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Master of Public Health Research Project

*Is Volunteering During Adolescence Associated with a Delay in
Pregnancy Until Adulthood?*

by

Diane L. Bishop

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Department of Epidemiology and Community Health
Master of Public Health Program
MPH Research Project: EPID 691

Virginia Commonwealth University
Richmond, Virginia

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**Master of Public Health
Research Project Agreement Form**
Department of Epidemiology and Community Health

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Number of semester hours (3-6): 3 Semester: Spring Year: 2009

Please complete the following outline. Do not exceed 2 pages (A-H).

A. PROJECT TITLE:

Does volunteering protect against teenage pregnancy?

B. PURPOSE (state hypothesis/research question):

To examine the relationship between volunteering during adolescence and an outcome of teenage pregnancy.

C. SPECIFIC OBJECTIVES (list major aims of the study):

- To examine the association between the act of volunteering and teen pregnancy.
- To examine the reason for volunteering (personal choice, court-ordered, or required by parents, school, or religious group) as it relates to the teen pregnancy outcome.
- Possible development of extracurricular activities scale (includes participation in active or leisure sports, other hobbies) to examine relationship with teen pregnancy. This scale could be substituted for volunteering in one model, to see how much additional variance the whole scale accounts for, compared to volunteering alone.

D. DESCRIPTION OF METHODS

D.1. Identify source(s) of data (eg, existing data set, data collection plans, etc):

The Add Health dataset, which includes Wave I (1995-1996), Wave II (1996), and Wave III (2001-2002). This publicly available dataset can be downloaded through the Inter-University Consortium for Political and Social Research (ICPSR).

D.2. State the type of study design (eg, cross-sectional, cohort, case-control, intervention, etc):

Add Health is a school-based longitudinal cohort study of a nationally-representative sample of adolescents.

D.3. Describe the study population and sample size:

A sample of 80 high schools and 52 middle schools from the US was selected with unequal probability of selection. Incorporating systematic sampling methods and implicit stratification

into the Add Health study design ensured this sample is representative of US schools with respect to region of country, urbanicity, school size, school type, and ethnicity.

For Waves I and II, the public use dataset consists of one-half of the core sample, chosen at random, and one-half of the oversample of African-American adolescents with a parent who has a college degree. The total number of respondents in this dataset is approximately 6,500 and includes adolescents who are in the 7th through 12th grade. For Wave III, a total of 4,882 of the original Wave I respondents were re-interviewed and were between 18 and 26 years old. Wave III data includes information on 2,348 pregnancies. This analysis will primarily include the Wave III dataset, functioning as cross-sectional data; in this wave only, the independent variables (volunteering and volunteering reasons) are available.

For all waves, female respondents will be selected for inclusion in this study.

D.4. List variables to be included (If a qualitative study, describe types of information to be collected)

- Demographics (including age, sex, race, income, education, marital status)
- Pregnancy History
- Pregnancy Intent (Question: "Before you got pregnant, did you want to get pregnant by your partner at that time?" Response possibilities: definitely no, probably no, neither wanted nor didn't want, probably yes, definitely yes).
- Volunteer (Question: "At any time during your adolescence, when you were between 12 to 18 years old, did you regularly participate in volunteer or community service work? Don't count things like washing cars or selling candy to raise money.")
- Volunteer reasons (Question: "Was this work strictly voluntary, that is, you did it only because you wanted to, or was it ordered by a court as part of a sentence or required by your parents, school, or religious group?" This is a check all that apply item, with the options of strictly voluntary, court-ordered, and required by parents/school/religious group)
- Possible additional variables include various sports activities and other hobby participation.

D.5. Describe methods to be used for data analysis (If a qualitative study, describe general approach to compiling the information collected)

The Add Health data has as complex survey design. To correct for design effects and unequal probability of selection to ensure that results are nationally representative with unbiased estimates, SAS survey procedures will be used with the weighted data, reporting weighted percentages and unweighted N's. Examples of SAS procedures potentially used include surveymeans, surveyfreq, surveyreg, and surveylogistic.

E. ANTICIPATED RESULTS:

Teenagers who volunteer, regardless of reason, are less likely to have a pregnancy compared to those who do not volunteer.

F. SIGNIFICANCE OF PROJECT TO PUBLIC HEALTH:

If volunteering, regardless of reason, is found to be protective against teen pregnancy, this study would provide support for recommending volunteer interventions and activities as a preventive measure.

G. IRB Status:

- 1) Do you plan to collect data through direct intervention or interaction with human subjects? ___yes ___Xno
- 2) Will you have access to any existing identifiable private information? ___yes ___Xno

If you answered “no” to both of the questions above, IRB review is not required.
If you answered “yes” to either one of these questions, your proposed study must be reviewed by the VCU Institutional Review Board (IRB). Please contact Dr. Vance or Dr. Sridhar for assistance with this procedure.

Please indicate your IRB status:

- ___ to be submitted (targeted date _____)
 ___ submitted (date of submission _____; VCU IRB # _____)
 ___ IRB exempt review approved (date _____)
 ___ IRB expedited review approved (date _____)
 ___ IRB approval not required

H. PROPOSED SCHEDULE: Start Date: January 2009 Anticipated End Date: May 2009

I. INDICATE WHICH OF THE FOLLOWING AREAS OF PUBLIC HEALTH KNOWLEDGE WILL BE DEMONSTRATED:

1. Biostatistics – collection, storage, retrieval, analysis and interpretation of health data; design and analysis of health-related surveys and experiments; and concepts and practice of statistical data analysis. ___Xyes ___no (if yes, briefly describe):
2. Epidemiology – distributions and determinants of disease, disabilities and death in human populations; the characteristics and dynamics of human populations; and the natural history of disease and the biologic basis of health. ___Xyes ___no (if yes, briefly describe):
3. Environmental Health Sciences – environmental factors including biological, physical and chemical factors which affect the health of a community. ___yes ___Xno (if yes, briefly describe):
4. Health Services Administration – planning, organization, administration, management, evaluation and policy analysis of health programs. ___yes ___Xno (if yes, briefly describe):
5. Social/Behavioral Sciences – concepts and methods of social and behavioral sciences relevant to the identification and the solution of public health problems. ___Xyes ___no (if yes, briefly describe):

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Abstract

Purpose: The objective of this study was to determine if regular volunteering during adolescence was associated with a delay in first pregnancy until adulthood.

Method: Data for this analysis were drawn from Wave III of the National Longitudinal Study of Adolescent Health (Add Health). Logistic regression was used, controlling for demographic characteristics and pregnancy intention, to estimate the independent contribution of volunteering during adolescence to a delay in first pregnancy until after age 18.

Results: One-third of respondents reported regularly volunteering during adolescence. Volunteering significantly differed among those who had a teen pregnancy compared to those who delayed pregnancy until adulthood (chi-square 6.52, p-value 0.012). In the adjusted analysis, respondents who reported regularly volunteering during adolescence were nearly 60% more likely to delay their first pregnancy until adulthood compared to those who did not volunteer.

Conclusions: This analysis is the only one known to have examined volunteering alone, not as part of a multiple component prevention program. Its findings suggest that incorporating volunteering opportunities may make pregnancy prevention programs more successful. In addition, increasing the number of the kinds of volunteering opportunities that are already available may confer some protection against adolescent pregnancy.

Introduction

Teens who give birth and their children face dim futures. Teenage pregnancy is associated with diminished education, income, prenatal health and healthcare, and child wellness.

Only 40% of teenage mothers finish high school and less than two percent complete college by the time they are 30.¹ Educational attainment is often intertwined with income level. During the past 20 years, while the median income for college graduates has increased nearly 20%, the median income for those who did not finish high school has decreased 28%.² Additionally, about one-quarter of teen mothers have a second child within two years, which may further interfere with educational efforts or affect the ability to continue employment, resulting in a continuing struggle to escape poverty.³

During pregnancy, teenagers are prone to behavioral risk factors for poor birth outcomes.⁴ Teens aged 15 to 19 years are more likely to smoke during their pregnancy compared to pregnant women aged 20 years or older. Pregnant teenagers are also less like to gain weight appropriately or receive prenatal care. In addition, pregnant teenagers are more likely than older pregnant women to be victimized by physical abuse.^{5,6}

The children of teenage mothers may carry the greatest burden of all. Not only are they at increased risk of being born prematurely and at low birthweight compared to children of older mothers,⁷ they are also more likely to be abused

or neglected.⁸ Furthermore, daughters of teenage mothers are likely to continue the cycle of teenage pregnancy; they are three times more likely to become a teen mother themselves compared to the daughters whose mothers were between 20 and 21 years when they were born.⁸

In addition to the affects of teenage pregnancy on the mothers and children, there are societal costs. Each year, teen pregnancy costs taxpayers approximately nine billion dollars, including public sector health care costs, child welfare costs, increased prison costs, and lost tax revenues. Between 1991 and 2004, with over six million births to teen mothers, the total public cost was estimated at \$161 billion dollars.⁹

There were 435,427 infants born to mothers between 15 and 19 years of age in 2006, yielding a birth rate of 41.9 live births per 1,000 women.¹⁰ More than 10 percent of all U.S. births that year were to mothers under age 20.¹¹ Pregnancy and birth rates declined from 61.8 to 40.5 per 1,000 women between 1991 and 2005; however, following the fourteen year decline, a five percent increase was observed between 2005 and 2007.^{11,12}

Among race and ethnic groups, trends of teenage births differed. The rate increased most notably for American Indian or Alaska Native teenagers aged 15 to 19 years, with a 12 percent increase from 55 per 1,000 in 2005 to 59 per 1,000 in 2007. Among non-Hispanic white and black teenagers as well as Asian or Pacific Islanders, rates increased nominally, around one or two percent. Only

for Hispanic teenagers did the rate decline in 2007, to 81.7 per 1,000; a two percent decrease from 2006 (83 per 1,000).¹²

Prevention Strategies

There is a growing body of evidence that programs designed to prevent teenage pregnancy can be effective. Effective programs fall under five broad categories according to The National Campaign to Prevent Teen and Unplanned Pregnancy: curriculum-based education; service learning; youth development programs; parent programs; and community-wide programs. Curriculum-based education typically occurs in schools and promotes both abstinence and contraceptive use. In service learning programs, youth participate in community service, such as tutoring or rehabilitating recreation areas, and then reflect on the experiences. Youth development programs take a holistic approach to encourage youth to plan for their future; the programs incorporate a broad range of topics such as health, academics, sex education, and employment assistance. Parent programs strive to improve parent-child communication on sex-related topics. Community-wide programs encourage all community members to participate through events such as health fairs or public service announcements.¹³

The National Campaign is a non-profit organization funded in part by the Centers for Disease Control and Prevention (CDC). One of the Campaign's

activities is providing guidance on rigorously evaluated prevention programs that have been demonstrated to work. To be a recommended program, several criteria must be met: completed and published in 1980 or later in the United States or Canada; targeted at middle and/or high school aged teens; included baseline and follow-up data; measured behaviors, not just intentions or attitudes; included at least 75 teens in both the intervention and control groups; used an experimental or quasi-experimental design.¹³ The following programs met the evaluation criteria of The National Campaign and included teenage pregnancy as a measured outcome.

Three curriculum-based education programs have been found to be effective to varying degrees. Focus on Kids plus ImPACT, an experimental urban after-school program for African American youth aged 13 to 16 years and their parents, was found to have a continued reduction in teen pregnancy two years post-intervention. Seattle Social Development was conducted in an urban setting among first through sixth graders. At age 18, girls who participated in the intervention were 35% less likely to have had a pregnancy compared to those in a comparison group. SiHLE Intervention, an after-school program in an urban setting for high school girls, was found to reduce teen pregnancy at six months post-intervention.¹³

Two service learning programs were considered effective after evaluation. Learn and Serve America was conducted in urban, suburban, and rural areas and consisted of an in-school program for middle and high school students. The

effect of this program was measured only in the short term; immediately following the program, participants were half as likely to be involved in a pregnancy compared to those in a comparison group.¹³ The Teen Outreach Program (TOP) is a national program; in its evaluation, high school students were randomly selected to receive either the TOP intervention or to participate in regular health or social studies classes. The intervention consisted of student engagement in a combination of mentored community volunteer activities, classroom discussions of the service activities, and classroom discussions and activities related to social developmental aspects of adolescence. The goal of the TOP program was to reduce teenage pregnancy, school failure, and school suspension. Students assigned to Teen Outreach Program had less than half the rates of teen pregnancy, school failure, and school suspension, compared to the control group. Among females in the TOP program, 4.2% became pregnant compared to 9.8% in the control group. Additionally, students reported finding the volunteer work to be enjoyable, and that it taught them new skills and how to think about future goals.¹⁴

Additionally, one youth development program was considered effective and recommended by The National Campaign. The Children's Aid Society (CAS) - Carrera Program was a multi-year program for high-risk high school students. At the end of the program, among girls who received the intervention, 55% were less likely to have become pregnant.¹³ This program has had lasting results in its six New York City sites for three years.¹⁵

There have been too few studies conducted among parents for conclusions to be drawn about effective programs. A major challenge for these types of programs is getting parents enrolled. While some improvement has been noted in parent to child communication, few studies have measured sexual behavior outcomes or teen pregnancy itself.¹⁵

The National Campaign examined six community-wide programs, of which only a few had an impact on lowering teen pregnancy and birth rates. These studies did not measure the impact on the teens directly served; instead, they investigated the effects of community-wide programmatic measures on pregnancy rates. While affecting community-wide teen pregnancy rates is an appropriate goal for this type of program, methodological challenges are created for evaluation when exposure cannot be associated with outcomes.¹³ No community-wide programs were recommended as being effective by The National Campaign.¹⁴

While several programs have been recognized as effective after evaluation and a systematic review, there are some widely implemented programs and strategies that have not been, including abstinence-only sex education (AOSE) and virginity pledges. A monograph written by The Heritage Foundation in 2002 claimed that "abstinence education programs for youth have been proven to be effective in reducing early sexual activity," and identified ten studies that demonstrated this.¹⁶ When those studies were evaluated by The National

Campaign using the same criteria as previously reviewed programs, it was determined that none of them provided strong evidence that they either delayed sex or reduced teen pregnancy. Considering the diversity of AOSE programs compounded with the lack of rigorous evaluation of behavior change, there is not enough evidence available to determine if abstinence-only programs work.¹⁷

In a study to determine if taking a virginity pledge affected adolescent sexual activity, pledgers and non-pledgers were matched and compared. Five years after taking the pledge, 82% of pledgers denied ever having pledged, there was no significant difference in premarital sex, and fewer pledgers reported using birth control in the past year or at last sex. These findings indicate that teens who do pledge are less likely to protect themselves from disease as well as from pregnancy;¹⁸ such findings have been echoed in other studies.^{19,20} Despite the lack of evidence to support the implementation of AOSE, funding has increased to these programs from \$73 million in 2001 to \$204 million in 2008.¹⁸

Rationale for this study

This study sought to answer the question: Is regular volunteering during adolescence associated with a delay in pregnancy until adulthood? This is an important question to explore because elaborate, mentored service learning programs have been found to be effective in reducing pregnancy but are not

available to all adolescents now and are unlikely to be in the near future. The present analysis examined volunteering as it occurred in a random, representative sample of American adolescents, not in the context of a well-funded experimental program where volunteering was assigned. Although the design of the present study did not permit causal inferences to be drawn, it had marked ecological validity; teen volunteering motives in this study ranged from the purely self-initiated to the court-mandated. A test of the association between pregnancy delay and volunteering broadly defined could pave the way for a general, unqualified recommendation to promote volunteering as a pregnancy prevention strategy

In addition, volunteering has the potential to have a positive influence on multiple aspects of an adolescent's life, as well as to benefit society. In addition to the in-kind contribution to worthy causes that teen volunteering represents, there are long-held societal beliefs that volunteering is good for teens, that it builds character and keeps them out of trouble. It is believed to build trust and empathy for others, to promote physical and mental health, and to create a general respect for the common good.²¹ Volunteering during adolescence has been linked to good citizenship, such as voting and working on a political campaign.²² Voluntary service has also been associated with a decreased risk of adolescent participation in negative behaviors such as stealing, using force to achieve a desired result, and physical attacks on others.²³

Objective

The objective of this study is to determine if regular volunteering during adolescence is associated with a delay in first pregnancy until adulthood.

Method

Overview of the National Longitudinal Study of Adolescent Health (Add Health)

Data for this analysis were drawn from the National Longitudinal Study of Adolescent Health (Add Health). It is a school-based longitudinal study that is nationally representative of adolescents who were in grades 7-12 in the United States during the 1994-95 school year. Eighty U.S. high schools were randomly selected after stratification by enrollment size, school type, region, location, and percentage of white students. For high schools that did not include 7th or 8th grades, feeder schools were selected for inclusion in Add Health.

The Add Health cohort has been followed from adolescence into young adulthood with data collected in four waves. Wave I consisted of two stages: an in-school survey and an in-home survey. In stage one, questionnaires were administered to students in participating schools between September 1994 and April 1995 (n=90,118). In the second stage, questionnaires were administered in students' homes between April and December 1995. Students were eligible for

participation in the in-home questionnaire regardless of participation status in the in-school survey, which allowed students to be followed if they drop or age out of school. This in-home sample is the core sample that is nationally representative of adolescents in grades 7 through 12 in the US in the 1994 to 1995 school year (n=12,105).

In addition to the core sample, special oversamples were generated. Four ethnic oversamples were drawn, including: African-American adolescents whose parents had a college degree (n=1,038); Chinese (n=334); Cuban (n=450); and Puerto Rican (n=437). A saturated sample was generated, where all students in 16 schools were selected for the in-home questionnaire to enable a social network analysis. Additionally, there was an oversample of disabled adolescents and a genetic sample comprised of pairs of siblings living in the same household. The total in-home questionnaire sample in Wave I, stage two was 20,745 adolescents.

Wave II data were collected in the following year between April and August and consisted of follow-up in-home interviews with adolescents who participated in the Wave I in-home questionnaire (n= 14,738). This sample excludes adolescents who were in the 12th grade at Wave I and not part of the genetic sample. Additionally, some adolescents not interviewed at Wave I were included in Wave II to increase the number of respondents in the genetic sample and the Wave I disability sample was not re-interviewed. The Wave III in-home survey sample was administered between August 2001 and April 2002

(n=15,197). This sample was comprised of Wave I respondents who completed the in-home questionnaire and could be located and re-interviewed. Wave IV data collection occurred during 2007 and 2008 with Wave I in-home questionnaire respondents.

Data collection

The Wave I in-school questionnaire was a self-administered paper instrument formatted for optical scanning. The survey was distributed during class to students with no make-up surveys for those who were absent. Parents were given advance notice about the questionnaire and could instruct their children not to participate.

For Waves I, II, III, and IV, no paper questionnaires were used for the in-home surveys; all data were collected using laptop computers. For less sensitive questions, an interviewer read the questions aloud and recorded the respondent's answer. For more sensitive questions, the respondent listened to pre-recorded readings of the questions using earphones, and entered their own answers privately. By using this method, both interviewer and parental influences were minimized, and data security maintained.

Data Utilized

All Wave III public-use data (ACSI with SAS set up files) and accompanying documentation were downloaded from the Interuniversity Consortium for Political and Social Research (ICPSR). The public-use data sets are a random subset of 4,882 respondents from the original Wave I respondents who were re-interviewed six years later at Wave III. The Wave III dataset is comprised of eight data files: the main respondent file which includes the in-home questionnaire data and grand sampling weights; the relationship table file; the pregnancy table file; the relationship detail file; the completed pregnancies file; the current pregnancies file; the live births file; and the children and parenting file. For this analysis, four datasets were necessary: the main respondent file, the pregnancy table file, the completed pregnancies file, and the current pregnancies file.

Wave III was used because it is the only wave where questions were asked of the cohort members about their volunteer activities during adolescence. Additionally, data on all current and past pregnancies during the respondent's lifetime were available in this wave. Wave III pregnancy data provide the most comprehensive assessment of when pregnancy began, with particular attention to those pregnancies beginning during teenage years; thus, using Wave III is the best way to address this research question.

While both female and male partners could provide information on a pregnancy, only females were selected for inclusion in this analysis. The final dataset included 901 female respondents who reported a pregnancy in the past or were pregnant at the time the Wave III survey was administered.

Data Management

After the public-use data were downloaded from the ICPSR, the four datasets required for analysis were brought into SPSS version 16 to be merged. The pregnancy-related datasets were linked using a unique identifier that combined the respondent identification number, relationship identifier and pregnancy number of that relationship. The creation of this unique identifier was necessary to distinguish between multiple pregnancies reported by a single respondent. The pregnancy datafile contained data on the month and year the pregnancy ended or was expected to end, educational attainment when the pregnancy began, pregnancy intent, type of insurance used to pay for prenatal visits, age when pregnancy began (current pregnancies only), and length of the pregnancy in weeks (completed pregnancies only).

After creating a single dataset of all pregnancies reported in Wave III, the data were merged with the main respondent file, using the original respondent identification number common to both datasets. From the main file, the variables selected for inclusion in this analysis included: sex, date of birth (month and

year), regular volunteering during adolescence status, and volunteer type (strictly voluntary, court-ordered, or required by parents, school, or religious group). After the final dataset was created in SPSS, it was saved as a SAS datafile so that software for complex samples could be employed; all variable recodes and analysis were conducted using SAS version 9.1.

Measures

Pregnant during adolescence. Teen pregnancy was defined as a pregnancy beginning at age 17 or younger. Females 18 years old and older were not included because they have legal adult status in some situations and are not usually the target of teen pregnancy prevention efforts. Age when pregnancy began was readily available only for females who were pregnant when Wave III surveys were administered (current pregnancies). For pregnancies completed prior to the Wave III survey, age was calculated using the respondent's month and year of birth, pregnancy end date, and pregnancy length. The day of birth was not provided; therefore, the 15th was imputed. To calculate age when pregnancy began, the first step was to subtract the pregnancy end date from the date of birth; this yielded the respondent's age when the pregnancy ended. The length of pregnancy was subtracted from this to yield Age at pregnancy onset. This could be calculated for the majority of women. Of the 901 pregnancies, age when pregnancy began was available or calculated for 96.2% of the sample.

Pregnancy Intended. All respondents who reported a pregnancy were asked if they wanted to have a child just before they became pregnant. Respondents indicated their response as yes or no.

Volunteering. There were four possible questions related to volunteering on the Wave III questionnaire. First, respondents were asked, "At any time during your adolescence, when you were between 12 to 18 years old, did you regularly participate in volunteer or community service work? Don't count things like washing cars or selling candy to raise money." Respondents who reported volunteering during adolescence were asked three additional questions to indicate whether any volunteer activity was: strictly voluntary; court-ordered; or required by parents, school, or religious group. All responses were collected as yes or no

Race/ethnicity. Information on race and ethnicity was collected as a multiple response variable, where respondents could indicate more than one race or ethnicity from White, Black or African American, Asian or Pacific Islander, American Indian or Alaska Native, Hispanic, and other. To create a single response race variable, if a respondent indicated a single race, it became the final race code. For those who choose more than one race, they were coded as having one or more races, without further specification. Respondents, who indicated that they are Hispanic, with or without another race category, were coded as Hispanic.

Method of payment for prenatal care. Method of payment of prenatal care was also collected as a multiple response variable. The insurance options available to Add Health respondents were self or partner's income or savings, self or partner's parents or other relatives, private insurance, Medicaid, government assistance other than Medicaid, and other source. This variable was recorded to a dichotomous single response variable with values of Medicaid, which captured any report of this payment type when multiple payment methods were used, and other sources (including self, partner's income, self or partner's parents or other relatives, private insurance, government insurance other than Medicaid, other sources, and multiple insurances used). This variable was used as an indicator of economic status because it was the only measure available specific to pregnancy. While data was collected on household and individual income at each Wave of Add Health, the income data are not explicit to during pregnancy and much of the income data are missing.

Educational attainment at pregnancy. Information on education was collected when pregnancy began. This variable was originally collected in twelve categories: Had never gone to school; 8th grade or less; more than 8th grade, but not a high school graduate; had gone to a business, trade, or vocational school instead of high school; high school graduate; completed a GED; had gone to a business, trade, or vocational school after high school; attending college; had gone to college, but not a college graduate; college or university graduate; attending graduate school; receiving professional training beyond a four year

college or university; had received an advanced degree. For the descriptive analysis, education was collapsed into three categories: less than high school, high school graduate or equivalency, and some college education or greater.

Analysis

Statistical analyses were conducted using SAS version 9.1. To account for study design and unequal probability of selection and to ensure that results are nationally representative with unbiased estimates, SAS survey procedures (proc surveyfreq and proc surveylogistic) were used on weighted data with a cluster variable adjustment. The data were weighted using the sampling weight appropriate for a cross-sectional study design to yield population average models. All results are reported using the weighted percentages and unweighted numbers.

Descriptive analysis was conducted by the use of frequencies to characterize the study population. Then, both unadjusted and adjusted logistic regression models were constructed. An adjusted logistic model was built by entering all significant factors from the bivariate analysis. To determine if interaction was present between the risk factor (volunteering) and potential confounders, Wald chi-squares and p-values were examined. No significant interactions were found, so only the main effects were interpreted. To identify the best predictor model, the -2 log likelihood was examined. Odds ratio and

95% confidence intervals were examined to determine associations between the outcome (teen pregnancy) and predictors.

Results

Descriptive statistics. The descriptive characteristics of the study population are shown in Table 1. Among the 862 pregnancies for which age at pregnancy could be calculated, 32.8% of pregnancies occurred among teenagers. Overall, one-third of the sample reported regularly volunteering during adolescence. Volunteering significantly differed among those who had a teen pregnancy compared to those who had a pregnancy during adulthood; 29.7% of those who had a teen pregnancy volunteered compared to 38.7% of those who delayed pregnancy (chi-square 6.52, p-value 0.012).

The study population was comprised of 58.2% white, non-Hispanic females, 21.8% black, non-Hispanic females, 13.9% Hispanic females, and 6.2% females reporting other or multiple races. There were statistically significant differences by race for teen and delayed pregnancies. The proportion of white and other races females with delayed pregnancies was higher while the proportion of black and Hispanic females who had a teen pregnancy was higher (chi-square 9.76, p-value 0.026).

Overall, 53.8% of the study population reported Medicaid as the method of payment for prenatal care. While more females who had teen pregnancies

reported Medicaid compared to those who had a pregnancy as an adult, the statistical significance of the difference was borderline (chi-square 3.81, p-value 0.053).

Two-thirds of pregnancies in this analysis were unintended. Among teen pregnancies, the proportion was significantly greater (77.5%), than it was among adult pregnancies (64.1%).

Unadjusted odds ratios. The crude logistic regression analysis results (Table 2) were similar to the chi-square results reported above. Those who volunteered regularly during adolescence were 1.6 times more likely to delay pregnancy until adulthood (OR 1.57, 95% CI 1.11, 2.22). Additionally, black and Hispanic females were less likely to delay pregnancy until adulthood compared to whites. Females who intended to become pregnant were significantly more likely to become pregnant compared to females not intending to become pregnant.

Adjusted odds ratios. After adjusting for race/ethnicity, method of payment for prenatal care, and pregnancy intention, volunteering remained a significant predictor of delay (OR 1.58, 95% CI 1.05, 2.38). In the adjusted model, Hispanic females were less than half as likely to delay pregnancy until adulthood compared to whites. Additionally, but not surprisingly, females who intended to become pregnant were nearly twice as likely to have a pregnancy compared to those who did not intend to become pregnant (Table 2).

Discussion

Regular volunteering during adolescence was found to be clearly protective in delaying pregnancy. Females who volunteered were nearly 60% more likely to postpone their first pregnancy until adulthood compared to those who did not volunteer. After accounting for potential confounders, this finding held true. The findings of this study are consistent with both experimental and non-experimental studies that have examined the relationship between volunteering and teen pregnancy prevention.^{14, 24, 25, 26} This study adds to previous research because it examines volunteering alone, while the other studies included volunteering as part of a pregnancy prevention program that incorporated classroom discussions of the volunteer activities and participation in activities related to social developmental aspects of adolescence.

A major strength of this analysis is that it is based on a sample that is nationally representative of US adolescents in grades 7-12 during the 1994-1995 school year. This analysis used the publicly available dataset. While this subsample is considerably smaller than the complete Wave III dataset, it had sufficient statistical power to detect pregnancy differences associated with the predictors of interest.

The sample in the Add Health study is unique; it is the first large, prospective self-report cohort study of the health status of the adolescent population in the United States and of the factors that contribute to adolescent

health. Additionally, the way in which data were collected during the in-home interviews decreased response bias. For all sensitive questions, audio computer-assisted self-interviewing (ACASI) technology was used. With ACASI, the participant listened to questions aloud using earphones and entered their own responses onto a laptop computer.²⁷

There are several limitations to this analysis. First, due to the cross-sectional study design, a causal relationship between volunteering and delay in pregnancy cannot be determined. There are also some limitations due to the data collected using the Add Health questionnaire. For example, there were no data available on income during pregnancy, so it was necessary to use the method of payment used for prenatal visits as a proxy indicator of economic status. There was a substantial amount of missing data for payment method (21%); however, these data appeared to be missing at random.

Of greater note, the dataset lacked an adequate education variable to determine whether teens were at the appropriate grade level for their age at the time of pregnancy. In the Add Health questionnaire, educational attainment at pregnancy is captured as a categorical variable, with few categories available for less than high school levels of attainment and more precise categories available for post-high school education. When the provided educational levels were examined for the teenage pregnancy and delayed pregnancy groups, few participants in the teenage pregnancy group (5%) had education beyond high school compared to nearly one-third of those who delayed pregnancy. This

distribution is logical because the teen pregnancy group is comprised of females whose pregnancies occurred at 17 years of age or younger when few would have had the opportunity to attain higher levels of education. Nonetheless, this uneven distribution across groups would have biased statistical analysis severely; the education variable was not suitable for inclusion in the regression models.

Without an adequate measure of education at the time of pregnancy, it was not possible to construct a variable that would indicate whether individuals were at the appropriate grade level for their ages when they became pregnant. Exploratory attempts to create and manipulative this variable generated clearly inaccurate results.

These analyses did not take into account the exact dosage or quality of the volunteering reported by Add Health participants. While the survey question did specifically ask about volunteering regularly during adolescence, "regularly" is left open to interpretation by the participant. The volunteering variable used in this analysis included any type of volunteering, including strictly voluntary volunteering, court-ordered volunteering, or volunteering required by parents, school, or religious group. It is likely that the volunteering experiences varied in quality, and that the average experience lacked the systematic mentoring and other aspects of evidence-based programs in the literature.

Lastly, although the exact age at pregnancy was known, the wording of an item on the original questionnaire prohibits knowing if the volunteering occurred before, after, or during pregnancy. Participation in volunteer activities

was ascertained by asking if regular volunteering was done between the ages of 12 and 18. Without knowing specifically when the volunteering took place, there is a potential threat to the validity of the conclusion that volunteering is protective with regard to pregnancy. However, relatively few females who did volunteer had a pregnancy at 18 years of age or younger. This is not surprising, given the multiple time and financial demands of parenting, and provides support for assuming a temporal sequence in which volunteering preceded pregnancy.

Conclusion

The findings of this study indicate that regular volunteering during adolescence is associated with a delay in first pregnancy until adulthood. Pregnancy prevention programs thus may benefit from the use of strategies that incorporate volunteer opportunities. This analysis is the only one known to have examined volunteering alone, not as part of a multiple component prevention program.

The present sample size was insufficient to examine if types of volunteering had an effect on teen pregnancy delay. Most of those in the publicly available dataset who reported volunteering during adolescence indicated it was strictly voluntary (82%), leaving very small numbers of participants in the other response categories. Future analysis could be conducted using the full Wave III dataset. The larger sample might provide

enough statistical power to determine if differing motivations for volunteering have an effect on teen pregnancy delay.

Adolescents' perceptions that they provided a lot of input into the type of work they were to do has been associated with more positive outcomes.²⁴ Where large-scale pregnancy prevention programs cannot be implemented, encouraging adolescents to seek out volunteer activities that mesh with their own interests may be a viable alternative that adds to the protective value of volunteering. Additional research should explore this possibility.

The present findings are particularly notable because of the apparent protective effect of volunteering that is not in the context of a formal prevention program. Not all adolescents have access to programs where volunteer opportunities can be matched to their interests, competently mentored, and supplemented with other enriching activities. The least access of all may be afforded to those at the greatest risk for teenage pregnancy. The findings of this study suggest that, in areas where there are scant funds or expertise for developing highly organized volunteering programs, a lower budget approach could be worthwhile.

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Table 1. Descriptive Characteristics of Respondents

	Teen Pregnancies (N=291)		Delayed Pregnancies (N=571)	
	<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>
Regularly Volunteer during Adolescence				
Yes	86	26.7	220	36.4
No	204	73.3	349	63.6
<i>Total</i>	<i>290</i>		<i>569</i>	
Race/Ethnicity				
White	128	52.1	305	62.4
Black or African-American	100	25.4	154	19.1
Hispanic	46	18.2	65	11.5
Other, including more than one race	17	4.3	47	7.0
<i>Total</i>	<i>291</i>		<i>571</i>	
Method of Payment for Prenatal Care				
Medicaid	133	60.9	232	51.0
Other sources of payment	90	39.1	233	49.0
<i>Total</i>	<i>223</i>		<i>465</i>	
Pregnancy Intended				
Yes	64	24.0	203	38.7
No	221	76.0	363	61.3
<i>Total</i>	<i>285</i>		<i>566</i>	
Educational Attainment at Pregnancy				
Less than High School	163	57.9	117	22.3
High School graduate or equivalent	103	38.0	256	48.5
More than High School	13	4.0	175	29.3
<i>Total</i>	<i>279</i>		<i>548</i>	

Table 2. Unadjusted and Adjusted Odds Ratios for Predictors of Delayed Pregnancy

	Unadjusted		Adjusted*	
	OR	(95% CI)	OR	(95% CI)
Regularly Volunteer during Adolescence				
Yes	1.57	1.11, 2.22	1.58	1.05, 2.38
No	Referent		Referent	
Race/Ethnicity				
White	Referent		Referent	
Black or African-American	0.63	0.43, 0.93	0.64	0.41, 1.02
Hispanic	0.53	0.31, 0.91	0.44	0.25, 0.77
Other, including more than one race	1.37	0.66, 2.84	1.11	0.47, 2.61
Method of Payment for Prenatal Care				
Medicaid	0.67	0.45, 1.00	0.74	0.50, 1.11
Other sources of payment	Referent		Referent	
Pregnancy Intended				
Yes	1.2	1.32, 3.03	1.86	1.17, 2.95
No	Referent		Referent	

*Adjusted for race/ethnicity, method of payment for prenatal care, and intention to become pregnant