Longer-Term Educational Impacts of a Program to Promote Healthy Birth Spacing Among Adolescent Mothers

November 30, 2022

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I. Introduction

Among programs designed to reduce teen pregnancy, few evidence-based interventions specifically aim to reduce repeat pregnancies. Repeat pregnancies among adolescent mothers, however, are both prevalent and consequential. About one-sixth of births to adolescent mothers are repeat births (Osterman et al. 2022). Compared to adolescent mothers with only one child, those with more than one face increased health risks and greater long-term difficulties related to educational and economic outcomes (Klerman 2004).

Teen Options to Prevent Pregnancy (TOPP) is an 18-month multicomponent program to delay repeat teen pregnancy among adolescent mothers. Developed by staff from the OhioHealth hospital system and Nationwide Children's Hospital in Columbus, Ohio, TOPP features personalized contraceptive counseling by nurses trained in motivational interviewing (MI), along with access to a contraceptive clinic and transportation and social worker assistance. Beginning in 2011, Mathematica collaborated with staff from OhioHealth and the Nationwide Children's Hospital to conduct a randomized controlled trial (RCT) of TOPP with 598 adolescent mothers with low incomes. Based on follow-up surveys conducted 6 and 18 months after study enrollment, as well as state birth records collected for up to 30 months after enrollment, this initial RCT found that TOPP significantly reduced the chances of study participants having a repeat pregnancy or subsequent birth, and increased their chances of using long-acting reversible contraception (Stevens et al. 2017).

Our present study builds on these results by examining the longer-term impacts of TOPP on participants' educational outcomes. As mentioned above, repeat births among adolescent mothers are linked to greater difficulties in attending or completing school, which might hinder their ability to achieve economic self-sufficiency later in life (Klerman 2004). This study examines whether TOPP impacted mothers' enrollment and persistence in postsecondary education over a period of up to eight years after starting the program, using college enrollment data from the National Student Clearinghouse (NSC). The sample for this study consisted of a large subset of adolescent mothers who participated in the initial RCT.

II. Research Questions

For this study, we defined two confirmatory research questions and five exploratory research questions. We defined these questions and our corresponding analysis methods (described below) before conducting the impact analysis in a pre-analysis plan registered on the Open Science Framework (https://osf.io/gub8w/).

Confirmatory research questions

For the confirmatory research questions, we examined whether adolescent mothers who were offered TOPP as part of the original RCT were more likely than those who received usual care services to (1) enroll in college and (2) persist in college. The specific research questions are as follows:

1. Did TOPP increase the chances of enrolling in postsecondary education (percentage enrolled in any two- or four-year college or university) within eight years after study enrollment?

2. Did TOPP increase the chances of persisting in postsecondary education (percentage enrolled in any two- or four-year college or university for at least three consecutive semesters) within eight years after study enrollment?

Exploratory research questions

To better understand and contextualize results from the confirmatory analysis, we estimated the impacts of TOPP on three additional measures of college enrollment and two additional measures of persistence. Exploratory outcomes of enrollment included examining enrollment in each of the eight years after TOPP enrollment, as well as enrolling in college full time and enrolling in a four-year school. Exploratory outcomes of persistence included completing at least one semester or earning a degree. Compared to our confirmatory measure of persistence, these exploratory measures provided more liberal and conservative measures of persistence, respectively. Collectively, these outcomes intend to answer the following exploratory research questions:

Enrollment in postsecondary education

1. Did TOPP increase the chances of enrolling in postsecondary education (percentage enrolled in any two- or four-year college or university) <u>in each</u> of the eight years after study enrollment?

2. Did TOPP increase the chances of <u>full-time</u> enrollment in postsecondary education (percentage enrolled <u>full time</u> in any two- or four-year college or university) within eight years after study enrollment?

3. Did TOPP increase the chances of enrolling in a <u>four-year</u> college or university (percentage enrolled in any <u>four-year</u> college or university) within eight years after study enrollment?

Persistence in postsecondary education

1. Did TOPP increase the chances of enrolling in postsecondary education without withdrawing (completing at least one semester) within eight years after study enrollment?

2. Did TOPP increase the chances of graduating from a two- or four-year college or university within eight years after study enrollment?

III. Study Methods

Recruitment and sample enrollment

Study participants consisted of 580 of the 598 participants in the original RCT.[1] These participants were recruited from seven obstetrics-gynecology clinics and five postpartum units of a large hospital system from October 2011 to January 2014. During the initial enrollment, eligibility criteria were as follows: (1) English speaking; (2) 10–19 years of age; (3) at least 28 weeks pregnant or less than 9 weeks postpartum; (4) regular telephone service; and (5) enrollment in Medicaid. For the present study, we constructed a panel data set with up to eight years of post-enrollment outcome data for each study participant. Most participants (72 percent) were ages 18 or 19 at the time of enrollment, so an eight-year panel data set enabled us to measure outcomes through ages 26 or 27. For the smaller number of participants who

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[1] We excluded 18 participants (8 from the intervention condition and 10 from the control condition) from the present study for the following reasons: (1) they enrolled in the original RCT as minors and did not reconsent after turning age 18 (n = 14); (2) they were known to have died or experienced a personal event (unrelated to the intervention) during the original RCT that precluded their continued participation in the study (n = 2); or (3) they verbally declined to participate in at least one round of follow-up data collection for the original RCT, which could signal an intent to revoke their consent (n = 2).

enrolled at age 17 or younger (28 percent), an eight-year panel data set enabled us to measure outcomes through ages 21 to 25.

Random assignment

As part of the original RCT, members of the study team used a web-based sample enrollment and random assignment system to randomize participants either to the intervention condition (TOPP) or the control condition (usual care). The team stratified eligible participants by recruitment location and age group (younger than 18 versus age 18 or 19) to avoid the possibility of a chance imbalance in these characteristics. The team used a permuted block design to maintain an even balance of participants across the intervention and control groups through the study enrollment period. The design used a variable block size of up to six characters and a 1:1 allocation of participants across the intervention and comparison conditions.

Intervention condition

Mothers in the intervention condition were offered the 18-month TOPP intervention. TOPP's stated goal is to "reduce rapid repeat teen births by helping young women identify goals, achieve self-sufficiency, access housing and financial stability, develop successful parenting skills, and establish healthy relationships." The program as delivered for the initial RCT had the following four components, which were offered to participants on a voluntary basis for up to 18 months:

Personalized contraceptive counseling by nurses trained in MI, a collaborative, nonconfrontational communication style designed to promote behavior change. It focuses on identifying a participant's own intrinsic motivation to change. For this component of the program, adolescents received telephone calls and home/community visits from a registered nurse trained in motivational interviewing. The recommended frequency of the interactions was about once per month, with greater frequency during the initial months of program enrollment and periods when a participant was actively seeking and adopting new forms of birth control. Nearly all participants (96.0 percent) assigned to the intervention condition received at least one MI-based phone call. The average number of phone calls received was 8.2.

Access to a contraceptive clinic. For any participants not already affiliated with a physician or having difficulty in receiving their desired contraceptive care from their existing provider, TOPP provided access to a contraceptive clinic. Two afternoons per week, the TOPP clinic offered a board-certified obstetrician-gynecologist who was available to provide contraceptive services solely to TOPP program participants. A Food and Drug Administration-approved method of contraception was available at any time postpartum if the participant was interested and there were no medical contraindications. Participants paid for contraception through Medicaid. About one-quarter of the participants (25.3 percent) assigned to the intervention condition received services through the TOPP contraceptive clinic at least once during the 18 months they were eligible for program services.

Transportation assistance. For participants without a reliable or convenient source of transportation, TOPP nurses offered a free van service. This service would provide a participant with round-trip transportation for contraceptive care to any local provider, including but not limited to the TOPP clinic. About one-third of the participants (32 percent) assigned to the intervention condition used the transportation assistance at least once.

Assistance from a social worker. The program employed a full-time social worker to conduct brief psychosocial assessments with participants and make referrals to other community-based social services.

Just over 8 in 10 participants (83.8 percent) assigned to the intervention condition received a psychosocial assessment, and 6 in 10 participants (60.3 percent) received at least one referral to other community-based social services.

Control condition

Participants randomly assigned to the control condition received usual care and had no access to any of the four components of the intervention condition. However, participants could still receive standard-of-care health services, including contraception. All participants in both the intervention and control conditions received educational handouts on birth control options, sexually transmitted infections, and birth spacing at the beginning of the study.

Data sources

For the present study, we drew on data from four sources. First, we obtained administrative data from the original RCT, including the mothers' group assignments, recruitment sites, and dates of random assignment. Because enrollment for the original RCT occurred on a rolling basis and spanned several years (2011 through 2014), we used the date of random assignment to construct an eight-year outcome window specific to each adolescent. Second, all adolescents were administered a baseline survey when they enrolled in the original study. The survey collected demographic information such as race, ethnicity, and education level. We used data from this survey to describe the characteristics of our sample.

Third, we measured educational outcomes using administrative records from NSC, which provides data on college enrollment, persistence, and degree completion at colleges and universities enrolling more than 97 percent of all public and private students in the United States (Dundar and Shapiro 2016). We requested data from NSC on postsecondary enrollment patterns between October 2011 through fall 2021 for the 580 participants in our sample. Through NSC, we obtained information on whether the participants in our sample matched a student in its database of those who attended a postsecondary institution. Students for whom there is a match are considered to have enrolled in a postsecondary institution. Students for whom there is no NSC match are defined as not having attended any postsecondary institution.

Fourth, we supplemented the NSC data with administrative data downloaded from the Integrated Postsecondary Education Data System (IPEDS). IPEDS provides information on college enrollment, graduation, financial aid, and demographics. We used these data to describe the types of colleges in which the college-going mothers in our sampled enrolled. Some mothers attended multiple schools during the outcome period of this study; for them, we summarized IPEDS data from all the schools they attended. Some colleges or college branches that mothers in our sample attended had closed by the time we collected outcome data. These schools are not included in our descriptive analysis of IPEDS data.

Outcome measures

We used the NSC data to construct outcomes corresponding to each of our two confirmatory and five exploratory research questions. We constructed all outcomes based on traditional fall and spring college semester enrollment, meaning we did not include winter or summer sessions in our outcomes. We also excluded any enrollment data reported before the participant enrolled in the original RCT, as well as any enrollment data reported eight or more years after the date they enrolled in the study. We defined our two confirmatory measures as follows:

1. **Ever enrolled in college.** Participant enrolled in a two- or four-year college within eight years following enrollment in the study.

2. **Persisted through three semesters in college.** Participant enrolled in college for at least three consecutive semesters without withdrawing within eight years following enrollment in the study.

We used a similar approach for constructing our exploratory outcomes, with one exception. Two of the exploratory outcomes were contingent on the student's enrollment status (for example, full time or withdrawal). NSC does not require institutions to report enrollment status; therefore, we excluded students who were missing this outcome from those analyses. We defined the resulting measures as follows:

- **Enrolled in college, by year.** For each year after enrolling in the TOPP study, the participant had enrolled in a two- or four-year college.

- **Ever enrolled in college full time.** Participant enrolled in a two- or four-year college full time within eight years following enrollment in the study.

- **Ever enrolled in a four-year college.** Participant enrolled in a four-year college within eight years following enrollment in the study.

- **Persisted through one semester in college.** Participant enrolled in college for at least one semester, during which they did not withdraw, within eight years following enrollment *in the study.*

- **Graduated college.** Participant graduated from a two- or four-year college within eight years following enrollment in the study.

Analysis methods

Our primary analytic approach estimated the impacts of TOPP using an intent-to-treat analysis and a standard regression-based modeling approach. The estimating equation is expressed as follows:

$$(1) \; y_i = \alpha + \gamma Treat_i + age_i\beta_1 + site_i\beta_2 + \epsilon_i$$

where *y* denotes the outcome for individual *i*, the variable *Treat* denotes an indicator for treatment status (1 = intervention condition, 0 = control condition), the variable age denotes the age of individual *i* at random assignment, the variable *site* denotes the recruitment site where individual *i* enrolled in the study, ϵ is a random error term, and γ and β denote the coefficients to be estimated. We included covariates for age and recruitment site in the estimating equation because random assignment was stratified by these variables in the original RCT (as described above). We used the regression results to calculate the covariate-adjusted difference in outcomes between groups and the associated standard error and *p*-value of the impact estimate (two-tailed test).

For the exploratory outcome measuring the impact of TOPP in each of the eight years after study enrollment, we used an intent-to-treat analysis and a survival regression-based modeling approach for panel data. The estimating equation is expressed as follows:

$$(2) \; y_{it} = \alpha_0 + \gamma Treat_i + \sum_t \alpha_t Year_t + \sum_t \beta_t Treat_i * Year_t + age_i\beta_1 + site_i\beta_2 + \epsilon_i$$

where *y* denotes the outcome for individual *i* in year *t;* the variable *Treat* denotes an indicator for treatment status (1 = intervention condition, 0 = control condition); *Year* denotes a series of indicator variables for each year in the panel data set; the variable age denotes the age of individual *i* at random

assignment; the variable *site* denotes the recruitment site where individual *i* enrolled in the study; ϵ is a random error term; and $\alpha, \gamma,$ and β denote the coefficients to be estimated. This approach allows for estimation of cumulative year-by-year enrollment differences between the intervention and control groups.

IV. Results

Baseline characteristics

Table 1 presents the baseline characteristics of the study sample. Participants' ages when they began the initial RCT ranged from 13 to 19; the average age of participants was 17.9. Participants were predominantly non-Hispanic White or Black and spoke English as their primary language. Based on self-reported data on educational attainment, about half of the participants had no high school diploma at the time they enrolled in the study. Just over one-third had graduated from high school or earned a general equivalency degree (GED). A small share (7 percent) had completed some college coursework at the time they enrolled in the program. Fifty-five percent of participants said they were enrolled in school at the time they enrolled in the study. Unpaired t-tests for each of the baseline characteristics showed no statistically significant differences between the treatment group means and control group means.

Table 1. Baseline characteristics

Variable	Treatment group mean (SD) or n (%)	Control group mean (SD) or n (%)	p-value
Age (mean, SD)	17.92 (1.27)	17.86 (1.28)	0.56
Race/ethnicity (n, %)			
White, non-Hispanic	134 (47%)	136 (47%)	0.93
Black, non-Hispanic	106 (37%)	106 (37%)	0.95
Hispanic	16 (6%)	21 (7%)	0.41
Multiracial/other	31 (11%)	26 (9%)	0.47
Unknown race	2 (1%)	2 (1%)	0.99
Primary language (n, %)			
English	278 (97%)	282 (98%)	0.43
Spanish	6 (2%)	4 (1%)	0.52
Other	3 (1%)	2 (1%)	0.65
Highest level of education completed at the time of study enrollment (n, %)			
No high school	13 (5%)	18 (6%)	0.35
Some high school	142 (49%)	144 (50%)	0.83
High school graduate or GED	108 (38%)	104 (36%)	0.75
Postsecondary	19 (7%)	19 (7%)	0.99
Other	5 (2%)	1 (<1%)	0.10
Enrolled in school at baseline	153 (53%)	164 (57%)	0.36

Source: Administrative program data, participant surveys.

Note: Standard deviations are in parentheses for age.

The p-values are calculated using unpaired t-tests with the null hypothesis that the difference between the control group mean and the treatment group mean for each baseline characteristic is equal to zero.

GED = general equivalency degree.

Types of colleges attended by study participants

The administrative records from NSC indicate that participants in our sample attended a total of 71 unique colleges or college branches in the eight years after study enrollment. From our supplementary analysis of IPEDS data for these schools, we found that about half of the schools (52 percent) primarily granted associate degrees or certificates. The others primarily granted baccalaureate degrees (37 percent) or a mix of degrees (11 percent). Most of the schools (56 percent) were public colleges and not highly selective. They had an average admissions rate of 93 percent, and more than four in five (86 percent) of them reported admitting at least 75 percent of applicants. The schools had an average graduation rate of 35 percent, and 80 percent of them reported that at most half of their students graduate. The average school awarded Pell grants to 40 percent of their students and federal student loans to 43 percent of students. Rates of non-White student attendance ranged from 10 to 98 percent, with the average student body of these schools being 45 percent non-White.

Confirmatory impact findings

For our two confirmatory outcomes, we found that participants in the intervention and control groups had similar levels of postsecondary enrollment and persistence eight years after study enrollment (Table 2). For enrollment, we found that 24 percent of mothers in the TOPP group had enrolled in a two- or four-year college within eight years of study enrollment, compared with 29 percent of mothers in the control group. The difference between groups was not statistically significant ($p = .20$). For persistence, we found that 6 percent of mothers in both research groups had enrolled in college for three consecutive semesters without withdrawing.

Table 2. Confirmatory impact findings

Outcome	TOPP group	Control group	Impact	Standard error	*p*-value
Enrollment in 2- or 4- year college within 8 years after study enrollment (%)	24	29	-5	4	0.20
Enrolled in 3 or more consecutive semesters without withdrawing within 8 years after study enrollment (%)	6	6	0	2	0.93

Source: Matched administrative program and NSC data for 580 study participants.

Notes: The percentages in the column for the control group are regression-adjusted predicted values. The percentages in the column for the TOPP group are the sum of the regression-adjusted control group values and the regression-adjusted impact estimates.

Exploratory impact findings

Table 3 presents impact findings for our exploratory outcomes. For all of the exploratory outcomes, we found that participants in the TOPP group and control group had similar levels of postsecondary enrollment and persistence. For example, we found that participants in the two groups were equally likely to have enrolled in a two- or four-year college in each of the eight years after study enrollment. Their outcomes were also similar when looking only at enrollment in four-year colleges or full-time enrollment. For persistence, we found that 21 percent of mothers in the TOPP group had enrolled in one or more semesters without withdrawing, compared to 24 percent of mothers in the control group. The difference between groups was not statistically significant ($p = .35$). Graduation rates were similarly low (4 percent) for participants in both groups. Figure 1 shows the similarity of enrollment outcomes for the two groups by plotting both regression-adjusted and unadjusted enrollment rates separately for each group.

**Table 3. Exploratory impact findings**

Outcome	TOPP group	Control group	Impact	Standard error	*p*-value
Enrolled in a 2- or 4-year college within each of the following years after study enrollment:[a] (%)					
1 year	18	22	-3	3	0.28
2 years	21	20	1	5	0.76
3 years	22	20	2	5	0.70
4 years	20	20	0	5	0.96
5 years	21	20	0	5	0.86
6 years	20	20	0	5	0.92
7 years	19	20	-1	5	0.84
8 years	19	20	-1	5	0.78
Enrolled in a 4-year college within 8 years after study enrollment[b] (%)	12	14	-1	3	0.64
Enrolled full time in a 2- or 4-year college within 8 years after study enrollment[b] (%)	12	14	-1	3	0.60
Enrolled in one or more semesters without withdrawing within 8 years after study enrollment[b] (%)	21	24	-3	4	0.35
Graduated college within 8 years after study enrollment[b] (%)	4	4	0	2	0.82

Source: Matched administrative program and NSC data. Sample size ranges from 573 to 580, depending on the outcome.

[a] The percentages in the TOPP and control group columns are regression-adjusted predicted values of enrollment outcomes from a panel regression model.

[b] The percentages in the column for the control group are regression-adjusted predicted values. The percentages in the column for the TOPP group are the sum of the regression-adjusted control group values and the regression-adjusted impact estimates.

Figure 1. Unadjusted and adjusted college enrollment rates, by research group and number of years of post-study enrollment
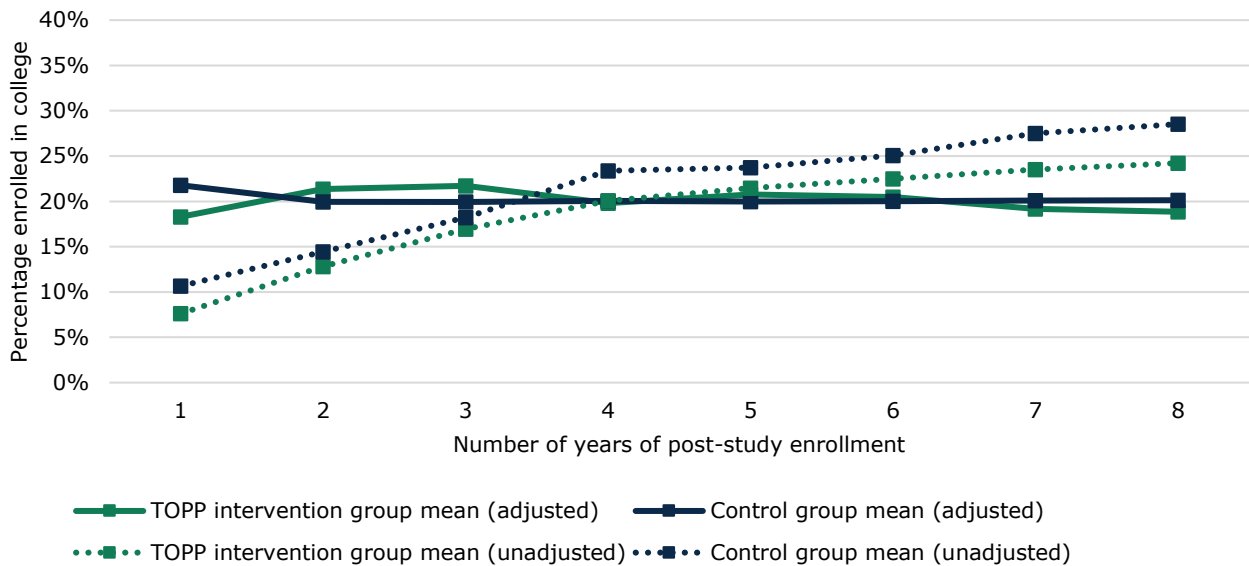
Source: Matched administrative program and NSC data for 580 study participants.

Notes: Unadjusted rates are raw percentages calculated separately by research group and year. Adjusted rates are regression-adjusted predicted values from a panel regression model.

V. Discussion

This study examined the longer-term impacts of TOPP, an 18-month multicomponent program to delay repeat teen pregnancy among adolescent mothers. An earlier RCT involving 598 low-income adolescent mothers in Columbus, Ohio found that the program succeeded in reducing rates of repeat pregnancy and subsequent birth in adolescence, and increased participant use of long-acting reversible contraception (Stevens et al. 2017). The program did not explicitly seek to change participants' educational outcomes. However, given prior evidence that adolescent mothers with more than one child can face long-term difficulties related to educational and economic outcomes (Klerman 2004), we sought to examine whether TOPP's success in reducing adolescents' rates of repeat pregnancy and subsequent birth led to longer-term impacts on participants' educational outcomes.

Based on our analysis of administrative data on postsecondary enrollment and persistence for 580 participants from the original RCT, we found that TOPP did not change participants' educational outcomes in the eight years after study enrollment. Compared to mothers in the study's control group, those offered TOPP were equally likely to have enrolled in any two- or four-year college within the eight years after study enrollment. They also had similar levels of persistence in postsecondary education, defined as enrolling in three or more consecutive semesters at any two- or four-year college without withdrawing. In exploratory analyses, we found similar results for several alternative measures of postsecondary enrollment and persistence, including full-time enrollment status, enrollment in four-year colleges, postsecondary graduation, and persistence for a single semester of college.

Why did we not find impacts on participants' educational outcomes, given that the program succeeded in reducing rates of repeat pregnancy and subsequent birth in adolescence? Although our study design did not enable us to provide a definitive answer to this question, the overall low rates of postsecondary

enrollment and persistence we found for mothers in this study suggest that family size was not the only factor influencing their educational outcomes. For mothers in both research groups, we found that less than 30 percent had enrolled in any two- or four-year college in the eight years after study enrollment, only 6 percent had persisted in college for more than three consecutive semesters, and only 4 percent had graduated from a two- or four-year college. We do not have data explaining possible reasons for these low rates. However, their levels suggest that many study participants faced substantial obstacles to postsecondary enrollment and persistence, regardless of family size. Improving longer-term educational outcomes for low-income adolescent mothers might require a broader network of supports than a single intervention like TOPP can provide.

The data we had available for this study preclude us from drawing wider conclusions about TOPP's long-term impacts. Although postsecondary education is strongly linked to economic self-sufficiency and outcomes later in life, it is not the only measure or determinant of adult success. For this study, we attempted but were unable to obtain administrative data on other markers of economic self-sufficiency and well-being, such as employment and the use of public benefits. In addition, we did not have indicators of secondary school or GED completion, which might have had more immediate relevance to the adolescent mothers in this sample. If administrative data on these or other relevant outcomes become available, future studies could provide a more comprehensive assessment of the longer-term impacts of programs like TOPP.

VI. References

Dundar, A., and D. Shapiro. "The National Student Clearinghouse as an Integral Part of the National Postsecondary Data Infrastructure." Herndon, VA: National Student Clearinghouse Research Center, May 2016.

Klerman, L.V. "Another Chance: Preventing Additional Births to Teen Mothers." Washington, DC: National Campaign to Prevent Teen and Unplanned Pregnancy, May 2004.

Osterman, M.J.K., B.E. Hamilton, J.A. Martin, A.K. Driscoll, and C.P. Valenzuela. "Births: Final Data for 2020." National Vital Statistics Reports, vol. 70, no. 17, February 2022. Hyattsville, MD: National Center for Health Statistics, 2022.

Stevens, Jack, Robyn Lutz, Ngozi Osuagwu, Dana Rotz, and Brian Goesling. "A Randomized Trial of Motivational Interviewing and Facilitated Contraceptive Access to Prevent Rapid Repeat Pregnancy Among Adolescent Mothers." *American Journal of Obstetrics and Gynecology,* vol. 217, no. 4, 2017, pp. 423.e1–423.e9.