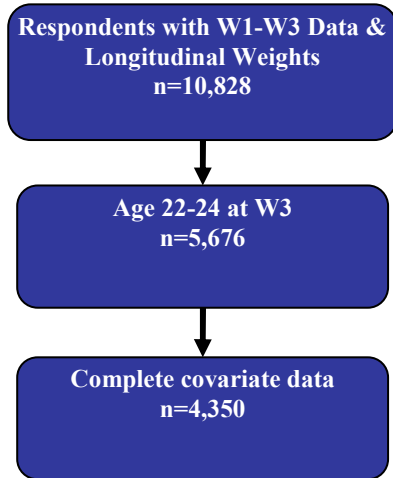


Table 1. Demographic characteristics, debut timing and educational attainment, weighted proportions for overall sample

	Total Analytic Sample (n=4,350)	
	N (unweighted)	Proportion (weighted)
Demographics		
Gender		
Male	2,078	50%
Female	2,272	50%
Race/ethnicity		
White	2,323	67%
Black	838	16%
Hispanic	775	12%
Other	414	5%
Age		
22	1,842	44%
23	1,747	38%
24	761	18%
Main Predictor		
Sexual debut timing		
Early (<16)	1,151	28%
Typical (16-18)	1,964	45%
Late (>18 or Wave III virgin)	1,235	27%
Main Outcome		
Education attainment by Wave III		
< HS/GED	306	8%
HS diploma/GED	1,469	34%
Some postsecondary	1,760	39%
≥Bachelors degree	815	18%

Figure 2. Sexual Debut Timing and Educational Attainment

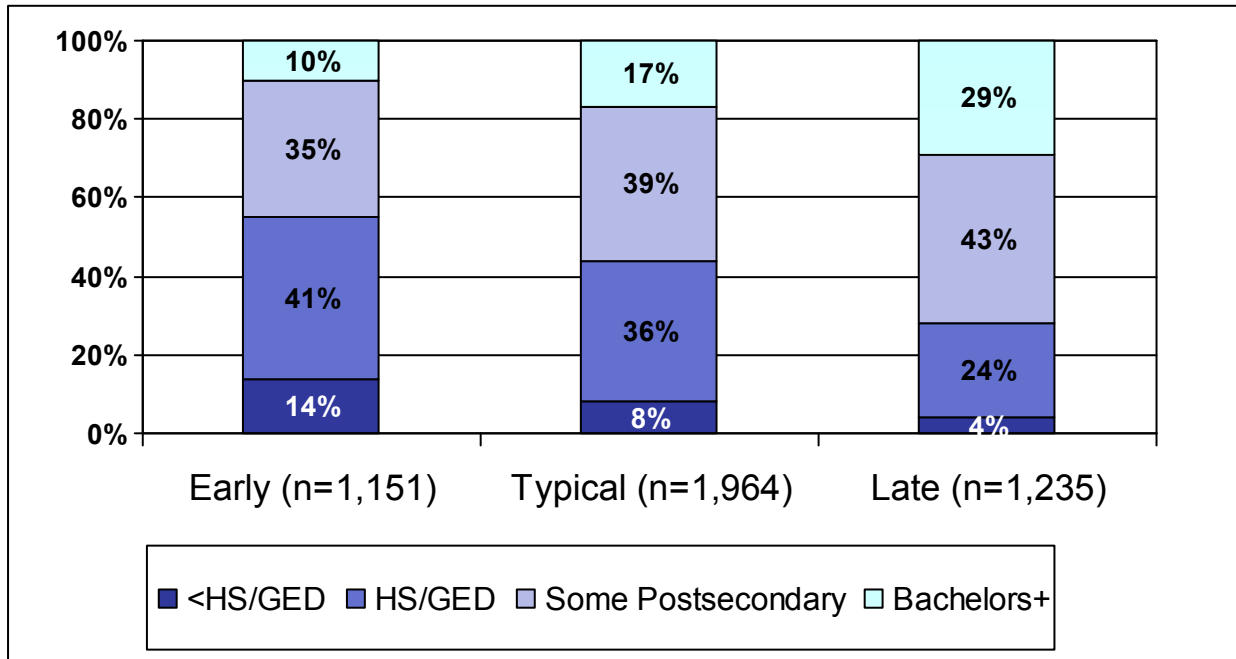


Figure 3. Educational protective factors: Distribution by sexual debut timing

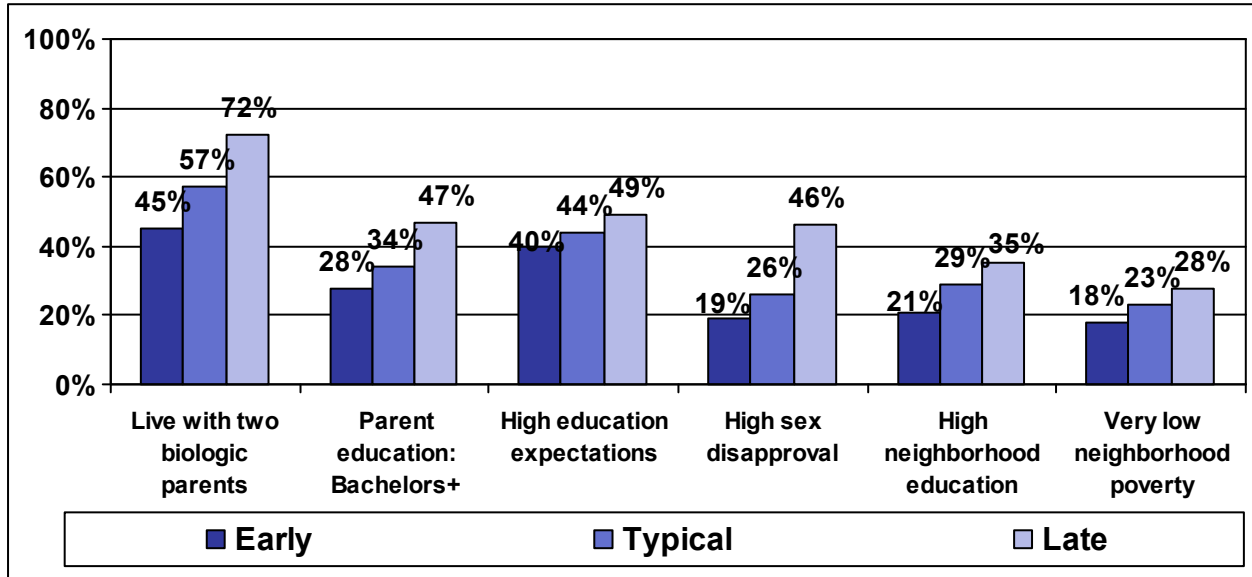


Figure 4. Educational risk factors: Distribution by sexual debut timing

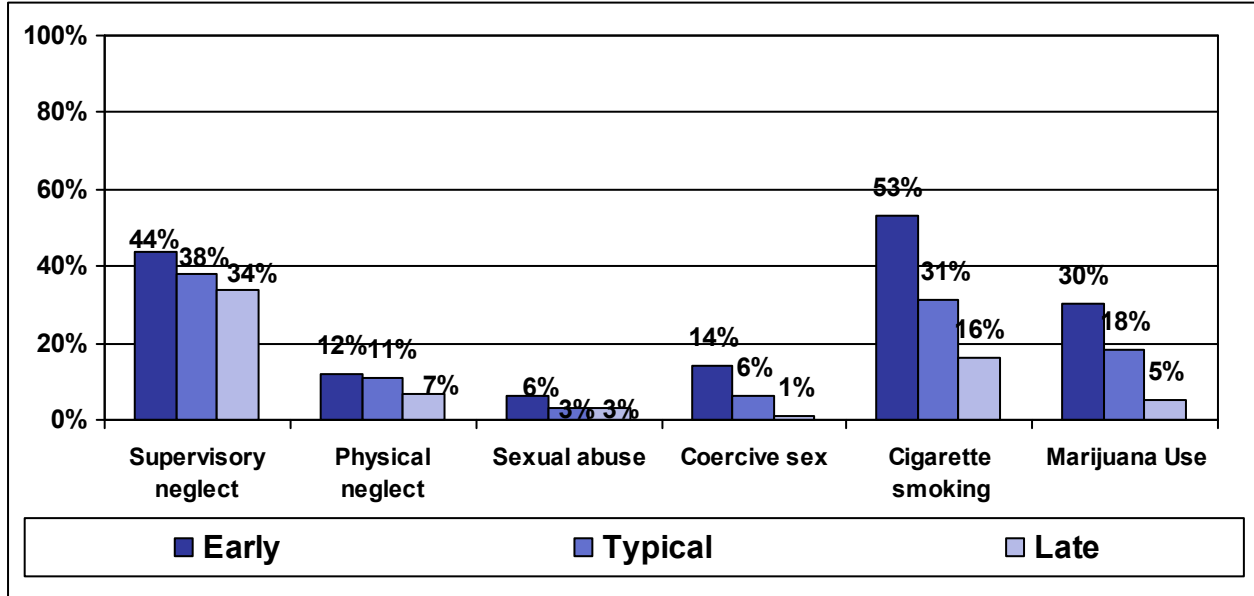
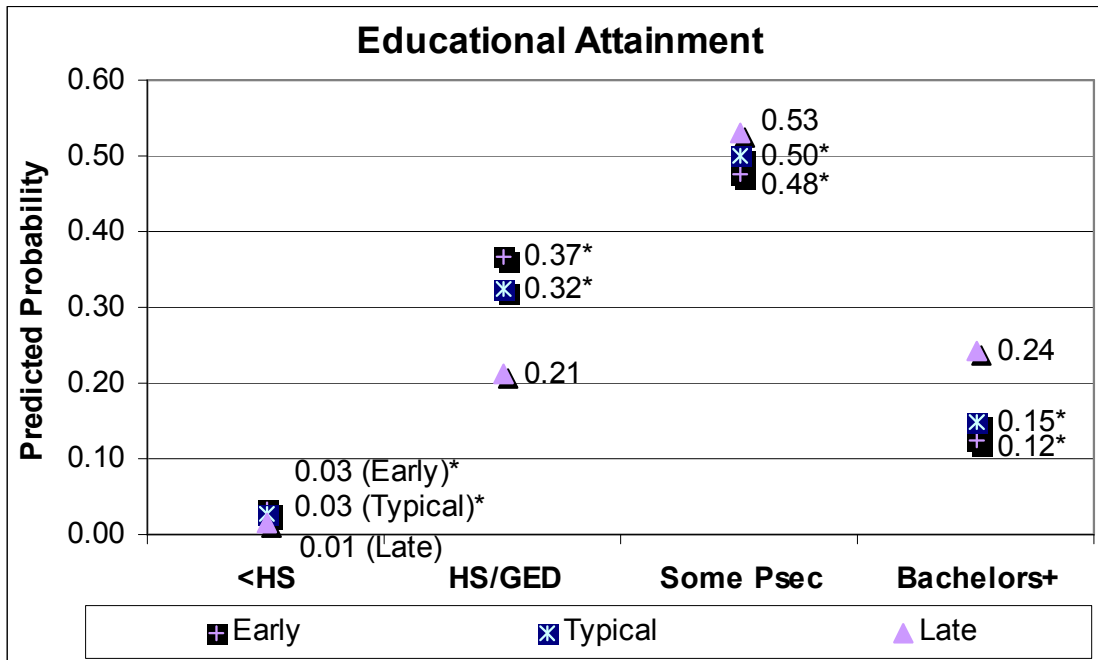
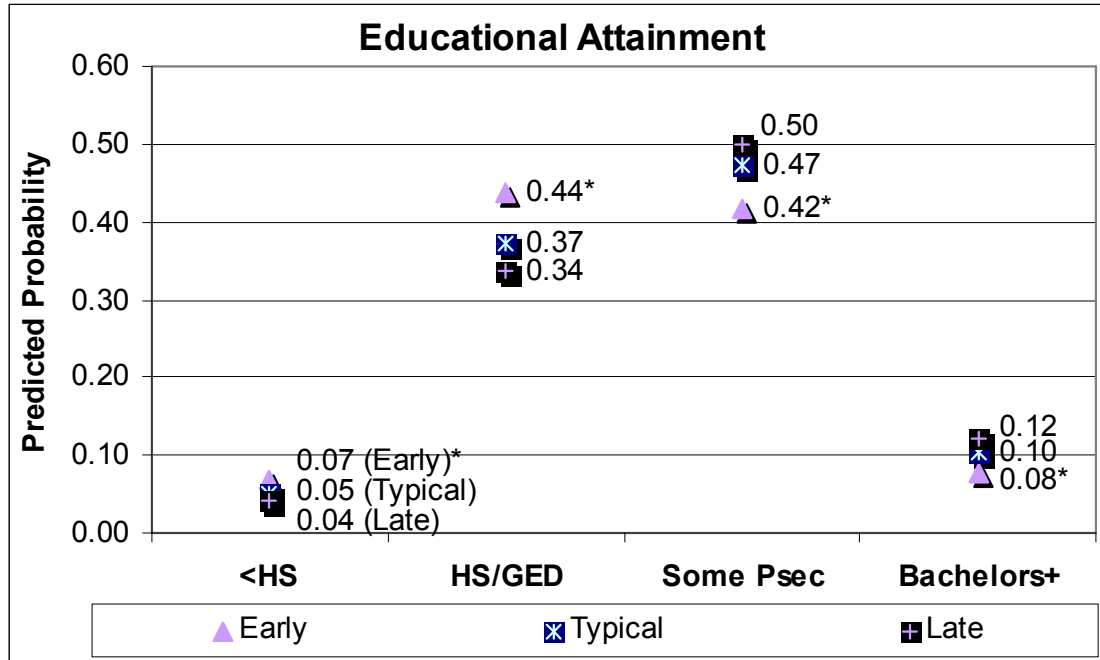


Figure 5. Adjusted predicted probabilities of emerging adult educational attainment by sexual debut timing: Females†



†Predicted probabilities are adjusted for age at Wave III, race/ethnicity, AH-PVT score, family structure, parent education, parent education expectancies, parent disapproval of sex, neighborhood poverty and education, childhood maltreatment, coercive sex experiences, and substance use (cigarette and marijuana) at Wave I.

Figure 6. Adjusted predicted probabilities of emerging adult educational attainment by sexual debut timing: Males[†]



[†]Predicted probabilities are adjusted for age at Wave III, race/ethnicity, AH-PVT score, family structure, parent education, parent education expectancies, parent disapproval of sex, neighborhood poverty and education, childhood maltreatment, coercive sex experiences, and substance use (cigarette and marijuana) at Wave I.