

# The Implications of Unintended Pregnancies for Mental Health in Later Life

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Despite decades of research on unintended pregnancies, we know little about the health implications for the women who experience them. Moreover, no study has examined the implications for women whose pregnancies occurred before *Roe v. Wade* was decided—nor whether the mental health consequences of these unintended pregnancies continue into later life. Using the Wisconsin Longitudinal Study, a 60-year ongoing survey, we examined associations between unwanted and mistimed pregnancies and mental health in later life, controlling for factors such as early life socioeconomic conditions, adolescent IQ, and personality. We found that in this cohort of mostly married and White women, who completed their pregnancies before the legalization of abortion, unwanted pregnancies were strongly associated with poorer mental health outcomes in later life. (*Am J Public Health*. 2016;106:421–429. doi: 10.2105/AJPH.2015.302973)

**B**ecause of its prevalence, potential consequences, and political salience, unintended pregnancy has been a source of significant research and policy concern for decades. Current estimates indicate that half (51%) of all US pregnancies are unintended,<sup>1</sup> and North America is the only region of the world in which rates have not declined in the past decade.<sup>2</sup> Strikingly, however, although a robust literature documents the well-being repercussions for women who terminate pregnancies, as well as the consequences for the well-being of children who result from unplanned pregnancies, we know relatively little about the ramifications for the well-being of women who continue unplanned pregnancies to term. Having a child and raising that child are key events in the life course. What are the long-term mental health implications for mothers who bear children resulting from unplanned pregnancies? Furthermore, do these implications differ according to whether the pregnancy was simply mistimed or unwanted altogether?

We addressed 2 key limitations of the research. First, the few previous investigations of pregnancy intention and mental health have focused on births that occurred after *Roe v. Wade* (1973). Because 40% of unintended pregnancies are terminated,<sup>1</sup> women who carried these children to term

after *Roe v. Wade* are different—and potentially different in ways that confound the relationship between unintended pregnancies and mental health outcomes.

Second, the studies have focused on the link between unintended pregnancies and mothers' mental health outcomes only when the children that resulted from these pregnancies were relatively young. We don't know if this influence on mental health is sustained into midlife. A large body of life course research shows how early life course experiences, such as poverty and family conflict, have independent and long-ranging effects on mental health in mid and later life.<sup>3–7</sup> More generally, we do know that children influence parental outcomes long after they become adults.<sup>8</sup> Consequently, having and raising a child of an unwanted pregnancy may result in similar long-lasting effects on mental health. For example, there is

evidence that some parents of children with disabilities don't start exhibiting higher levels of mental and physical health strains until they reach later life.<sup>9</sup> Evidence also suggests that the negative mental health effects associated with raising children are greater for mothers than for fathers.<sup>8–11</sup>

## UNINTENDED PREGNANCIES AND MATERNAL MENTAL HEALTH

Considering that half of pregnancies in the United States are unintended,<sup>1</sup> what are the mental health consequences for the women who continue these pregnancies? The large majority of the research focused on unintended pregnancies has attempted to document the effects of pregnancy intention on the health and development of infants and children—with poorer comparative outcomes found among children resulting from unintended pregnancies.<sup>12–20</sup>

The literature exploring the effect on the well-being of women who continue these unintended pregnancies to term is comparatively thin. Gipson et al. highlighted the “scarcity of studies on the effects of unintended pregnancy on the physical and mental health of men and women.”<sup>14(p30)</sup> When other researchers include women's health indicators in such research, they tend to focus on such behaviors as prenatal care seeking or smoking during pregnancy, that is, behaviors related to effects on newborn and infant health rather than women's well-being.

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This article was accepted October 27, 2015.

doi: 10.2105/AJPH.2015.302973

There are a few exceptions to the general inattention to the implications of unintended pregnancies for women's well-being. First, there is a body of scholarship that examines associations between mental health and pregnancies that end in abortion, the overwhelming majority of which are unintended. Reviews have found that the highest quality studies on this topic suggest few, if any, differences in either short-term or long-term mental health differences between women who had abortions and comparison groups.<sup>21–25</sup> The Turnaway Study provides more recent research, which suggests that after 3 years there was no strain on mental health as a result of abortions and that, in fact, women who were denied abortion services had a higher likelihood of an anxiety disorder diagnosis.<sup>25</sup> However, these studies have not yet had the ability to examine the mental health of women who give birth to unintended children over a longer period of time.

Second, there is a small group of studies that focused on pregnancy intention and short-term maternal mental health early in the life course, when the children were still young. These investigations found associations between unintended pregnancy and maternal depression during the pregnancy,<sup>26</sup> during the postpartum period,<sup>27</sup> and within the first 7 years of the birth.<sup>28</sup> With longitudinal data from the National Survey of Family and Households, Barber et al. explored the health effects of mothers with school-aged unintended children.<sup>20</sup> The authors found that mothers of unintended children aged 5 to 18 years were significantly more likely to be depressed and unhappy than were women whose children resulted from intended pregnancies. Although they controlled for a wide range of possible confounders, they could not account for how their findings were influenced by the fact that this cohort of women had access to legal abortion services.

## STUDY OBJECTIVES

We endeavored to fill the gaps in the literature by assessing later-life depressive symptoms and episodes among women who reported unwanted and mistimed pregnancies before *Roe v. Wade* was decided, while accounting for potential confounders,

including IQ, personality, and early socioeconomic factors. We used a data set uniquely positioned to examine women's longer-term well-being: the Wisconsin Longitudinal Study (WLS), a nearly 60-year-long longitudinal study of Wisconsin high school graduates from the class of 1957, which provides a distinctive opportunity to explore this question for 3 reasons.

First, unlike the cohorts in previous work on the effects of unwanted pregnancies, WLS respondents had experienced nearly all their pregnancies before the 1973 *Roe v. Wade* decision, which legalized abortion in Wisconsin for the first time. Most, if not all, of these women did not have the opportunity to terminate an unwanted pregnancy. Second, the study contains a broad range of prospectively measured items obtained before the births of participants' children, ranging from parental socioeconomic status to participants' sociopsychological characteristics, which could confound the relationship between unplanned pregnancies and later-life mental health outcomes. Finally, the longitudinal nature of these data allows us to explore the implications of these unwanted pregnancies for mental health outcomes in later life. No other data meet these criteria.

Our sample was limited to White and mostly married respondents, all of whom had at least a high school diploma, and we know that education, race/ethnicity, and marital status are significantly associated with the prevalence of unintended pregnancy.<sup>1</sup> Although our sample thus lacked important sociodemographic diversity, it can help us understand the implications of unwanted or mistimed pregnancies for those with greater social and economic resources to manage these pregnancies and the subsequent birth and childrearing.

## METHODS

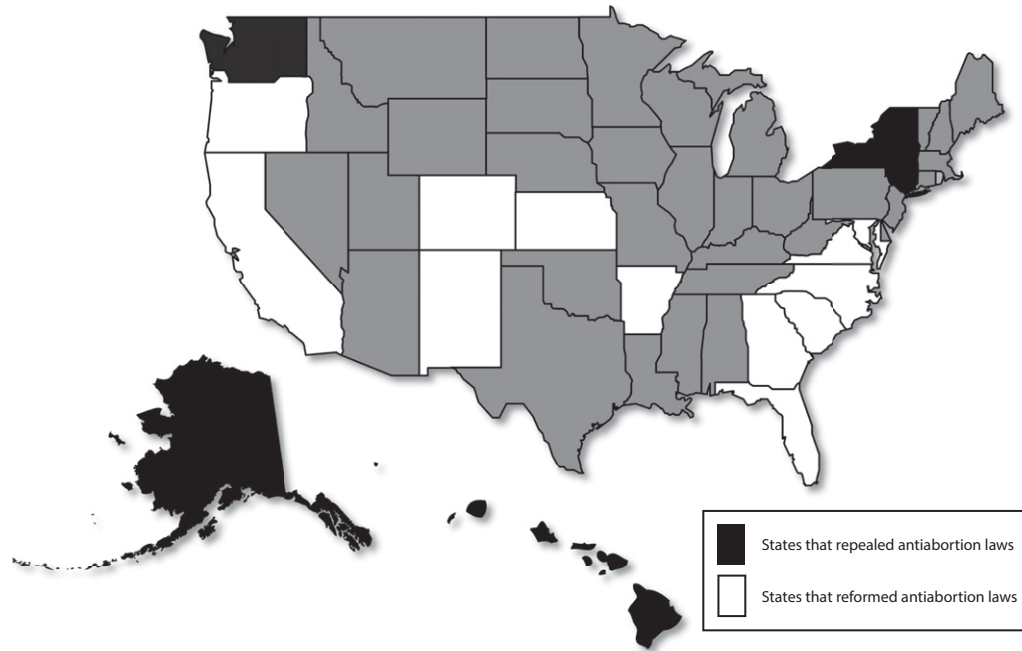
The WLS is grounded on a 1-in-3 sample of all 1957 Wisconsin high school graduates (n = 10 317) and the siblings of these graduates.<sup>29–31</sup> We conducted the statistical analyses using Stata version 14 (StataCorp, College Station, TX). Our sample included only the graduates, because siblings were not included in the survey until 1992 and thus did not report pregnancy intention data. Respondents are currently in their early 70s. Data

were collected on the graduates in 1957, 1964, 1975, 1993, 2004, and 2011; for this study, we drew on the first 4 rounds. The original WLS sample contained 5326 women, 4809 of whom (90%) were interviewed in 1975. The majority of these women (4199) had given birth to at least 1 child by the time of their interview in 1975. Among these women, 2749 had complete data on pregnancy intentions in 1975, the covariates, and the mental health outcome measures in 1992. A total of 287 respondents were deceased. The remaining missing data resulted from item nonresponse (n = 321) and nonresponse either to the survey or specifically to the mail instrument, which included the mental health measures (n = 842).

One primary advantage of the WLS for our analysis was its prospective data before women's pregnancies and births, 99% of which occurred before *Roe v. Wade*. Although abortion was accessible in some states before 1973 (Figure 1) and illegal abortions were available to some women, we can assume that the proportion of WLS respondents who sought abortions was exceedingly small. Joyce et al. estimate that, in the years before *Roe v. Wade*, abortion rates declined by 12% for every hundred miles a woman lived from New York or Washington.<sup>33</sup> Figure 1 shows Wisconsin's distance from states with more liberal abortion laws.

Another advantage of the WLS is its relative homogeneity: all its respondents graduated from high school, and by 1975, 94% had married and 92% of those who married had children. This homogeneity, in general, helps rule out a range of potential confounders. Speaking broadly, this is a sample of relatively socially advantaged respondents with comparatively strong educational, financial, and social resources. Of course, these are key characteristics that would predict both unplanned pregnancies and poorer mental health outcomes. Furthermore, WLS respondents are more likely to have carried those pregnancies to term and to have raised the children in their own families than was a sample of adolescent or unmarried women, who may have been more likely to have sought illegal abortions before *Roe v. Wade*.

Two central problems are inherent to nearly all the work that has examined the relationship between pregnancy intention and parental and child outcomes—problems



Source: Gold.<sup>32</sup>

**FIGURE 1—Abortion Availability Before *Roe v. Wade* (1973)**

we believe the WLS leaves us uniquely positioned to address. First, pregnancy intentions and health outcomes may be jointly determined by prepregnancy factors. For example, women who come from a lower socioeconomic background may be both more likely to have unintended pregnancies and more likely to be depressed. Second, retrospective bias in reporting the “wantedness” of a pregnancy might be of concern. This bias might relate to mothers’ characteristics: women with a more disagreeable personality might be more likely to be biased negatively in their reporting. Such retrospective bias could also relate to child characteristics. Something about the children—for example, their drain on a parent’s time and resources—could increase the probability that a mother would retrospectively report the pregnancy as unwanted and increase the propensity for her to be depressed.

No previous study has been able to account for such a broad range of confounding characteristics to address these concerns. The WLS, however, provides detailed information on both parents and children that allows us to account for the most plausible confounders. First, the WLS is the only study conducted on women experiencing

unintended pregnancies before legalized access to abortion. Second, the lifetime, longitudinal nature of these data allows us to account for a wide range of childhood and early adulthood characteristics that preceded these pregnancies and may be correlated with both the propensity for having an unintended pregnancy and depressive symptoms. It may be that individuals who were less diligent or careful might be both more likely to report an unintended pregnancy and more likely to be depressed. Hence, we controlled for IQ and academic performance in high school (both drawn from administrative data) and educational attainment.

We also account for a range of personality characteristics—which, to our knowledge, no previous study has done—that likely shape the propensity to report an unintended pregnancy and also influence depression. We are able to test whether periods of depression before pregnancies influence some of our findings. Although it is possible that economic factors associated with having an additional child are associated with reporting both unintended pregnancies and depression, we have a range of socioeconomic measures to account for this possibility. Religious affiliation and participation could confound the

estimates, and WLS contains extensive measures of these things. Finally, we can test for the potential that the characteristics of children themselves, who were young when questions on pregnancy intention were asked, might have influenced the women’s reporting on pregnancy intention.

Our key variable of interest was whether women had mistimed, unwanted, or planned pregnancies. In 1975, all women in the WLS, who were approximately aged 36 years, were asked about up to 4 pregnancies. In addition to questions about birth dates and pregnancy outcomes, for each live birth, respondents were asked, “Before you became pregnant, did you want to become pregnant at that time?” And if they reported no, they were asked, “Did you want to have another baby sometime?” If an individual reported yes to the first question, we coded the pregnancy as planned. If the individual responded no to the first question and yes to the second question, we coded the pregnancy as mistimed. If the individual responded no to the first question and no to the second question, we coded the pregnancy as unwanted.

By not asking the respondent directly whether a specific pregnancy was “unwanted”

but rather whether she wanted to have another baby “sometime,” this question design reduced the possibility of social stigma or guilt influencing the response to the question. We then coded the outcome variable as follows. If an individual had at least 1 unwanted pregnancy—even if she also had a mistimed pregnancy—we classified her as having an unwanted pregnancy. We classified women who had 1 or more mistimed pregnancies—but no unwanted pregnancies—as having had a mistimed pregnancy. We classified those who had only planned pregnancies (neither mistimed nor unwanted) as having planned pregnancies. We generated these responses into dummy variables in which the reference category was a planned pregnancy. This coding is relatively standard<sup>20</sup>; however, we performed sensitivity analyses that demonstrate that the substantive findings do not change with alternative specifications.

The key outcome of interest in this study is mental health. The mental health measures we employed were collected in 1992, when respondents were approximately aged 53 years, and included the following:

1. A subset of items from the Center for Epidemiologic Studies–Depression (CES-D) scale, a short self-report scale that measured current level of depressive symptomatology, with an emphasis on negative affect.<sup>34</sup> The internal consistency of these items in the WLS ranged from 0.88 to 0.92.
2. Self-report of ever experiencing a serious episode of depression, as captured by responses to the following question: “Have you ever had a time in life lasting two weeks or more when nearly every day you felt sad, blue, depressed, or when you lost interest in most things like work, hobbies, or things you usually liked to do for fun?” We did not count those who reported that their serious episodes of depression were always a product of physical illness or drugs or alcohol, because these individuals are considered to have substance abuse disorders or physical illnesses.

Our primary outcome measure was the CES-D scale. We employed the reporting of a serious episode of depression as

a sensitivity measure. This item allowed us to test whether—or the extent to which—early life depression confounds the findings. The random 80% of individuals who answered this item also reported the age at which they experienced their first serious episode of depression. We thus excluded these individuals from our analysis to test the potential influence of this group on the findings.

The WLS contains a wealth of early life measures, collected prospectively before the reported pregnancies that help us account for factors that might confound the relationship between pregnancy intendedness and mental health. Early life socioeconomic and cognitive resources, early adult educational attainment, social context, fertility history, religiosity, and personality may influence whether an individual reports a pregnancy as intended or unintended and may also influence later-life mental health.

The first childhood measure was parental socioeconomic status, which was a scale derived from

1. the highest number of years of schooling of the respondent’s mother and father;
2. the 4-year average of parental income, derived from 1957–1960 Wisconsin tax records;
3. the socioeconomic index occupational score for the father of the respondent<sup>35</sup>;
4. whether the respondent’s mother worked; and
5. whether the respondent was ever in a single-parent household as a child.

The second childhood measure is IQ, which was derived from an administrative measure: the Henmon Nelson Test of Mental Ability was administered to all high school students in Wisconsin. The year students took the test varied over time, but most scores employed in the WLS are from the student’s junior year or are adjusted to reflect what their junior scores would be. These scores were then renormed to IQ equivalents on the basis of the percentile distribution of scores that were observed among all Wisconsin high school juniors in 1951. The third childhood measure was the students’ high school rank. High school rank is a percentile rank on the basis of high school grades ( $100 - [\text{rank in class} / (\text{no. of students in class} \times 100)]$ ).

Although high school rank and IQ are correlated (0.58), meaningful variation exists. High school rank, after controlling for IQ, does seem to capture some latent elements of personality (e.g., conscientiousness). This phenomenon is useful because the personality measures we employed were collected in 1992.

The first adulthood measure is educational attainment, which was assessed in 1964 and captures the number of years of postsecondary schooling. Additional variables collected in 1975 include the respondent’s age at her first pregnancy, the number of children born to the respondent, and the respondent’s marital status. Nearly all the women in the sample were married, so we classified respondents as either married or unmarried. A measure captures the size of the town the respondent lived in in 1975 because of concerns that individuals in small towns may have been more likely to have difficulty accessing birth control. In this period, although contraception was legal, it may be that in small towns, where one knew the pharmacist, social stigma factors reduced the probability that someone sought oral contraceptives. Finally, a measure from 1975 captures how frequently individuals attend a religious service on average over the course of the year. We included this as a potential confounder because religiosity is correlated with mental health and could be correlated with fertility patterns and contraceptive use—at least in this era.<sup>36,37</sup>

The final control variables were the Big Five personality measures (agreeableness, conscientiousness, extraversion, neuroticism, and openness), which are widely used scales of personality.<sup>38</sup> These measures were first collected in a 1992 mail survey. Although evidence exists that personality shifts slightly as individuals age, for the purposes of these analyses, the fact that an individual’s place in the relative distribution does not seem to shift assures us that this does not present a significant issue for our models.

Table 1 provides a summary of the descriptive characteristics of the sample broken down by whether these women had only planned pregnancies, any unwanted pregnancies, or any mistimed pregnancies. Women with unwanted pregnancies have a 3- or 4-point higher CES-D score than do women with mistimed pregnancies and only planned pregnancies, respectively. Women with unwanted pregnancies were also more

TABLE 1—Descriptive Characteristics of the Sample: Wisconsin Longitudinal Study, 1957, 1964, 1975, 1993

Variable	Women With Only Planned Pregnancies (n = 1218), Mean ±SD	Women With at Least 1 Unwanted Pregnancy (n = 563), Mean ±SD	Women With at Least 1 Mistimed Pregnancy (n = 966), Mean ±SD
<b>Outcomes</b>			
CES-D summary score	16.2 ±15.3	20.3 ±19.5	17.3 ±15.9
Experienced a significant depressive episode	25.5 ±43.6	33.2 ±47.1	29.3 ±45.5
<b>Childhood measures</b>			
High school rank, percentile	60.5 ±26.9	59.0 ±26.7	61.2 ±26.0
Parental socioeconomic status <sup>a</sup>	17.1 ±11.8	14.0 ±8.7	16.2 ±10.8
IQ <sup>b</sup>	102.2 ±14.3	101.1 ±14.1	102.5 ±14.1
<b>Adulthood measures</b>			
Years of respondent's education in 1964	13.4 ±1.8	12.9 ±1.5	13.2 ±1.7
Respondent's age at her first birth	24.4 ±3.7	21.9 ±2.5	22.2 ±2.6
Town size of residence in 1970, 100s	107.3 ±409.0	99.6 ±281.6	110.2 ±366.5
No. of children in 1975	2.6 ±1.2	3.8 ±1.3	3.2 ±1.3
Frequency of religious attendance, times per month	3.2 ±1.6	3.1 ±1.7	3.1 ±1.7
% with depressive episode before her first pregnancy <sup>c</sup>	2.1 ±14.3	2.5 ±15.7	1.3 ±11.5
<b>Personality measures<sup>d</sup></b>			
Extroversion	23.7 ±5.4	22.6 ±5.4	23.5 ±5.4
Agreeableness	29.7 ±4.1	29.1 ±4.2	29.3 ±4.1
Conscientiousness	29.5 ±4.0	28.9 ±4.2	29.1 ±4.1
Neuroticism	16.5 ±5.0	17.1 ±5.0	16.4 ±4.9
Openness	22.0 ±5.1	21.3 ±4.8	21.9 ±4.8

Note. CES-D = Center for Epidemiologic Studies-Depression. We counted individuals with any unwanted pregnancies as having had an unwanted pregnancy. We classified individuals who had only mistimed pregnancies as mistimed.

<sup>a</sup>Factor-weighted summary score range = 0–100.

<sup>b</sup>Score mapped from Henmon Nelson test range = 61–145.

<sup>c</sup>Data on the time of the first depressive episode are available for 70% of the estimation sample.

<sup>d</sup>Each personality item is a summary score with a possible range of 0–36.

likely to report having experienced a serious depressive episode. Table 1 also presents differences across these groups on the model control variables.

Overall, just under one half of these women (47%) had at least 1 mistimed pregnancy and just over 1 in 5 (21%) had at least 1 unwanted pregnancy. Although not presented in Table 1, cumulatively, women reported a total of 11 789 pregnancies, 34% of which they classified as unintended. Among unintended pregnancies, 71% were mistimed and 29% were unwanted. Table 1 does show some, albeit not large, differences across these groups, especially in regard to early life and socioeconomic measures. Hence, we included these variables in the regression analyses.

In addition to our ability to account for the most plausible confounders for these estimates, some basic descriptive differences in the data are reassuring. The most striking descriptive result, and the strongest predictor

of unintended pregnancies in regression models by large orders of magnitude, is that unintendedness (and especially unwanted pregnancies) increased as birth order increased (Table A, available as a supplement to the online version of this article at <http://www.ajph.org>). Whereas only 2% of first pregnancies were unwanted, 40% of last pregnancies were unwanted. Inversely, the proportion of mistimed pregnancies declined with birth order. Whereas 27% of first pregnancies were mistimed, about 16% of last pregnancies were mistimed. In short, the women reporting unwanted pregnancies appear to have been done with having children but then became pregnant again. Second, we found that individuals who reported a pregnancy as mistimed, versus planned or unwanted, had a previous pregnancy an average of 22 months earlier compared with 34 and 38 months, respectively, for planned and unwanted pregnancies.

Regarding the statistical models for these analyses, for the CES-D outcome we employed a standard ordinary least square regression. We accounted for the range of childhood, early adulthood, and personality characteristics. We used logit models, displaying odds ratios (ORs) in the findings, for the serious episode of depression outcome. We employed the same set of covariates as the models with CES-D as an outcome. We conducted these analyses on a smaller sample of individuals—a random 80% subset that received the depression symptoms instrument. We excluded individuals who reported a serious depressive episode before their first pregnancy from the analysis.

## RESULTS

Results suggest a strong and persistent relationship between having an unwanted pregnancy resulting in a live birth and poorer

later-life mental health outcomes, even when controlling for other variables likely to affect both pregnancy intention and mental health; these included personality and a range of potential early life and prepregnancy confounders. As Table 2 demonstrates, those who had at least 1 unwanted pregnancy had significantly higher CES-D scores ( $b = 2.36$ ; 95% confidence interval [CI] = 0.59, 4.14) than did those reporting planned pregnancies. To provide a sense of magnitude, other factors predictive of depressive symptoms, such as having a college degree versus a high school diploma or differences between those married and unmarried, are of similar magnitude as having an unwanted pregnancy. The difference between planned and mistimed pregnancies was not statistically significant.

Table 3 presents similar findings. On the basis of the results from a logit model,

those with an unwanted pregnancy were more likely to have reported a significant episode of depression (lasting 2 weeks or more) than were those with all wanted pregnancies (i.e., those who classified all their pregnancies as planned). We excluded those who reported that they had a depressive episode that preceded the birth of their children (or in sensitivity analyses preceded the birth of their last child) from these analyses. The exclusion of these cases had little impact on the findings. The coefficients in Table 3, estimated from a logit model, are expressed as ORs. Women with unwanted pregnancies had 1.42 greater odds (95% CI = 1.07, 1.88) of having a depressive episode than did women who had planned pregnancies. Those with planned pregnancies were more likely to report a depressive episode than were those with mistimed

pregnancies, but this relationship was only marginally significant.

We conducted a range of additional sensitivity analyses not presented here. Because religious belief was positively correlated with the probability of having an unintended pregnancy, we ran models that included a range of measures to capture this factor as a potential confounder. In addition to frequency of religious attendance included in our models, we accounted for affiliation, especially being Catholic, because of the stance of the Catholic Church regarding birth control. Doing so had no effect on the outcomes. We suspect these variables had little influence on the findings, possibly because of generally lower rates of depression among those with strong religious beliefs.

We also conducted sensitivity analyses for how we classified unwanted and mistimed pregnancies. We ran models that separated out individuals who had both unwanted and mistimed pregnancies. The central finding that having an unwanted pregnancy is positively correlated with depression remained regardless of adjustments in how this measure was coded. We also ran models that accounted for whether individuals had multiple mistimed pregnancies or multiple unwanted pregnancies. A small fraction of individuals fell into these categories. Individuals who had multiple unwanted pregnancies did not drive the estimate for unwanted pregnancies.

## DISCUSSION

We examined pregnancies resulting in live birth before *Roe v. Wade* and found persistent negative mental health effects for those with unwanted pregnancies. These included higher levels of depressive symptoms and a greater propensity to have had a significant episode of depression for the women who carried unwanted pregnancies to term—even after controlling for potential confounders. Confounders included early life socioeconomic status, high school academic performance, IQ, and personality. Differences in mental health between women with mistimed pregnancies and women with only planned pregnancies were not statistically significant.

The overwhelming majority of previous research on the health effects of unintended

**TABLE 2—Linear Regression Analysis of the Determinants of Later-Life CES-D Scores: Wisconsin Longitudinal Study, 1957, 1964, 1975, 1993**

Variable	b (95% CI)
<b>Type of pregnancy<sup>a</sup></b>	
Planned (Ref)	1
Unwanted	2.36 (0.59, 4.14)
Mistimed	0.76 (-0.51, 2.03)
<b>Childhood measures</b>	
High school rank, percentile	0.003 (-0.03, 0.03)
Parental socioeconomic status <sup>b</sup>	-0.03 (-0.08, 0.02)
IQ <sup>c</sup>	-0.08 (-0.13, -0.03)
<b>Adulthood measures</b>	
Years of education in 1964	-0.37 (-0.75, 0.03)
Age at her first birth	0.13 (-0.07, 0.33)
Married in 1975	-2.52 (-4.95, -0.10)
No. of children in 1975	0.05 (-0.44, 0.54)
Town size of residence in 1970, in 100s	0.001 (-0.001, 0.002)
Frequency of religious attendance in 1975, times per month	-0.29 (-0.65, 0.07)
<b>Personality<sup>d</sup></b>	
Extroversion	-0.43 (-0.55, -0.31)
Agreeableness	-0.41 (-0.56, -0.26)
Conscientiousness	-0.51 (-0.68, -0.34)
Neuroticism	0.98 (0.84, 1.12)
Openness	-0.02 (-0.15, 0.10)
Constant	51.43 (40.45, 62.41)

Note. CI = confidence interval; CES-D = Center for Epidemiologic Studies-Depression. The population size was  $n = 2749$ .  $R^2 = 0.25$ .

<sup>a</sup>We counted individuals with any unwanted pregnancies as having had an unwanted pregnancy. We classified individuals who had only mistimed pregnancies as mistimed.

<sup>b</sup>Factor-weighted summary score range = 0–100.

<sup>c</sup>Score mapped from Henmon Nelson test range = 61–145.

<sup>d</sup>Each personality item is a summary score with a possible range of 0–36.

**TABLE 3—Logistic Regression Analysis of the Determinants of Experiencing a Serious Depressive Episode: Wisconsin Longitudinal Study, 1957, 1964, 1975, 1993**

Variable	OR (95% CI)
<b>Type of pregnancy<sup>a</sup></b>	
Planned (Ref)	1
Unwanted	1.42 (1.07, 1.884)
Mistimed	1.24 (0.98, 1.569)
<b>Childhood measures</b>	
High school rank, percentile	0.995 (0.990, 1.000)
Parental socioeconomic status <sup>b</sup>	1.01 (0.996, 1.02)
IQ <sup>c</sup>	1.02 (1.01, 1.02)
<b>Adulthood measures</b>	
Years of education in 1964	0.95 (0.88, 1.03)
Age at her first birth	0.99 (0.95, 1.03)
Married in 1975	0.76 (0.50, 1.13)
No. of children in 1975	0.96 (0.878, 1.05)
Town size of residence in 1970, in 100s	1.00 (1.00, 1.00)
Frequency of religious attendance in 1975, times per month	0.96 (0.90, 1.02)
<b>Personality<sup>d</sup></b>	
Extroversion	0.97 (0.95, 0.99)
Agreeableness	0.98 (0.96, 1.01)
Conscientiousness	0.97 (0.94, 0.997)
Neuroticism	1.06 (1.04, 1.09)
Openness	1.05 (1.02, 1.07)

Note. CI = confidence interval; OR = odds ratio. Population size was  $n = 2127$ .  $R^2 = 0.041$ .

<sup>a</sup>We counted individuals with any unwanted pregnancies as having had an unwanted pregnancy. We classified individuals who had only mistimed pregnancies as mistimed.

<sup>b</sup>Factor-weighted summary score range = 0–100.

<sup>c</sup>Score mapped from Henmon Nelson test range = 61–145.

<sup>d</sup>Each personality item is a summary score with a possible range of 0–36.

pregnancy focuses on infants' and children's well-being or women's health behaviors during pregnancy.<sup>14</sup> Our study adds to a small body of research suggesting that health effects on women themselves may be both notable and persistent. In their longitudinal study of the health effects of mothers of school-aged unintended children, Barber et al. also found that reports of pregnancy unintendedness were associated with women's depression and (lack of) happiness in their 30s<sup>20</sup>

However, unlike Barber et al., we focused on women in their early 50s, whose children have largely left home. Further, and most importantly, our data allowed us to explore this relationship for women who, to the best of our knowledge, were overwhelmingly unable to seek legal abortions for their unintended pregnancies, thus substantially reducing the selection issues that have marred previous studies. Because currently 40% of all

unintended pregnancies are terminated,<sup>1</sup> potential confounding issues challenge research examining the relationship between continuing unwanted pregnancies to term and mental health outcomes among mothers who were of childbearing age *after Roe v. Wade*. In short, these data allowed us to examine this question in the context of a cohort that generally could not terminate pregnancies safely or legally.

Our findings add to a large body of literature suggesting that unwanted versus mistimed pregnancies can create tangibly different experiences for women, although they are almost always grouped together under the larger "unintended" banner. Although we are hardly the first to underline the important difference between mistimed and unwanted pregnancies,<sup>39</sup> we considered that difference from a cohort-specific life course perspective. Especially for the cohort of women in the WLS, unwanted pregnancies

were more likely to be third-, fourth-, and higher-order pregnancies that occurred after women thought they had completed their childbearing. And although we can't rule out the possibility that some women reported these pregnancies as mistimed rather than unwanted because of social pressures, the survey question design substantially reduced this possibility. Moreover, the average birth spacing leading to pregnancies classified as mistimed (22 months) compared with unwanted (38 months) varied as would be expected, suggesting the validity of our intention measure.

Our goal was to examine the relationship between unintended pregnancies and mental health in later life, which is a significant contribution because of the very limited research on the topic. Although it was beyond the scope of our study to explore the specific life course pathways that might help explain the link between unwanted pregnancies and poorer later-life mental health, the literature on the relationship between parenting and mental health provides some potential clues. First, children are taxing. Indeed, Bird and Fremont have documented that time spent caring for children reduces women's overall health.<sup>40</sup> At a basic level, raising a child who arrived after a woman thought she was done with childbearing extends the amount of time she spends as a caretaker. The link between caretaking and well-being can be strongly gendered in many heterosexual relationships.

For example, Bird found that the social and economic burdens of caring for children are associated with increased anxiety and depression for mothers more than for fathers.<sup>10</sup> Nomaguchi and Milkie documented that parental status has far less effect on (heterosexual) married men's health and social well-being than on women's.<sup>11</sup> Second, evidence suggests that unintended births may lead to poorer quality relationships between parents and children and thus negatively influence parental well-being.<sup>20</sup> Finally, unwanted children could lead to delayed entry back into the labor market for mothers and thus negatively influence their economic security and employment opportunities, which in turn could negatively influence mental health. Preliminary analyses with WLS data, however, did not provide evidence that unwanted or mistimed

pregnancies were correlated with lower labor force participation or earnings among these women all the way into their early 60s. Further research should attempt to delineate potential pathways.

## Limitations and Strengths

Our findings must be considered in light of at least 4 study limitations. First, our data do not indicate with certainty whether these women had ever obtained an abortion. Estimates do indicate that the number of Wisconsin women who sought abortions before *Roe v. Wade* was very small—among the smallest in the country.<sup>33</sup> Moreover, because our respondents were almost all married and had children (only 2% reported that their first pregnancy was unwanted), abortions among this cohort were even more unlikely. Nonetheless, we cannot rule out this possibility.

Second, our sample was limited to White and mostly married respondents, all of whom had at least a high school diploma, and we know that education, race/ethnicity, and marital status are all significantly associated with the prevalence of unintended pregnancy.<sup>1</sup> Although our sample thus lacked important sociodemographic diversity, it also had the advantage of providing a fairly homogenous cohort in which to explore the long-term effects of pregnancy intention. Because this sample of women had relatively strong social, educational, and financial resources to cope with this unwanted life event, our findings may be conservative. For example, unintended births to single mothers would likely be more exhausting and emotionally burdensome than would unintended births to married women, plausibly leading to larger effects. Most research focused on stress and mental health finds that cumulative stress matters.<sup>41</sup> For already disadvantaged groups, an additional and significant stressor would likely have a greater impact because of the lack of modifying resources to offset the source of stress.

Third, the WLS collected pregnancy intention status from women only. However, research now shows men's intentions to be associated with their involvement in pregnancy outcomes and parenting.<sup>42–44</sup> We encourage future researchers to explore associations between pregnancy intentions

(as reported by both people involved) and the health and well-being of both women and men.

Finally, despite sensitivity analyses and inclusion of important prepregnancy factors in our analyses, we cannot rule out the possibility that there is an unobserved confounder that we have not identified. However, the WLS data allowed us to account for the range of potential confounders far better than previous research on the topic could. In short, we were able to account for the most plausible confounders that would undermine these findings—including prospectively or administratively measured early life economic and social conditions, high school academic performance, IQ, religious affiliations, depression before childbearing, and personality. Sensitivity tests largely demonstrated that the primary determinant of an unwanted pregnancy was that it was a higher-order pregnancy. Nonetheless, we cannot rule out, for example, that there were differences in mental health that we were unable to capture that made women more likely either to classify a birth as unwanted (as opposed to mistimed) or to have an unwanted birth.

Nonetheless, to our knowledge this is the only study conducted on women continuing unintended pregnancies before legalized access to abortion. Because 40% of unintended pregnancies are terminated, the fact that we are not dealing with that selection is a very large advantage. Moreover, recent findings from the Turnaway Study, which comes as close as possible to a random experiment, found that women were at greater risk for an anxiety disorder 3 years after having an unwanted pregnancy than were those who terminated an unwanted pregnancy.<sup>25</sup>

## Conclusions

Experiencing unwanted pregnancies, especially after a woman or couple has reached a desired number of children, appears to be strongly associated with poor mental health effects for women later in life. We encourage researchers and policymakers to attend to the importance of unintended pregnancies and childbearing in both their understandings of women's short- and long-term well-being and their justification for widely available clinical services that help women prevent and

terminate unwanted pregnancies. Moreover, the findings from this study point to the need to provide better supports for women who choose to continue unwanted pregnancies to term because of the increased risk for negative mental health consequences. **AJPH**

## CONTRIBUTORS

P. Herd designed and oversaw the analyses and wrote the article. J. Higgins contributed to the study design and the writing of the article. K. Sicinski contributed to the study design and conducted the analyses. I. Merkurieva contributed to the data analysis.

## ACKNOWLEDGMENTS

The authors would like to acknowledge the feedback on these analyses from presentations of the work at Duke University, University of Wisconsin–Madison, and the Population Association of America Annual Meeting.

## HUMAN PARTICIPANT PROTECTION

The University of Wisconsin–Madison institutional review board approved this study.

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