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# Social Disparities in the Relationship Between Depression and Unintended Pregnancy During Adolescence and Young Adulthood

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A B S T R A C T

**Purpose:** We investigated the influence of depression on subsequent risk of unintended pregnancy and social disparities within this relationship, during adolescence and young adulthood.
**Methods:** Drawing upon 15-year, nationally representative data from 8,810 young U.S. women in the National Longitudinal Study of Adolescent to Adult Health, we estimated associations between depression and time to first pregnancies reported as unintended, overall and stratified by race/ethnicity, socioeconomic status, and age with Cox proportional hazard models.
**Results:** Moderate/severe depression symptoms were associated with an increased risk of unintended first pregnancy (hazard ratio [HR], 1.21; confidence interval [CI], 1.02–1.44). In stratified models, depression increased the pregnancy risk for all minority groups (HRs, 1.36–3.25) but not white women. Depression increased the pregnancy risk for women with $0–$19,999 (HR, 1.48; CI, 1.11–1.98) and $20,000–$49,999 (HR, 1.33; CI, 1.05–1.68) income levels but not those at higher levels. Depression increased the pregnancy risk for adolescents <20 years (HR, 1.35; CI, 1.07–1.71) but decreased the risk for women >24 years (HR, .47; CI, .25–.86).
**Conclusions:** Findings may inform more equitable, holistic public health strategies that target depression as a modifiable risk factor for adverse reproductive outcomes during adolescence and young adulthood.



**IMPLICATIONS AND CONTRIBUTION**

Findings contribute new insights into social inequities in young women's experiences with depression and unintended pregnancy during adolescence and young adulthood. Findings have implications for more equitable, holistic, and integrated models of reproductive health care that can concurrently address young women's mental health, social context, and family planning needs.

While rates of unintended pregnancy in the U.S. have declined in recent years, they continue to be among the highest in the Western world [1–3]. Moreover, persistent social disparities in the U.S. unintended pregnancy rates exist by race/ethnicity and socioeconomic status [3]. Black and Hispanic women experience unintended pregnancy rates two-to-three times higher than white women [3]. Even worse inequities are noted among poor women, with those below 200% of the federal poverty level experiencing unintended pregnancy rates five times that of women at the highest income level [3]. Although there is a need for more rigorous work to better measures pregnancy intentions generally, some research has indicated that unintended pregnancy is associated with a host of negative health outcomes, outcomes which disproportionately impact socially disadvantaged women [4–8]. Reducing rates of and inequities in unintended pregnancy have been a major U.S. public health goal for more than three decades [9].

**Conflicts of Interest:** The authors have no conflicts of interest to disclose.

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Demographic, social, and cognitive behavioral factors associated with unintended pregnancy have been well documented [1,10–12]. Less research has focused on health-related predictors of unintended pregnancy, though an increasing number of studies (ours and others) have pointed to the potential role of mental health in contributing to unintended pregnancy and its proximate determinants (i.e., sex and contraceptive behaviors) [13–24]. In the National Comorbidity Survey of nearly 6,000 U.S. men and women aged 15–54 years, those who reported having an early onset psychiatric disorder had a higher cumulative probability of also having experienced a teenage birth compared to those without a psychiatric history [17]. In a birth cohort study of pregnant Japanese women, Takahashi et al. [14] found that depression and anxiety diagnoses were associated with increased likelihoods of reporting the current pregnancy as mistimed and unwanted, respectively. In our own recent community-based study of 992 18- to 19-year-olds in Michigan, we found effects of moderate/severe stress, and to a lesser extent depression, symptoms, on elevated rates of contraceptive nonuse, misuse, use of less effective methods, sexual intercourse activity, and unintended pregnancy over 1 year [13].

Collectively, this work has contributed some insight into whether depression may be an under-recognized risk factor for unintended pregnancy. However, prior studies have often been limited by methodological issues, including small sample sizes (Ns $<$100 to $<$1,000); retrospective, cross-sectional, or short follow-up ($<$1 year) designs; clinical or geographically constrained settings; a focus on pregnant or postpartum women alone; and samples lacking racial/ethnic and socioeconomic diversity [13–18]. Thus, the extent to which existing evidence can inform our understanding of and approaches to depression and unintended pregnancy using population data, life course perspectives, and social determinants of health frameworks has been limited.

We estimated the association between depression and risk of subsequent pregnancy, specifically first pregnancies reported as unintended, among a large, nationally representative cohort of U.S. adolescent and young adult women followed over a 15-year period. We further explored potential differences in the magnitude of the association by race/ethnicity and socioeconomic status. We hypothesized that: (1) higher levels of depressive symptoms would be associated with an increased risk of pregnancy, especially unintended first pregnancies; and (2) the magnitude of association between depression and unintended pregnancy would be greater for racial/ethnic minority young women and those from lower income backgrounds as compared to their socially advantaged counterparts.

## Methods

Data were drawn from the National Longitudinal Study of Adolescent to Adult Health (Add Health), a nationally representative, school-based, longitudinal cohort study of U.S. adolescents followed through adulthood [25]. Between 1994 and 1995, more than 90,000 students completed an In-School Questionnaire. A nationally representative core sample of adolescents (n = 12,105) was then randomly chosen for in-home interviews that were conducted with respondents in four survey waves in 1995 (wave 1 n = 20,745, participants from grades 7–12); 1996 (wave 2 n = 14,738, participants grades 8–12), 2001–2002 (wave 3 n = 15,197, participants aged 18–26 years); and 2008–2009 (wave 4 n = 15,701, participants aged 24–32 years).

We drew upon data from all four Add Health waves. For our analysis, 9,204 Add Health participants who self-identified as female and completed wave 1 and at least one additional wave of data collection were considered eligible for inclusion (89% of females from wave 1). Women were excluded if they had a history of pregnancy before wave 1 (n = 344) or if they had missing data on pregnancies or pregnancy intendedness (n = 50). Of the remaining 8,810 eligible women, 7,528 (85%) were last followed at wave 4, 838 (10%) at wave 3, and 444 (5%) at wave 2. In our bivariate and multivariable analyses, we also excluded 656 women reporting no history of sexual intercourse experience by wave 4. Data were weighted to adjust for the complex sampling design per Add Health guidelines (http://www.cpc.unc.edu/projects/addhealth/documentation/guides/wt-guidelines.pdf). Our analysis was approved by the Institutional Review Board of Emory University.

### *Measures*

Depressive symptoms were measured at each wave with the Center for Epidemiologic Studies Depression Scale (CES-D) (19-item scale in waves 1 and 2; 9-item scale, comprising a subset of the 19 items, in waves 3 and 4) [26]. We used the 9-item version to characterize depression exposure over time. Respondents were asked how often during the last 7 days, on a four-point Likert scale (0 never or rarely to 3 most of the time or all of the time), they felt the following depression symptoms: you were bothered by things that usually do not bother you; you could not shake off the blues, even with help from your family and your friends; you felt that you were just as good as other people (reverse); you had trouble keeping your mind on what you were doing; you felt depressed; you felt too tired to do things; you enjoyed life (reverse); you felt sad; and you felt that people disliked you. For each wave, responses were added for a total score, ranging from 0 to 27, with higher scores denoting higher levels of symptoms. Mean responses were imputed into missing items, but if women were missing more than five items for any particular wave, their depression score was set to the value of the score from the last available wave with nonmissing data. We examined depression as a time-varying primary independent variable in two ways: as continuous depression scores and as binary indicator of moderate/severe depression symptoms (using the threshold CES-D score of $\geq$10) versus $<$moderate symptoms (score $<$ 10) [27,28]. The CES-D has demonstrated good sensitivity, specificity, and high validity in adolescent and young adult samples and demonstrates strong internal consistency in the Add Health sample (wave 1 $\alpha$ = .82, wave 2 $\alpha$ = .83, wave 3 $\alpha$ = .83) [26].

Pregnancy: Our outcome of interest was time to first unintended pregnancy. Each wave included a series of items assessing women's pregnancy history. We relied primarily upon the wave 4 pregnancy table, which represents the most comprehensive pregnancy data for the entire study period. Respondents were first asked, "Have you ever been pregnant," which included any current or past pregnancies that ended in live birth, abortion, stillbirth, miscarriage, or ectopic/tubal pregnancy. Those who reported a history of pregnancy were then asked about the number of pregnancies, the specific dates that pregnancy(ies) ended (month and year), and pregnancy outcomes. Respondents were also asked about intendedness of the pregnancy(ies), "Thinking back to the time just before this pregnancy with {Partner}, did you want to have a child then," to which women