Family formation and post-secondary educational attainment among community college and 4-year college students: a longitudinal study

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Background: Early adulthood is a turning-point for educational attainment and family formation. Our understanding of whether family formation predicts educational attainment is incomplete for two growing populations: unmarried families and community college students. This study examined whether family formation among college students ages 18−24 predicts educational attainment at ages 25−32.

Methods: We test our hypothesis using data from the National Longitudinal Study of Adolescent and Adult Health attending community college ($n = 1{,}530$) and 4-year college ($n = 2{,}897$) in 2001 with graduation outcomes measured in 2008: certificate or above, associate's degree or above, and bachelor's degree or above. We estimated adjusted relative risks of each level of educational attainment using multivariate Poisson regression with robust standard errors controlling for pre-college grade-point average, test scores, college expectancies, demographics, socioeconomic status, and health risk behaviors.

Results: Four-year college students with children were 23% less likely to have earned a BA 7 years later than students without children [adjusted relative risk (ARR) = 0.77, 95% confidence interval (CI) (0.68, 0.89)], but community college students with children did not differ from students without children in attainment of certificate or above, associates or above, or bachelors or above [ARR = 0.93 (0.77, 1.13); 0.85 (0.67, 1.09); 0.61 (0.36, 1.04)]. Community and 4-year college students who were willing to leave college for marriage were, respectively, 71 and 21% less likely to have attained a bachelor's or above than students who did not endorse leaving college for marriage [ARR = 0.29 (0.10, 0.83); 0.79 (0.67, 0.94)].

Conclusion: Community colleges may accommodate students with families better than 4-year colleges. Young adults who plan to start families during college may have higher educational attainment if they begin in community college. Colleges should reinforce persistence attitudes and provide material supports so that students do not perceive incompatibility between marriage and college completion.

KEYWORDS

young adult, college completion, educational attainment, propensity scores, cohabitation, family formation norms, community college, emerging adulthood

Introduction

Young adults from families with low socioeconomic statuses (low SES) have greater access to college than in past generations. However, this college access often does not translate into gains in educational attainment. Formerly a small portion of college students, community college students comprised 46% of undergraduates in 2016 (Snyder et al., 2019) (Table 304.80). Community college has served as the primary institution for expanding college access for low-SES young adults despite poor grades or resource restrictions that may have been prohibitive in earlier generations (Settersten and Ray, 2010). College access for low-SES youth has not improved their social mobility because many community college students leave without finishing a credential: the three-year completion rate for the 2-year associates degree is under 15% and almost half leave without a credential (Horn, 2009; Provasnik and Planty, 2008), but community college non-completion is poorly understood. In nationally representative data, half of former community college students who left in the first 2 years cited "personal reasons" as their explanation for leaving college (49% in year 1, 50% in year 2), about twice as many as cited "family" (17 and 9%) or "finances" (29 and 18%), but the data could not determine the nature of these personal reasons (Horn, 2009; Provasnik and Planty, 2008).

Tinto's model of student retention posits that students who are academically and socially well-integrated in college are more likely to persist in college than students who are not well-integrated (Tinto, 1994). Academic integration includes academic achievement and identification with student role, which would be impaired with willingness to drop out or attend school part time for college. Social integration includes social life oriented towards college, and having childcare obligations would interfere with social integration. This study evaluates whether 11 measures of cohabitation, marriage, and family formation are associated with lower educational attainment among community college students and 4-year college students.

Early family formation may inhibit the social integration of college students. Young adults from low-SES family backgrounds are more likely to cohabit and begin family formation earlier than young adults from middle and higher SES backgrounds (Cherlin, 2010). On the other hand, community college students are more diverse in age and life stage than students at 4-year colleges, so even traditionally-aged college students who had families at young ages may be less marginalized at community college than if they attended 4-year college. This study investigates whether early cohabitation or family formation predicts subsequent educational attainment among nationally representative samples of community college and 4-year college students, ages 18–24. We considered both marital and non-marital family formation factors including willingness to curtail education for marriage, past cohabitation (before age 25), marriage, child-bearing, and current cohabitation (both alone and as part of a household).

Cohabitation is sometimes seen as a practical way to pool resources (Meier and Allen, 2008), but cohabiting relationships are often unstable and may include housing instability (London, 2000; Clark et al., 2011). Women who cohabit are more likely to be subjected to intimate partner violence (Abramsky et al., 2011). A nationally representative sample of African American adolescents who cohabited had worse physical and mental health and more risky health behaviors than non-cohabiting counterparts (Harris et al., 2010), and a sample of African American adolescents and young adults who cohabited were more likely to engage in unprotected sex and have unplanned pregnancies (Rosenbaum et al., 2014). Adolescents who cohabit have been hypothesized to be less likely to complete educational goals, but these hypotheses have not been tested in nationally representative samples.

Methods

Data

We tested the hypothesis that family formation factors predict educational attainment using data from the National Longitudinal Study of Adolescent and Adult Health (Add Health), a nationally representative sample of students who were in grades 7–12 in 1994–95 who were interviewed in their homes and answered sensitive questions on an audio computer-assisted self-interview component (Harris et al., 2009). The sample was restricted to respondents who in 2001 (ages 18–25) had graduated high school, not yet attained an AA or BA, and were enrolled in community college ($n = 1,530$) and 4-year college ($n = 2,897$) and who participated in the wave 3 and 4 follow-up surveys (Figure 1). We used data from 1994–95 (baseline, ages 12–18), 2001 (wave 3, ages 18–25), and 2008 (wave 4, ages 25–32).
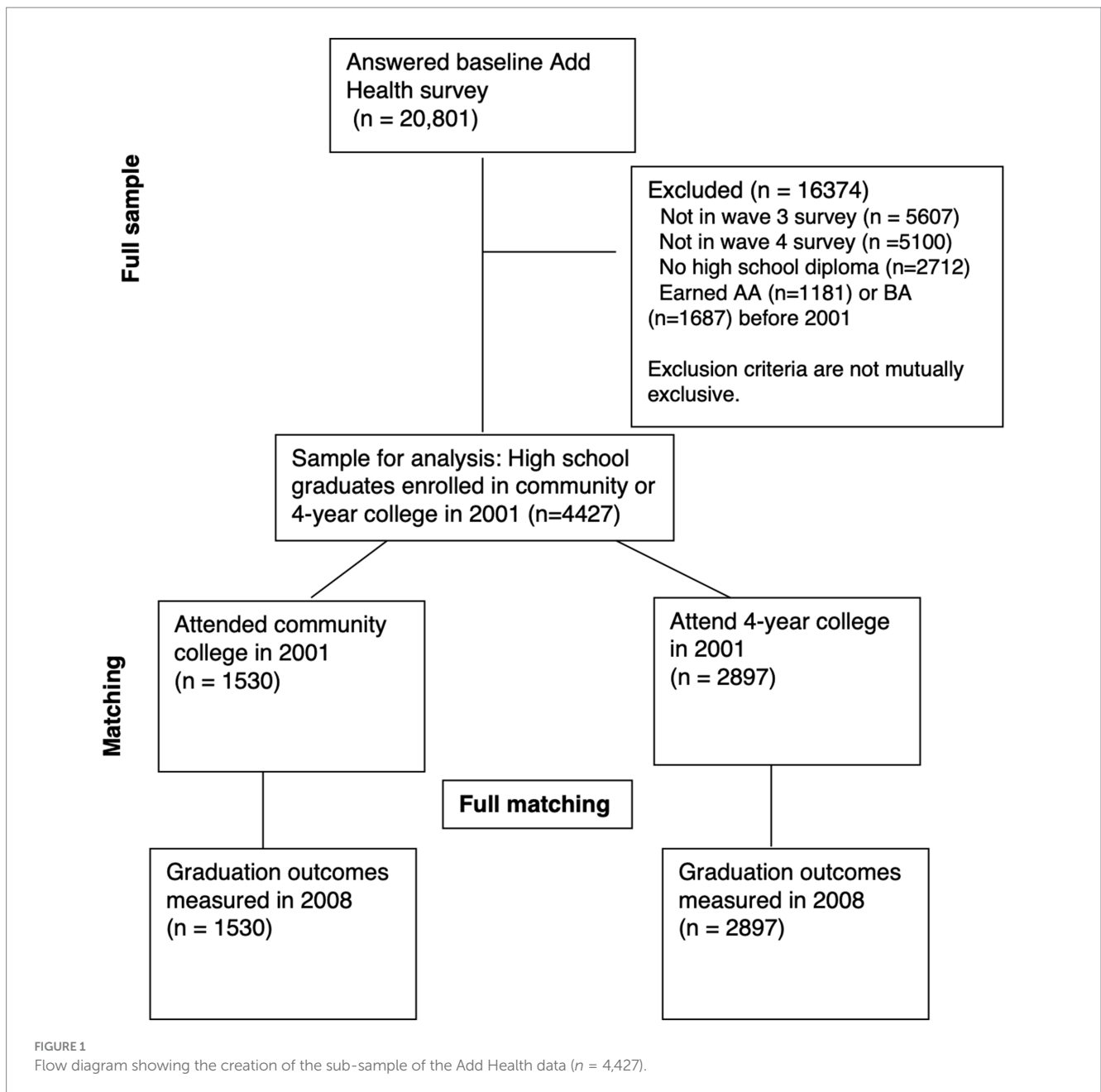
Measures

We maintained temporal order of pre-college variables, cohabitation/marriage/children, and educational attainment by measuring these variables at different time points. Control variables were measured in 1995 at ages 12–18, college enrollment and cohabitation and marriage in 2001 at ages 18–24, and educational attainment in 2008 at ages 25–32. This study did not use the wave 5 data that were collected in 2016–18 when the participants were ages 33–42 because the topic of interest is educational attainment in young adulthood, a life stage that is parallel with the Beginning Postsecondary Studies data.

College enrollment: Community college and 4-year college enrollment were measured in 2001 when respondents were ages 18–24 by the question "Is this a high school, a two-year college, a four-year college, or a graduate school?"

Outcome: The outcome of educational attainment was measured in 2008 as the highest degree listed in a detailed history of every degree attained: high school diploma, community college certificate or above, associate's degree (AA) or above, and bachelor's degree or above (BA+). Respondents attained their highest degree 3–13 years after baseline.

Exposure variables: The 11 exposure variables were measured at ages 18–24 (in 2001) by questions measuring respondents' cohabitation and marriage history and status, children, and their attitudes towards marriage.

Past and current marriage included three measures: lifetime history of marriage ("ever married"), lifetime history of divorce ("Ever divorced"), and current marriage ("currently married.") These marriage history variables were measured by the questions "How many times have you been married?"; "Are you still married?"; and "How did this relationship end?"

FIGURE 1
Flow diagram showing the creation of the sub-sample of the Add Health data (*n* = 4,427).

Cohabitation before age 25 was measured by the question "Have you ever lived with someone in a marriage-like relationship for 1 month or more?" Living in a household that includes a boyfriend/girlfriend in addition to others (denoted "Household includes boyfriend/girlfriend" in the tables) was measured by a detailed inventory of the household composition. Living with a biological child was elicited by an inventory of pregnancies and live births followed by the questions "Does (child) live with you?" (denoted "Live with biological child" in the tables) and "Does (child's parent) live with you?" (denoted "Live with biological child and child's parent" in the tables).

Attitudes towards marriage included three measures: the desire to be married now, willingness to drop out of college for marriage, and willingness to attend college part time for marriage. Desire to be married now was measured by the question "How much do

you agree or disagree with the question `I would like to be married now.'?" and denoted "Want to be married now" in the tables. Willingness to leave college for marriage was measured by the question "Suppose that in the next few years you were going to school full time and met someone you really wanted to marry, but the only way to get married was to drop out of school completely. Would you get married then or wait until you finished your education?" and is labeled "Would drop out for marriage" in the tables. Willingness to attend college part time for marriage was measured by the question "What if you wanted to get married but you could not unless you started going to school part time? Would you get married then or wait until you finished your education?" and is denoted "Would attend part time for marriage" in the tables.

Pre-college control variables: We chose pre-college control variables as variables that predict enrollment in community college

versus 4-year college and subsequent educational attainment as well as from socioeconomic predictors that would predict early cohabitation (van den Bree et al., 2009). The control variables were all measured at baseline in 1995 with the exception of age which was measured concurrent with college enrollment in 2001: demographics (male gender, Latino, Asian, and Black identities); educational background (high school GPA, high school GPA missing, Peabody vocabulary test score percentile, college expectancies on a 4-point scale, history of school suspension); socioeconomic status (parent-reported mother's educational level and log household income); school attachment problems (sum of 9 items including feelings of belonging and safety in school, problems with teachers and classmates, Cronbach's alpha = 0.91); health risk behaviors (ever pregnant; number of friends who smoke cigarettes and ever used marijuana); and age measured at wave 3, concurrent with college enrolment.

Analysis

Bivariate analysis evaluated whether there was a monotonically increasing or decreasing relationship between the percentage of people with each outcome of educational attainment and each exposure variable using Cuzick's non-parametric test for trend, a generalization of the Mann–Whitney test. We conducted bivariate analysis of the comparison between community college and 4-year college students using the chi-square test for dichotomous variables and Wilcoxon test for continuous variables.

For multivariable analysis, we estimated relative risks with a multivariate Poisson working model with robust standard errors. The multivariate analysis used a Poisson working model because estimators from logistic regression are inconsistent when the outcomes are not rare, as is the case for these outcomes; Poisson regression yields consistent and unbiased estimators (Cummings, 2009; Lumley et al., 2006; McNutt et al., 2003). The multivariate analysis controlled for the following potential confounders: demographics (gender, Latino/Asian/African-American race/ethnicity, age in 2008), educational factors (grade point average, test score), expectations (college attendance intentions, positive expectancies index), parent background (educational level, nativity, enough money to pay bills, household income, speak English at home), community college enrollment factors (gap of at least a year between high school graduation and college enrollment, attend college full-time, age of high school graduation.) Using survey weights from a highly constrained subset of the data can change variance unpredictably (Chantala and Tabor, 2010), so these analyses did not use survey-weighted analysis methods to avoid inducing or increasing bias.

People who matriculate into community college and 4-year college differ prior to college matriculation, as demonstrated elsewhere using these data (Rosenbaum, 2012), so we used a propensity score matching method to weight community college and 4-year college students so that they were on average similar on pre-college variables. Some exposures of interest, such as early divorce and willingness to drop out for marriage, are rare in this age group. Thus, we chose to use full matching on estimated propensity score within the region of common support, which is a flexible method that allows for varying ratios of, in this case, community
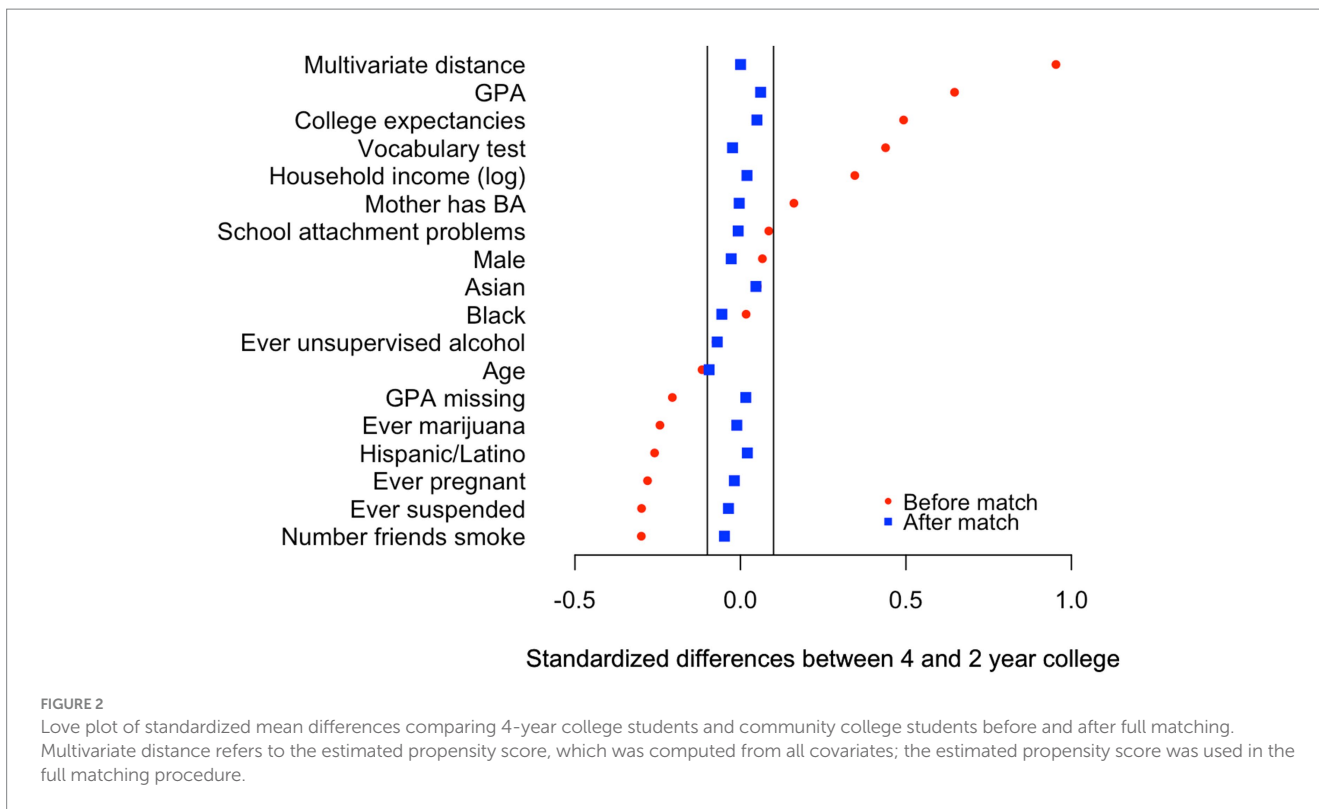
college and 4-year college students and often preserves as much sample size as possible (Stuart and Green, 2008). Because the full matching method allows for varying ratios of exposed and unexposed participants in each matched grouping, full matching also does not require equal numbers of exposed and unexposed participants either before or after matching (Stuart and Green, 2008). The propensity score was estimated from all covariates, and full matching yielded balance on all covariates and maintained the full sample (Figure 2). After matching, the above multivariate regression analysis was repeated within the matched sample. We performed the same regression method before and after matching to demonstrate that the propensity matching method did not bias results away from the null association.

These analyses were performed in the R statistical package version 4.4.0 using the sandwich library (Zeileis, 2006) and the MatchIt library (Ho et al., 2011). This study was declared exempt from review by the SUNY Downstate Health Sciences University institutional review board (FWA number 00003624, Study number 440410–1.) An earlier version of this study was presented at the American Public Health Association meeting on November 1, 2011.

Results

About 62% of community college students in 2001 had earned a post-secondary credential in 2008: 13% earned certificate(s), 28% earned AAs, and 20% earned a BA or above; 42% of BA holders also had an AA or certificate. Among community college students, variables associated with lower educational attainment in bivariate analysis were past cohabitation, willingness to attend college part time for marriage, willingness to drop out of college for marriage, interest in marrying now, and living in a household including a boyfriend or girlfriend (Table 1). Among community college students in multivariable regression, cohabiting before age 25 was associated with 12, 21, and 26% lower chances of attaining certificate or above, associates or above, and bachelor's or above; living in a household that includes a boy/girlfriend was associated with 39% lower chances of attaining a BA or above; willingness to drop out of college for marriage was associated with 62% lower chances of BA or above and willingness to attend part time for marriage was associated with lower chances of all educational attainments; and interest in being married now was associated with 34% lower chance of BA or above (Table 2).

About 85% of 4-year college students in 2001 had earned a post-secondary credential in 2008: 2.3% earned a certificate, 6.2% earned associate's degree, and 77% earned bachelor's or above. Among 4-year college students, variables associated with lower educational attainment in bivariate analysis were past cohabitation, willingness to attend college part time for marriage, willingness to drop out of college for marriage, interest in marrying now, ever marrying, being currently married, having ever divorced, having children, living with a biological child, and living with child and child's parent (Table 1). Among 4-year college students in multivariable regression, 10 of 11 family formation variables were associated were lower chances of attaining a BA or above: having children, living with biological child, and living with biological child and the child's parent were associated with 22–24% lower chances; ever being married was associated with 15% lower chances; cohabitation before age 25 was associated with 14% lower chances; willingness to attend part time or drop out for

FIGURE 2
Love plot of standardized mean differences comparing 4-year college students and community college students before and after full matching. Multivariate distance refers to the estimated propensity score, which was computed from all covariates; the estimated propensity score was used in the full matching procedure.

marriage was associated with, respectively, 9 and 21% lower chances; wanting to be married now was associated with 7% lower chances; and having ever been divorced was associated with 42% lower chances (Table 2).

In bivariate analyses of 4-year college students and community college students on pre-college variables before matching, 4-year college students had more educational assets (e.g., higher grades, test scores, college expectancies), higher socioeconomic status (e.g., household income, mother with college degree), fewer educational risks (e.g., history of suspension), and fewer risk behaviors (e.g., history of marijuana use, pregnancy, number of friends who smoke) (Figure 2). Four-year college students scored on average 12 percentiles higher on the standardized test than community college students and were 10 percentage points less likely to have ever been suspended (Table 3). After matching, the community college and 4-year college students were similar on all observed variables (Figure 2).

After matching, we found that 10 of 11 family formation variables were associated with lower attainment of the BA or above for 4-year college students: having children and living with children were associated with 23–24% lower chances; ever and current marriage was associated with 12–15% lower chances (Table 4). After matching, community college students who perceived incompatibility between college and marriage by being willing to attend part time or to drop out of college were, respectively, 51 and 71% less likely to complete a bachelor's degree but did not differ in attainment of other degrees (Table 4). Community college and 4-year college students with a cohabitation before age 25 had lower educational attainments at nearly all levels (Table 4).

We estimated time-to-degree in these data and found that among community college students who get BAs within 8 years, 57% took 6–8 years, and only 14% attained a BA did so within 4 years.

Discussion

This study found that 4-year college students who were married or had children before age 25 were less likely to earn a bachelor's degree than students who did not marry or have children; however, these early family formation activities were not associated with lower degree attainment for community college students. Marriage and children may inhibit degree attainment for 4-year college students because the nature of school attachment at 4-year colleges often involves more extensive campus-based activities, whereas 2-year colleges have fewer on-campus activities (Tinto, 1994; Rosenbaum, 2020). This finding concurs with other research that parenthood interferes with completion of 4-year college (Atherwood and Sánchez-Soto, 2023) and that marriage during young adulthood is associated with lower engagement in a "partying" social life at college (Uecker, 2012). College students who lack access to affordable childcare are less likely to complete their degrees, and states may improve completion rates by making childcare available (Palmer, 2024).

Contrary to concerns that marriage and children might increase time demands and reduce community college completion, this study finds no association on community college degree completion. Community college students often have substantial outside life commitments including full-time work and families do not appreciably inhibit school attachment in community college students relative to other students' life commitments (Karp et al., 2010; Townsend and Wilson, 2009). Community colleges also increasingly structure their programs for students who have multiple life obligations to improve completion rates (Rosenbaum et al., 2017). Finally, past research in the Add Health data has found that students who choose to marry during college may

TABLE 1 Family formation and attitudes of students attending community college (n = 1,530) and 4-year college (n = 2,897) in 2001, by educational attainment in 2008.

	Highest degree attained in 2008				
	High school diploma	Certificate	AA	BA+	p-value
Community college students in 2001					
N	503	169	355	253	
Cohabitation before age 25	32.4	39.6	28.2	22.1	**
Would attend part time for marriage	20.3	21.3	18.0	11.1	**
Would drop out for marriage	6.8	5.9	4.5	2.4	**
Want to be married now	20.5	24.9	20.9	12.3	*
Household includes boyfriend/girlfriend	11.1	13.0	11.8	5.9	+
Ever married	13.1	17.2	13.8	10.3	
Any biological children	13.1	21.3	10.7	10.3	
Live with biological child	11.7	20.7	10.4	9.5	
Currently married	11.5	13.6	12.4	8.7	
Live with biological child and child's parent	6.2	10.7	5.6	5.5	
Ever divorced	1.6	3.6	0.9	1.2	
4-year college students in 2001					
N	382	55	130	1844	
Cohabitation before age 25	25.1	23.6	28.5	14.8	***
Would attend part time for marriage	20.4	14.6	14.6	13.1	***
Would drop out for marriage	5.8	3.6	4.6	2.4	***
Want to be married now	21.2	27.3	21.5	15.1	***
Household includes boyfriend/girlfriend	5.2	12.7	6.2	4.5	
Ever married	9.2	10.9	16.2	4.5	***
Any biological children	11.5	12.7	18.5	4.1	***
Live with biological child	10.2	10.9	17.7	3.6	***
Currently married	8.1	9.1	13.1	4.1	***
Live with biological child and child's parent	5.0	3.6	10.8	1.7	***
Ever divorced	0.8	1.8	3.1	0.3	**

Survey-weighted percentages. P gives the significance of the Cuzick's test for trend, which evaluates whether the frequency of the trait is proportional to educational level. Traits are sorted in order of significance and prevalence among community college students. $+p \leq 0.1$, $*p \leq 0.05$, $**p \leq 0.01$, $***p \leq 0.001$.

self-select for maturity, family and social support, and other assets; marriage may also be associated with improved well-being and life satisfaction that could promote college graduation (Uecker, 2012). For example, community college students in this sample who had children may have been more likely to have family available who could provide child care for their young children, partly mitigating the time poverty of early parenthood (Wladis et al., 2018).

In the framework of emerging adulthood, community college might be regarded as deferring family formation (Arnett, 2007). However, our research finds that community college students who have already embarked on family formation when they begin school are no less likely than their classmates to attain post-secondary degrees, including the bachelor's degree. By contrast, we found that 4-year college students who have children are less likely to graduate with a bachelor's degree. This research demonstrates the utility of credential stacking for non-traditional students: that is, completing a

community college credential or degree before enrolling for the bachelor's degree: for example, earning an associate's degree in a health profession such as nursing or radiograph, or a technological skill certificate prior to the bachelor's degree (Kuneyl, 2022). Young adults who stack credentials have a contingency plan for higher earnings and a career in case they do not finish or are delayed in completing their bachelor's degree (Kuneyl, 2022).

This study also found the importance of persistence attitudes in college completion for both community college and 4-year college students: even though these questions were hypothetical, this study found that the willingness to compromise college attendance for marriage predicted lower educational attainment for community college students and lower chances of bachelor's attainment for 4-year college students. This research suggests that students' priorities influence their likelihood of completion, even adjusting for college expectancies prior to college matriculation. This research also found that early cohabitation predicted lower educational attainment,

TABLE 2 Association between family formation variables of students attending community college (CC, *n* = 1,280) and 4-year college (4YC, *n* = 2,897) before matching.

	Certificate or above		Associates degree or above		Bachelors degree or above	
	IRR (95% CI)	P	IRR (95% CI)	P	IRR (95% CI)	P
Any biological children						
CC students	1.01 (0.90, 1.14)	0.9	0.87 (0.73, 1.03)	0.1	0.86 (0.63, 1.19)	0.4
4YC students	**0.89 (0.82, 0.97)**	**0.008**	**0.87 (0.79, 0.95)**	**0.003**	**0.78 (0.69, 0.89)**	**0.0002**
Live with biological child						
CC students	1.05 (0.93, 1.18)	0.5	0.90 (0.75, 1.07)	0.2	0.88 (0.63, 1.22)	0.4
4YC students	**0.89 (0.81, 0.97)**	**0.01**	**0.86 (0.78, 0.95)**	**0.004**	**0.77 (0.68, 0.89)**	**0.0002**
Live with biological child and child's parent						
CC students	1.09 (0.95, 1.25)	0.2	1.00 (0.81, 1.23)	0.99	1.03 (0.69, 1.52)	0.9
4YC students	0.90 (0.80, 1.01)	0.08	**0.88 (0.77, 1.00)**	**0.05**	**0.76 (0.63, 0.91)**	**0.004**
Ever married						
CC students	1.02 (0.91, 1.14)	0.7	0.98 (0.84, 1.13)	0.7	0.88 (0.65, 1.20)	0.4
4YC students	0.95 (0.89, 1.02)	0.1	**0.92 (0.85, 1.00)**	**0.04**	**0.85 (0.77, 0.95)**	**0.003**
Currently married						
CC students	1.01 (0.90, 1.14)	0.8	0.99 (0.85, 1.15)	0.9	0.91 (0.66, 1.25)	0.6
4YC students	0.95 (0.88, 1.02)	0.1	0.93 (0.86, 1.00)	0.06	**0.88 (0.80, 0.98)**	**0.02**
Ever divorced						
CC students	0.97 (0.71, 1.33)	0.9	0.76 (0.46, 1.27)	0.3	0.62 (0.21, 1.84)	0.4
4YC students	1.00 (0.82, 1.21)	0.98	0.90 (0.68, 1.19)	0.5	**0.58 (0.34, 1.00)**	**0.05**
Cohabitation before age 25						
CC students	**0.88 (0.80, 0.97)**	**0.007**	**0.79 (0.70, 0.90)**	**0.0003**	**0.74 (0.58, 0.94)**	**0.02**
4YC students	**0.93 (0.88, 0.97)**	**0.002**	**0.92 (0.87, 0.97)**	**0.002**	**0.86 (0.81, 0.92)**	**<0.0001**
Household includes boyfriend/girlfriend						
CC students	0.95 (0.83, 1.08)	0.5	0.87 (0.72, 1.05)	0.1	**0.61 (0.40, 0.92)**	**0.02**
4YC students	1.01 (0.94, 1.08)	0.9	0.97 (0.89, 1.05)	0.4	0.93 (0.85, 1.03)	0.2
Would attend part time for marriage						
CC students	**0.88 (0.79, 0.99)**	**0.03**	**0.81 (0.70, 0.94)**	**0.006**	**0.57 (0.42, 0.79)**	**0.0006**
4YC students	**0.93 (0.89, 0.97)**	**0.003**	**0.92 (0.88, 0.97)**	**0.003**	**0.91 (0.86, 0.97)**	**0.003**
Would drop out for marriage						
CC students	0.81 (0.65, 1.01)	0.07	0.75 (0.56, 1.01)	0.06	**0.38 (0.18, 0.84)**	**0.02**
4YC students	**0.86 (0.75, 0.97)**	**0.02**	**0.83 (0.72, 0.95)**	**0.008**	**0.79 (0.67, 0.94)**	**0.006**
Want to be married now						
CC students	0.97 (0.88, 1.07)	0.6	0.89 (0.78, 1.02)	0.1	**0.66 (0.50, 0.89)**	**0.005**
4YC students	0.96 (0.92, 1.00)	0.07	**0.94 (0.90, 0.99)**	**0.01**	**0.93 (0.88, 0.98)**	**0.01**

Each line in the table corresponds to a factor and includes estimates for the relative risk of attainment of each of three post-secondary credentials: community college certificate or above, AA or above, and BA or above. Relative risks were estimated from multivariate regression using a Poisson working model. The control variables were demographics (gender, Latino/Asian/Black race/ethnicity); educational background (high school GPA, high school GPA missing, Peabody vocabulary test score percentile, college expectancies, all measured in 1995); socioeconomic status in 1995 (parent-reported mother's educational level and log household income); school attachment problems in 1995 (sum of 9 items including feelings of belonging and safety in school, problems with teachers and classmates, Cronbach's alpha = 0.91); and age measured at wave 3, concurrent with college enrollment. Bold text signifies statistical significance with *p*<0.05.

perhaps because of background circumstances that may have caused cohabitation at a young age. Colleges that improve social integration of married students, such as by facilitating the introductions of students in the same personal circumstances, may improve completion and reduce perceived incompatibilities of marriage and college.

Strengths and limitations

This paper examines predictors of educational attainment outside the usual human capital model with outcomes measured through late 20s and early 30s, which is later than many datasets about higher educational attainment such as Beginning Postsecondary Studies

TABLE 3 Comparison of community college and 4-year college students: all variables measured before college except age, which was measured concurrently with college.

	CC	4YC	P-value
N	N = 1,530	N = 2,897	
Age in years: median (IQR)	21 (20, 23)	21 (20, 22)	0.003
Household income ($1,000): median (IQR)	42.1 (29.0, 50.0)	42.1 (38.0, 65.0)	<0.001
Vocabulary test percentile: median (IQR)	50 (27, 70)	62 (42, 83)	<0.001
Number of friends who smoke: mean (sd)	0.66 (0.96)	0.42 (0.80)	<0.001
Grade point average (GPA): median (IQR)	3.0 (2.3, 3.25)	3.25 (2.75, 3.75)	<0.001
School attachment problems (0–1): median (IQR)	0.50 (0.42, 0.56)	0.5 (0.44, 0.56)	0.01
Mother has BA	13.9%	20.4%	<0.001
Male	40.1%	43.4%	0.04
Hispanic/Latino	20.1%	11.8%	<0.001
Black	22.0%	22.7%	0.6
Asian	7.8%	9.3%	0.1
Ever pregnant	4.1%	1.1%	<0.001
Ever suspended	23.2%	13.1%	<0.001
GPA missing	6.4%	2.9%	<0.001
Ever unsupervised alcohol	33.5%	30.2%	0.02
Ever used marijuana	25.4%	16.4%	<0.001
College expectancies (0–1): mean (sd)	0.83 (0.24)	0.91 (0.17)	<0.001

Grade point average uses a 4-point scale where A is 4, B is 3, C is 2, D is 1, and F is 0. Continuous variables are summarized with median (interquartile range (IQR)) with p-values from Wilcoxon test: mean (sd) displayed if more informative. Household income is on log scale with median and IQR transformed back. Percentages are column percentages of the column total.

(BPS) that follow students through early/mid-20s (National Center for Education Statistics, 2024). Longer follow-up with the same students in BPS could show different results, as our study found that community college students may take 8 years to earn a 4-year bachelor's degree.

This study evaluated divorce, finding no association between divorce by ages 18–25 and educational attainment 7 years later, but it did not evaluate family fragility after age 25 which may reduce graduates' ability to benefit fully from their educational attainments (Wilcox et al., 2015).

In our study, residual confounding may have remained with differences between community college and 4-year degree students that would bias results towards finding better outcomes for 4-year degree students due to educational advantages that existed prior to college. However, our results found that 4-year college students were at a disadvantage from a larger number of family formation behaviors than community college students, suggesting that residual confounding was unlikely to have biased these results away from the null.

In order to maintain temporal ordering of variables, this study was limited to study participants who had not yet earned a post-secondary degree by wave 3 when participants were ages 18–25, meaning that a subset of students were somewhat older than traditional college-age students rather than a nationally representative sample of college students. Due to the subject matter of marriage, cohabitation, and family formation during college, this sample that included non-traditional students disproportionately was appropriate and not a limitation for studying non-traditional students; however, this study may not generalize to traditional students.

This study was limited to quantitative data and lacked the rich information available in qualitative and mixed methods studies of persistence attitudes, which can uncover barriers to college completion not elicited by quantitative data such as lack of clearly defined role and identity for community college students (Karp and Bork, 2014).

The Add Health age cohort was born in the late 1970s and early 1980s, so these findings may not apply to current generations of young adults; this limitation is intrinsic to longitudinal research. Successive generations of adults have delayed or avoided marriage and children, so marriage before age 25 is less common than in these Add Health data (Ruggles, 2016), so married young adults in the current generation may have lower social integration at college than in past generations, which may predict larger negative impacts on completion (Tinto, 1994). Community and 4-year colleges have implemented programs to improve completion and graduation outcomes following widespread attention from the federal and state governments, which may have mitigated the negative impacts of family formation on college completion; however, the completion rates have improved only marginally despite attention to improving completion rates (National Student Clearinghouse Research Center, 2023).

Conclusion

This study finds that 4-year college students with children were less likely to attain a bachelor's degree than students without children, but community college students with children were not less likely to have earned a certificate, associates, or bachelor's degree than students without children. This finding concurs with past research suggesting the advantages of credential stacking for non-traditional and lower socioeconomic status students.

TABLE 4 Association between educational attainment and family formation variables of students attending community college (CC, *n* = 1,530) and 4-year college (4YC, *n* = 2,897) after full matching.

	Certificate or above		Associates degree or above		Bachelors degree or above	
	IRR (95% CI)	P	IRR (95% CI)	P	IRR (95% CI)	P
Any biological children						
CC students	0.93 (0.77, 1.13)	0.5	0.85 (0.67, 1.09)	0.2	0.61 (0.36, 1.04)	0.07
4YC students	**0.89 (0.82, 0.97)**	**0.008**	**0.87 (0.79, 0.95)**	**0.003**	**0.77 (0.68, 0.89)**	**0.0002**
Live with biological child						
CC students	0.94 (0.77, 1.15)	0.6	0.84 (0.65, 1.09)	0.2	0.65 (0.38, 1.13)	0.1
4YC students	**0.89 (0.81, 0.97)**	**0.01**	**0.86 (0.78, 0.95)**	**0.004**	**0.77 (0.68, 0.89)**	**0.0002**
Live with biological child and child's parent						
CC students	1.02 (0.83, 1.25)	0.9	0.95 (0.72, 1.25)	0.7	0.65 (0.32, 1.32)	0.2
4YC students	0.90 (0.80, 1.01)	0.08	**0.88 (0.77, 1.00)**	**0.05**	**0.76 (0.63, 0.91)**	**0.004**
Ever married						
CC students	1.01 (0.86, 1.20)	0.9	1.05 (0.86, 1.28)	0.6	0.96 (0.57, 1.61)	0.9
4YC students	0.95 (0.89, 1.02)	0.1	**0.92 (0.85, 1.00)**	**0.04**	**0.85 (0.77, 0.95)**	**0.003**
Currently married						
CC students	1.07 (0.91, 1.26)	0.4	1.13 (0.94, 1.37)	0.2	1.11 (0.66, 1.88)	0.7
4YC students	0.95 (0.88, 1.02)	0.1	0.93 (0.86, 1.00)	0.06	**0.88 (0.80, 0.98)**	**0.02**
Ever divorced						
CC students	0.70 (0.37, 1.33)	0.3	0.59 (0.25, 1.39)	0.2	**0.13 (0.02, 0.68)**	**0.02**
4YC students	1.00 (0.82, 1.21)	0.98	0.90 (0.68, 1.19)	0.5	**0.58 (0.34, 1.00)**	**0.05**
Cohabitation before age 25						
CC students	**0.86 (0.75, 0.99)**	**0.04**	**0.83 (0.70, 0.99)**	**0.04**	0.81 (0.54, 1.21)	0.3
4YC students	**0.93 (0.88, 0.97)**	**0.002**	**0.92 (0.87, 0.97)**	**0.002**	**0.86 (0.81, 0.92)**	**<0.0001**
Household includes boy/girlfriend						
CC students	0.80 (0.63, 1.01)	0.07	**0.67 (0.49, 0.92)**	**0.01**	0.52 (0.24, 1.13)	0.1
4YC students	1.01 (0.94, 1.08)	0.9	0.97 (0.89, 1.05)	0.4	0.93 (0.85, 1.03)	0.2
Would attend part time for marriage						
CC students	0.87 (0.74, 1.03)	0.1	0.83 (0.67, 1.02)	0.08	**0.49 (0.30, 0.82)**	**0.007**
4YC students	**0.93 (0.89, 0.97)**	**0.003**	**0.92 (0.88, 0.97)**	**0.003**	**0.91 (0.86, 0.97)**	**0.003**
Would drop out for marriage						
CC students	0.76 (0.52, 1.09)	0.1	0.66 (0.42, 1.04)	0.07	**0.29 (0.10, 0.83)**	**0.02**
4YC students	**0.86 (0.75, 0.97)**	**0.02**	**0.83 (0.72, 0.95)**	**0.008**	**0.79 (0.67, 0.94)**	**0.006**
Want to be married now						
CC students	1.07 (0.94, 1.22)	0.3	1.06 (0.89, 1.26)	0.5	0.78 (0.50, 1.21)	0.3
4YC students	0.96 (0.92, 1.00)	0.07	**0.94 (0.90, 0.99)**	**0.01**	**0.93 (0.88, 0.98)**	**0.01**

Each line in the table corresponds to a factor and includes estimates for the relative risk of attainment of each of three post-secondary credentials: community college certificate or above, AA or above, and BA or above. Relative risks were estimated from multivariate regression using a Poisson working model with the sandwich estimator to yield robust standard errors. The control variables were demographics (gender, Latino/Asian/Black race/ethnicity); educational background (high school GPA, high school GPA missing, Peabody vocabulary test score percentile, college expectancies, all measured in 1995); socioeconomic status in 1995 (parent-reported mother's educational level and log household income); school attachment problems in 1995 (sum of 9 items including feelings of belonging and safety in school, problems with teachers and classmates, Cronbach's alpha = 0.91); and age measured at wave 3, concurrent with college enrollment. Bold text signifies statistical significance with *p*<0.05.

This study further finds the importance of persistence attitudes for both community and 4-year college students: students who perceived incompatibility between college and marriage in hypothetical questions were less likely to complete their degrees. Colleges should integrate married students by providing opportunities for them to meet others in the same life circumstances and improve access to childcare to improve completion rates.

Data availability statement

Ethics statement

The studies involving humans were approved by SUNY Downstate Health Sciences University Institutional Review Board. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required from the participants or the participants' legal guardians/next of kin in accordance with the national legislation and institutional requirements. This study was ruled not human subjects research by the institutional review board of SUNY Downstate Health Sciences University (FWA number 00003624, Study number 440410-1.).

Author contributions

JR: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Visualization, Writing – original draft, Writing – review & editing.

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Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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