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Women's Mental Health and Well-being 5 Years After Receiving or Being Denied an Abortion
A Prospective, Longitudinal Cohort Study

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IMPORTANCE The idea that abortion leads to adverse psychological outcomes has been the basis for legislation mandating counseling before obtaining an abortion and other policies to restrict access to abortion.

OBJECTIVE To assess women's psychological well-being 5 years after receiving or being denied an abortion.

DESIGN, SETTING, AND PARTICIPANTS This study presents data from the Turnaway Study, a prospective longitudinal study with a quasi-experimental design. Women were recruited from January 1, 2008, to December 31, 2010, from 30 abortion facilities in 21 states throughout the United States, interviewed via telephone 1 week after seeking an abortion, and then interviewed semiannually for 5 years, totaling 11 interview waves. Interviews were completed January 31, 2016. We examined the psychological trajectories of women who received abortions just under the facility's gestational limit (near-limit group) and compared them with women who sought but were denied an abortion because they were just beyond the facility gestational limit (turnaway group, which includes the turnaway-birth and turnaway-no-birth groups). We used mixed effects linear and logistic regression analyses to assess whether psychological trajectories differed by study group.

MAIN OUTCOMES AND MEASURES We included 6 measures of mental health and well-being: 2 measures of depression and 2 measures of anxiety assessed using the Brief Symptom Inventory, as well as self-esteem, and life satisfaction.

RESULTS Of the 956 women (mean [SD] age, 24.9 [5.8] years) in the study, at 1 week after seeking an abortion, compared with the near-limit group, women denied an abortion reported more anxiety symptoms (turnaway-births, 0.57; 95% CI, 0.01 to 1.13; turnaway-no-births, 2.29; 95% CI, 1.39 to 3.18), lower self-esteem (turnaway-births, −0.33; 95% CI, −0.56 to −0.09; turnaway-no-births, −0.40; 95% CI, −0.78 to −0.02), lower life satisfaction (turnaway-births, −0.16; 95% CI, −0.38 to 0.06; turnaway-no-births, −0.41; 95% CI, −0.77 to −0.06), and similar levels of depression (turnaway-births, 0.13; 95% CI, −0.46 to 0.72; turnaway-no-births, 0.44; 95% CI, −0.50 to 1.39).

CONCLUSIONS AND RELEVANCE In this study, compared with having an abortion, being denied an abortion may be associated with greater risk of initially experiencing adverse psychological outcomes. Psychological well-being improved over time so that both groups of women eventually converged. These findings do not support policies that restrict women's access to abortion on the basis that abortion harms women's mental health.

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Supplemental content

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In 1989, the US Surgeon General concluded that "the scientific studies [to date] do not provide conclusive data about the health effects of abortion on women"[1(pg32)] and recommended a prospective, 5-year, longitudinal cohort study to provide the necessary conclusive data on the topic. Since then, numerous studies and reviews on this topic have found no evidence that abortion leads to negative mental health outcomes, yet they have also pointed to the many limitations of the existing literature and the need for more rigorous, prospective longitudinal studies on this topic.[2-8] Studies finding a negative effect on women's mental health owing to abortion have been critically refuted.[6,9-11]

Nonetheless, the assumption that women experience adverse mental health outcomes owing to abortion has been the basis for legislation seeking to mandate counseling before obtaining an abortion[12] and other policies to restrict access to abortion.[13] Currently, 9 states require that women seeking an abortion be counseled on the negative psychological and emotional responses to abortion.[14]

The Turnaway Study is a prospective, longitudinal study that, for 5 years, observed women who obtained and women who were denied a wanted abortion. The Turnaway Study improves on the methodological shortcomings found in the previous literature[4] by taking into account preexisting mental health conditions and examining both possible outcomes of an unwanted pregnancy—abortion and carrying the pregnancy to term. Previous publications using mid-study findings from the Turnaway Study have demonstrated that abortion does not increase women's risk of experiencing symptoms of posttraumatic stress,[15] depression,[16,17] or anxiety,[16,17] or of experiencing lower self-esteem or life satisfaction.[18] However, some have argued that the negative psychological effects of abortion are delayed or occur over the longer term.[13,19] Our study presents all 5 years of data from the Turnaway Study assessing the association of having an abortion with women's mental health and well-being.

Key Points

Question Are there associations between having or being denied an abortion with women's mental health and well-being?

Findings This longitudinal cohort study observed 956 women semiannually for 5 years. Eight days after seeking an abortion, women who were denied an abortion reported significantly more anxiety symptoms and lower self-esteem and life satisfaction, but similar levels of depression, as women receiving abortions; outcomes improved or remained steady over time.

Meaning Abortion denial may be initially associated with psychological harm to women and findings do not support restricting abortion on the basis that abortion harms women's mental health.

Methods

Study Design

This analysis includes all 5 years (11 interview waves) of data from the Turnaway Study.[20,21] The study protocol is available in Supplement 1. Abortion facilities with the latest gestational limit of any other facility within 150 miles were eligible recruitment sites. Thirty-one abortion facilities representing a range of geographical regions were identified as recruitment sites using data from the National Abortion Federation and professional contacts. All but 2 of the identified facilities agreed to participate. One facility was replaced with a facility with a similar catchment area and similar patient volume. Women were recruited from January 1, 2008, to December 31, 2010, from 30 abortion facilities located in 21 states throughout the United States. Interested prospective participants were connected to researchers at the University of California, San Francisco by telephone, informed consent was obtained orally, and an interview was scheduled 1 week later. Women were first interviewed by telephone 8 days after having or being denied an abortion, and then every 6 months for 5 years. Interviews were completed on January 31, 2016. The structured interview guide contained questions about demographics, physical and mental health, childbearing experiences and intentions, and history of traumatic life events. The gestational limits of the 30 final participating facilities ranged from 10 weeks through the end of the second trimester. This study was approved by the University of California, San Francisco, Institutional Review Board.

Study Participants

To be eligible, participants needed to speak English or Spanish, be 15 years or older, and have had no known fetal anomalies or demise or maternal health indications for abortion. Women were recruited into 3 study groups in a 2:1:1 ratio. These groups were women whose pregnancy was within 2 weeks under a facility's gestational limit who presented and received an abortion (near-limit group; n = 452), women whose pregnancy was up to 3 weeks past a facility's gestational limit who presented and were denied an abortion (turnaway group; n = 231), and women who received a first-trimester abortion (first-trimester group; n = 273). The first-trimester group served to assess whether outcomes differed among women who seek abortions earlier vs later in pregnancy. The turnaway group was further divided into those who gave birth (turnaway-birth group; n = 161) and those who miscarried or later had an abortion elsewhere (turnaway-no-birth group; n = 70). The gestational age limits of each recruitment site varied, so there was some overlap in gestational ages between study groups.

Outcome Variables

Using validated scales, we examined 4 mental health and 2 psychological well-being outcome measures. Mental health outcomes included 2 measures of depression and 2 measures of anxiety. Depression and anxiety symptoms were assessed using the Brief Symptom Inventory depression and anxiety subscales, where respondents are asked to indicate the intensity of distress felt in the past 7 days.[22] Each of the 2 subscales includes 6 items, measured on a 5-point Likert scale ranging from 0 (not at all) to 4 (a great deal). Total subscale scores range from 0 to 24. To identify clinically relevant cases of depression and anxiety, we

categorized women with depression and anxiety scores of 9 or more as a case of depression or anxiety, respectively.

Well-being outcomes included self-esteem and life satisfaction. Self-esteem was assessed using a 1-item measure of global self-esteem, which has been validated as an alternative approach to the Rosenberg self-esteem scale.[23] One item from the 5-item Satisfaction With Life Scale was selected to measure life satisfaction.[24] For both measures of well-being, participants were asked to "describe how well the following statements describe how you have been feeling in the last 7 days, including today." These 2 statements were "Felt high self-esteem" and "Felt satisfied with your life." Participants responded to these 2 items on a 5-point scale, ranging from 1 (not at all) to 5 (extremely). Response categories were slightly altered from the original items to achieve consistency between items.

Independent Variables

Study group, time (years since seeking abortion), and study group by time interactions served as the primary independent variables. Study groups included the near-limit group, which was the reference group; the turnaway-birth group, our main comparison group; the turnaway-no-birth group; and the first-trimester group. The 15 women in the turnaway group who placed their newborns for adoption are included in the turnaway-birth group.

Covariates

Control variables consisted of baseline characteristics known to be associated with our outcomes. They included age, self-reported race/ethnicity (white, black, Hispanic or Latina, and other), highest educational level (less than high school, high school or equivalent, associate degree or technical school or some college, and college degree or higher), marital status, employment (full-time or part-time), parity, history of child abuse or neglect, history of depression or anxiety diagnosis, prepregnancy illicit drug use, and prepregnancy problem alcohol use (drinking first thing in the morning or inability to remember what happened after drinking).

Statistical Analysis

All analyses were performed using Stata, version 14 (StataCorp). $P < .05$ (2-tailed) was considered statistically significant. Baseline differences between the near-limit group and the other 3 study groups were assessed using mixed effects regression analyses to account for clustering by site. An omnibus postestimation test was performed to accommodate multiple category associations. For longitudinal models, to assess whether outcome trajectories differed by study group, we used mixed effects linear (for continuous outcomes) and logistic (for dichotomous outcomes) regression analyses. We flexibly modeled trajectories by testing whether including quadratic or cubic terms for time or random slopes for individuals improved the model fit and included them if indicated by a significant ($P < .05$) likelihood ratio test. We estimated whether trajectories changed over time or differed by study group via a postestimation test using the *lincom* and *testparm* commands in Stata. Longitudinal models adjusted for baseline covariates that could potentially confound the association between the independent variables and model outcomes. Unadjusted results are in eTable 1 in Supplement 2. Gestational age (number of weeks pregnant at the time of the interview) was excluded because it was highly correlated with group owing to the study design. To graph our model results, we estimated the marginal probability of each outcome by study group at 6-month intervals. The benefit of mixed-effects models is that they produce unbiased estimates even when some individuals have missing observations, adjust for differential loss to follow-up, accommodate irregular time measurement, and account for clustering by sites and individuals, as required for our panel data.

We conducted 2 sets of sensitivity analyses to test the robustness of our results. The first set aimed to assess the effect of the recruitment rate on the results by limiting all adjusted analyses to the 464 women from the 11 sites with a recruitment rate of 50% or greater. The second set aimed to assess the effect of adoption by excluding the 15 women in the turnaway-birth group who placed their newborns for adoption.

Results

A total of 1132 of 3016 eligible participants approached (37.5%) consented to participate. A total of 956 women (84.5%) completed the baseline interview, with an average of 5% lost from wave to wave and 558 (58.4%) retained at the last interview. There was no differential loss to follow-up by whether women had a history of anxiety or depression or by study group through wave 10. By the final interview wave (wave 11), women in the turnaway-birth group (80 of 162 [49.4%]) were less likely to participate than those in the near-limit group (182 of 452 [40.3%]; $P = .045$). The last interview wave was conducted from 5 to 6 years after the women sought an abortion (mean, 5.1 years). The mean for the time variable year was 2.3 (median, 2.0 years). Women participated in an average of 8.2 interviews. The eFigure in Supplement 2 is a flowchart of participant recruitment and retention.

At approximately 1 week after seeking an abortion, educational level, marital status, mental health history, and prior drug and/or problem alcohol use did not differ significantly between women in the near-limits group and the 3 other study groups (**Table 1**). Those in the near-limits group differed from women in the other groups in terms of age, employment, race/ethnicity, parity, history of child abuse and neglect, and gestational age.

Depression

Depressive symptom trajectories differed by group. Women in the first-trimester group initially experienced fewer symptoms (-0.59; 95% CI, -1.10 to -0.09) and a less steep decline in symptoms compared with those in the near-limit group (**Table 2** and **Figure 1**). For all groups, depressive symptoms declined over time (eTable 2 in Supplement 2). There were no baseline differences in depression cases; they declined significantly for all groups except the turnaway-birth group, where cases remained relatively flat (Table 2 and eTable 2 in Supplement 2).

Table 1. Characteristics of Participants by Study Group

Characteristic[a]	Group[b]			
	Near-Limit [Reference] (n = 413)	Turnaway-Birth (n = 160)	Turnaway-No-Birth (n = 50)	First-Trimester (n = 254)
Age, mean (SD), y	24.9 (5.9)	23.4 (5.6)	24.4 (6.2)	25.9 (5.7)
P value	NA	.01	.58	.04
Race/ethnicity, No. (%)				
White	132 (32.0)	40 (25.0)	21 (42.0)	99 (39.0)
Black	131 (31.7)	54 (33.8)	14 (28.0)	80 (31.5)
Hispanic or Latina	87 (21.1)	45 (28.1)	7 (14.0)	54 (21.3)
Other	63 (15.3)	21 (13.1)	8 (16.0)	21 (8.3)
P value	NA	.22	.87	.03
Highest educational level, No. (%)				
<High school	76 (18.4)	39 (24.4)	10 (20.0)	41 (16.1)
High school or equivalent	142 (34.4)	55 (34.4)	13 (26.0)	78 (30.7)
Some college, associate degree, or technical school	167 (40.4)	57 (35.6)	23 (46.0)	107 (42.1)
College degree or higher	28 (6.8)	9 (5.6)	4 (8.0)	28 (11.0)
P value	NA	.28	.63	.22
Employed full-time or part-time, No. (%)	224 (542)	64 (40.0)	24 (48.0)	161 (63.4)
P value	NA	.003	.30	.02
Gestational age, mean (SD), y	19.7 (4.1)	23.1 (3.4)	18.9 (4.0)	7.6 (2.3)
P value	NA	<.001	<.001	<.001
Parity, No. (%)				
Nulliparous	140 (33.9)	75 (46.9)	20 (40.0)	97 (38.2)
Infantyounger than 1 y	51 (12.3)	10 (6.3)	4 (8.0)	28 (11.0)
≥1 Previous births, no birth in the past year	110 (26.6)	33 (20.6)	14 (28.0)	54 (21.3)
≥2 Previous births, no birth in the past year	112 (27.1)	42 (26.3)	12 (24.0)	75 (29.5)
P value	NA	.017	.62	.35
Marital status, No. (%)				
Single	329 (79.7)	134 (83.8)	39 (78.0)	194 (76.4)
Married	33 (8.0)	16 (10.0)	3 (6.0)	28 (11.0)
Divorced or widowed	51 (12.3)	10 (6.3)	8 (16.0)	32 (12.6)
P value	NA	.13	.69	.48
Mental health history, No. (%)				
No diagnosis of anxiety or depressive disorder	316 (76.5)	127 (79.4)	35 (70.0)	178 (70.1)
Anxiety disorder only	20 (4.8)	8 (5.0)	2 (4.0)	13 (5.1)
Depressive disorder only	35 (8.5)	14 (8.8)	6 (12.0)	35 (13.8)
Anxiety and depressive disorder	42 (10.2)	11 (6.9)	7 (14.0)	28 (11.0)
P value	NA	.76	.90	.16
History of child abuse or neglect, No. (%)	108 (26.2)	41 (25.6)	7 (14.0)	70 (27.6)
P value	NA	.99	.04	.69
Drug and problem alcohol use, No. (%)				
Any drug use before discovering pregnancy	52 (12.6)	22 (13.8)	4 (8.0)	45 (17.7)
P value	NA	.72	.38	.07
Problem alcohol use before discovering pregnancy	18 (4.4)	11 (6.9)	5 (10.0)	11 (4.3)
P value	NA	.22	.09	.13

Abbreviation: NA, not applicable.

[a] *P* values are based on mixed effects regression analyses accounting for clustering by site and are in comparison with the near-limit group.

[b] See the Study Participants subsection in the Methods section for a descripton of the study groups.

Anxiety

One week after being denied an abortion, women in the turnaway-birth (0.57; 95% CI, 0.01-1.13) and turnaway-no-birth groups (2.29; 95% CI, 1.39-3.18) had significantly more anxiety symptoms than those in the near-limit group (**Table 3** and **Figure 2**). All groups except the first-trimester group experienced significant declines in anxiety over time (eTable 2 in Supplement 2). Anxiety cases were initially higher among the turnaway-no-birth group (adjusted odds ratio, 4.39; 95% CI, 1.18-16.32) compared with the near-limit group (Table 3).

Table 2. Adjusted Mixed Effects Linear and Logistic Regression Models of Depression

Variable	Depressive Symptoms, Coefficient (95% CI)	Depression Cases, Adjusted Odds Ratio (95% CI)
Study group[a]		
Near-Limit	1 [Reference][b,c]	1 [Reference][b,d]
First-Trimester	-0.59 (-1.10 to -0.09)[e,f]	0.67 (0.32 to 1.42)[e,g]
Turnaway-Birth	0.13 (-0.46 to 0.72)[e,h]	0.87 (0.36 to 2.12)[e,i]
Turnaway-No-Birth	0.44 (-0.50 to 1.39)[e,j]	2.02 (0.55 to 7.48)[e,k]
Years	-1.43 (-1.81 to -1.05)	0.58 (0.36 to 0.94)
First-Trimester × years	1.14 (0.52 to 1.76)	1.22 (0.60 to 2.48)
Turnaway-Birth × years	-0.60 (-1.34 to 0.14)	0.65 (0.28 to 1.51)
Turnaway-No-Birth × years	-0.38 (-1.59 to 0.83)	1.84 (0.46 to 7.32)
Years^2	0.44 (0.26 to 0.62)	0.98 (0.89 to 1.09)
First-Trimester × years^2	-0.47 (-0.76 to -0.17)	0.98 (0.85 to 1.14)
Turnaway-Birth × years^2	0.33 (-0.02 to 0.69)	1.17 (0.98 to 1.38)
Turnaway-No-Birth × years^2	0.21 (-0.37 to 0.79)	0.82 (0.58 to 1.15)
Years^3	-0.04 (-0.07 to -0.02)	[l]
First-Trimester × years^3	0.05 (0.01 to 0.09)	[l]
Turnaway-Birth × years^3	-0.04 (-0.09 to 0.00)	[l]
Turnaway-No-Birth × years^3	-0.03 (-0.11 to 0.04)	[l]
Covariates		
Child abuse or neglect	0.78 (0.45 to 1.11)	3.99 (2.39 to 6.66)
History of depression or anxiety		
None	1 [Reference]	1 [Reference]
Anxiety disorder only	0.26 (-0.39 to 0.91)	1.58 (0.53 to 4.72)
Depressive disorder only	1.80 (1.33 to 2.27)	7.08 (3.60.13.91)
Anxiety and depressive disorder	1.97 (1.48 to 2.46)	11.40 (5.72 to 22.73)
Race/ethnicity		
White	1 [Reference]	1 [Reference]
Black	0.17 (-0.21 to 0.54)	1.28 (0.67 to 2.44)
Hispanic or Latina	-0.05 (-0.46 to 0.36)	1.14 (0.55 to 2.38)
Other	-0.04 (-0.51 to 0.44)	0.59 (0.26 to 1.33)
Age	0.04 (0.01 to 0.07)	1.02 (0.97 to 1.07)
Marital status		
Single	1 [Reference]	1 [Reference]
Married	0.11 (-0.39 to 0.61)	1.38 (0.62 to 3.06)
Divorced or widowed	0.03 (-0.44 to 0.51)	0.94 (0.45 to 1.97)
Employed full-time or part-time	-0.31 (-0.61 to -0.01)	0.79 (0.49 to 1.28)
Parity		
Nulliparous	1 [Reference]	1 [Reference]
Infant younger than 1 y	0.09 (-0.41 to 0.58)	1.27 (0.57 to 2.85)
≥1 Previous births, no birth in the past year	-0.03 (-0.42 to 0.36)	1.30 (0.69 to 2.46)
≥2 Previous births, no birth in the past year	-0.41 (-0.84 to 0.02)	0.72 (0.35 to 1.46)
Prepregnancy drug use	0.89 (0.48 to 1.30)	1.53 (0.83 to 2.83)
Prepregnancy problem alcohol use	0.56 (-0.04 to 1.17)	1.46 (0.59 to 3.59)
Highest educational level		
<High school	1 [Reference]	1 [Reference]
High school or equivalent	-0.24 (-0.65 to 0.17)	1.05 (0.55 to 2.02)
Some college, associate degree, or technical school	-0.34 (-0.75 to 0.08)	0.76 (0.39 to 1.49)
College degree or higher	-0.53 (-1.18 to 0.13)	0.78 (0.26.2.35)

[a] See the Study Participants subsection in the Methods section for a descripton of the study groups.

[b] Testing whether overall trajectories differ by group using *testparm*, after fitting the adjusted models.

[c] $P = .001$.

[d] $P = .20$.

[e] Testing whether the trajectory of 1 group differs from the near-limit group using *testparm* commands in Stata, after fitting the adjusted models. Footnotes e through k refer to differences in trajectories.

[f] $P = .003$.

[g] $P = .70$.

[h] $P = .19$.

[i] $P = .06$.

[j] $P = .59$.

[k] $P = .48$.

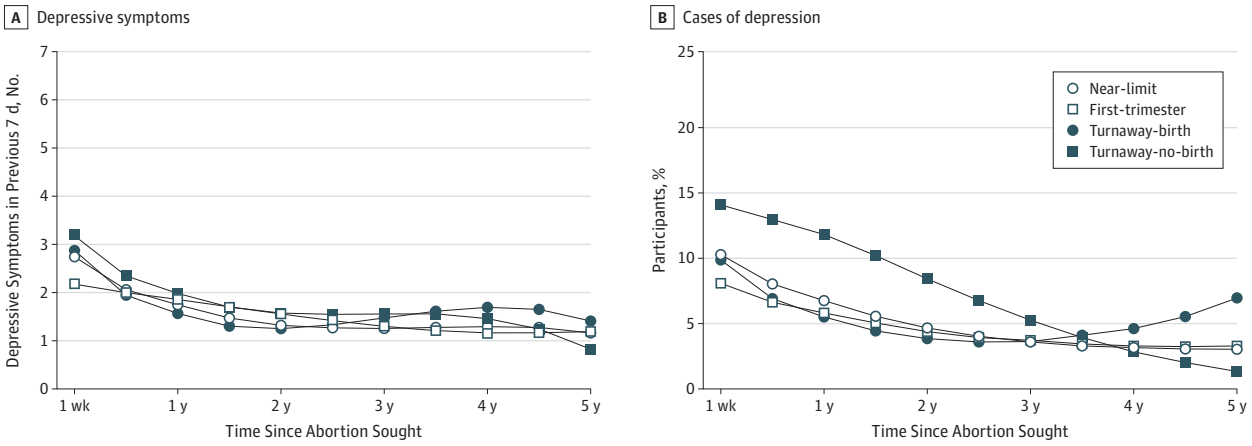
[l] Blank cells for quadratic and cubic terms indicate that they were not included in the model because they did not improve the model fit.

Anxiety cases declined for all groups except the turnaway-birth group, where cases remained relatively flat (eTable 2 in Supplement 2).

Well-being

Baseline self-esteem was lower among women in the turnaway-birth and turnaway-no-birth groups than those in the near-

Figure 1. Depressive Symptom and Case Trajectories



A, Depressive symptoms in the previous 7 days as measured by the Brief Symptom Inventory. B, Cases of depression as measured by the Brief Symptom Inventory.

limit group (-0.33; 95% CI, -0.56 to -0.09 and -0.40; 95% CI, -0.78 to -0.02, respectively) (Table 3). Overall, trajectories differed by group and improved over time for all groups (eTable 2 in Supplement 2). The initially lower levels of self-esteem among both turnaway groups improved more rapidly over time (Figure 2). Women in the turnaway-no-birth group reported significantly lower initial levels of life satisfaction than those in the near-limit group (-0.41, CI -0.77 to -0.06) (Table 3 and Figure 2). There were significant improvements over time among all groups except the first-trimester group (eTable 2 in Supplement 2).

Sensitivity Analyses

When we limited our sample to the 11 facilities with a participation rate greater than 50%, results for the adjusted models showing associations with depressive symptoms were similar in direction and in magnitude. Baseline differences in self-esteem, life satisfaction, and anxiety between women in the turnaway-no-birth and near-limit groups were similar in direction but no longer statistically significant. When we removed the women who placed their newborns for adoption from our sample, results for all but 1 of the adjusted models remained similar in direction and in magnitude (eTable 3 and eTable 4 in Supplement 2).

Discussion

To our knowledge, the Turnaway Study is the first to respond to the US Surgeon General's recommendation to prospectively observe women in the United States for 5 years after seeking an abortion. Our findings add to the body of evidence rejecting the notion that abortion increases women's risk of experiencing adverse psychological outcomes. Women who had an abortion demonstrated more positive outcomes initially compared with women who were denied an abortion.

Women who were denied an abortion, in particular those who later miscarried or had an abortion elsewhere (turnaway no-birth group), had the most elevated levels of anxiety and lowest self-esteem and life satisfaction 1 week after being denied an abortion, which quickly improved and approached levels similar to those in the other groups by 6 to 12 months. These initial elevated levels of distress experienced by both turnaway groups may be a response to being denied an abortion, as well as other social and emotional challenges faced on discovery of unwanted pregnancy and abortion seeking. The reasons women give for seeking abortion[25]—not having enough money, partner issues, bad timing, needing to focus on existing children, and not being emotionally or mentally prepared—are indicative of their difficult circumstances at the time they seek an abortion. The experience of an unintended pregnancy may cause women to contend with their circumstances and reflect on their lives. When relationships and financial situations are thought to be insufficient to support a pregnancy, this feeling of deficiency, rather than the decision to abort or the procedure itself, may be the cause of lowered mental health indicators. These factors, along with the stress of trying to obtain an abortion, likely diminish over time, as indicated by the overall improvements in mental health and well-being outcomes observed in this study. Similarly, Major and colleagues[26] found that women's self-esteem levels were lowest and depressive symptoms highest just before having an abortion, with immediate improvements observed from the period before to the period after the abortion. Women in the turnaway-no-birth group may have experienced the additional stress of trying to find and travel to another abortion facility and raise additional money to pay for the procedure. At the first interview, many of these women reported that they were still trying to access abortion services.[21] These initial adverse outcomes abated after these women miscarried or received their wanted abortion.

Earlier studies have suggested that having an abortion later in the pregnancy can result in more adverse mental health outcomes for women than having a first-trimester abortion[27] or that the evidence is too scarce to draw conclusions.[2] In our study, for all but 1 outcome, women in the near-limit and

Table 3. Adjusted Mixed Effects Linear and Logistic Regression Models of Anxiety, Self-esteem, and Life Satisfaction

Variable	Anxiety Symptoms, Coefficient (95% CI)	Anxiety Cases, Adjusted Odds Ratio (95% CI)	Self-esteem, Coefficient (95% CI)	Life Satisfaction, Coefficient (95% CI)
Study group[a]				
Near-Limit	1 [Reference][b,c]	1 [Reference][b,d]	1 [Reference][b,e]	1 [Reference][b,c]
First-Trimester	-0.37 (-0.85 to 0.10)[f,g]	0.56 (0.23 to 1.32)[f,h]	0.07 (-0.13 to 0.27)[f,i]	0.17 (-0.02 to 0.36)[c]
Turnaway-Birth	0.57 (0.01 to 1.13)[f,j]	0.89 (0.33 to 2.38)[f,k]	-0.33 (-0.56 to -0.09)[f,g]	-0.16 (-0.38 to 0.06)[f,l]
Turnaway-No-Birth	2.29 (1.39 to 3.18)[f,m]	4.39 (1.18 to 16.32)[f,n]	-0.40 (-0.78 to -0.02)[f,o]	-0.41 (-0.77 to -0.06)[f,p]
Years	-0.37 (-0.73 to -0.01)	0.57 (0.34 to 0.96)	0.41 (0.25 to 0.58)	0.31 (0.15 to 0.47)
First-Trimester × years	0.88 (0.30 to 1.46)	1.66 (0.75 to 3.67)	-0.05 (-0.32 to 0.21)	-0.35 (-0.61 to -0.09)
Turnaway-Birth × years	-0.93 (-1.62 to -0.23)	0.73 (0.28 to 1.87)	0.44 (0.12 to 0.76)	0.29 (-0.02 to 0.60)
Turnaway-No-Birth × years	-2.24 (-3.37 to -1.11)	0.69 (0.17 to 2.81)	0.60 (0.08 to 1.12)	0.51 (0.00 to 1.01)
Years^2	0.06 (-0.11 to 0.23)	1.01 (0.91 to 1.12)	-0.13 (-0.20 to -0.05)	-0.08 (-0.16 to -0.01)
First-Trimester × years^2	-0.37 (-0.64 to -0.10)	0.90 (0.77 to 1.06)	-0.01 (-0.13 to 0.12)	0.14 (0.01 to 0.26)
Turnaway-Birth × years^2	0.40 (0.07 to 0.73)	1.09 (0.90 to 1.32)	-0.17 (-0.33 to -0.02)	-0.09 (-0.24 to 0.06)
Turnaway-No-Birth × years^2	0.87 (0.33 to 1.41)	1.01 (0.73 to 1.39)	-0.21 (-0.46 to 0.04)	-0.21 (-0.45 to 0.03)
Years^3	0.00 (-0.02 to 0.02)	[q]	0.01 (0.00 to 0.02)	0.01 (0.00 to 0.02)
First-Trimester × years^3	0.04 (0.01 to 0.08)	[q]	0.00 (-0.01 to 0.02)	-0.01 (-0.03 to 0.00)
Turnaway-Birth × years^3	-0.05 (-0.09 to 0.00)	[q]	0.02 (0.00 to 0.04)	0.01 (-0.01 to 0.03)
Turnaway-No-Birth × years^3	-0.10 (-0.17 to -0.03)	[q]	0.02 (-0.01 to 0.06)	0.03 (0.00 to 0.06)
Covariates				
Child abuse or neglect	0.74 (0.39 to 1.09)	2.76 (1.56 to 4.90)	-0.11 (-0.27 to 0.04)	-0.19 (-0.33 to -0.05)
History of depression or anxiety				
None	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]
Anxiety disorder only	0.70 (0.01 to 1.39)	4.00 (1.33 to 12.03)	-0.16 (-0.47 to 0.14)	-0.18 (-0.45 to 0.10)
Depressive disorder only	1.45 (0.95 to 1.95)	6.70 (3.05 to 14.69)	-0.63 (-0.85 to -0.41)	-0.45 (-0.65 to -0.25)
Anxiety and depressive disorder	3.07 (2.55 to 3.59)	23.02 (10.56 to 50.20)	-0.33 (-0.56 to -0.10)	-0.37 (-0.57 to -0.16)
Race/ethnicity				
White	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]
Black	0.06 (-0.33 to 0.46)	1.18 (0.55 to 2.52)	0.41 (0.24 to 0.59)	-0.02 (-0.18 to 0.13)
Hispanic or Latina	0.11 (-0.32 to 0.54)	1.68 (0.79 to 3.56)	0.03 (-0.16 to 0.21)	0.02 (-0.15 to 0.19)
Other	0.03 (-0.47 to 0.53)	0.93 (0.38 to 2.25)	0.24 (0.02 to 0.46)	0.01 (-0.19 to 0.20)
Age	0.05 (0.01 to 0.08)	1.04 (0.98 to 1.10)	-0.02 (-0.03 to 0.00)	-0.02 (-0.04 to -0.01)
Marital status				
Single	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]
Married	0.29 (-0.24 to 0.82)	1.62 (0.67 to 3.88)	0.04 (-0.19 to 0.28)	0.16 (-0.05 to 0.37)
Divorced or widowed	0.01 (-0.50 to 0.51)	0.73 (0.31 to 1.70)	-0.08 (-0.30 to 0.14)	-0.06 (-0.26 to 0.14)
Employed full-time or part-time	-0.55 (-0.87 to -0.24)	0.38 (0.22 to 0.66)	0.20 (0.06 to 0.34)	0.09 (-0.04 to 0.21)
Parity				
Nulliparous	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]
Infant younger than 1 y	-0.08 (-0.61 to 0.45)	0.70 (0.27 to 1.80)	-0.03 (-0.26 to 0.21)	-0.16 (-0.37 to 0.05)
≥1 Previous births, no birth in the past year	-0.26 (-0.67 to 0.15)	0.76 (0.37 to 1.57)	0.01 (-0.18 to 0.19)	-0.11 (-0.27 to 0.05)
≥2 Previous births, no birth in the past year	-0.57 (-1.03 to -0.12)	0.46 (0.21 to 1.01)	0.10 (-0.10 to 0.30)	-0.07 (-0.25 to 0.11)
Prepregnancy drug use	0.73 (0.29 to 1.17)	1.37 (0.69 to 2.72)	-0.14 (-0.33 to 0.06)	-0.33 (-0.51 to -0.16)
Prepregnancy problem alcohol use	0.82 (0.17 to 1.46)	1.73 (0.66 to 4.53)	0.03 (-0.26 to 0.31)	0.01 (-0.24 to 0.27)
Highest educational level				
Less than high school	1 [Reference]	1 [Reference]	1 [Reference]	1 [Reference]
High school or equivalent	-0.01 (-0.44 to 0.43)	0.81 (0.38 to 1.74)	0.21 (0.02 to 0.40)	0.23 (0.06 to 0.40)
Some college, associate degree, or technical school	0.13 (-0.31 to 0.57)	0.82 (0.39 to 1.74)	0.44 (0.25 to 0.64)	0.37 (0.20 to 0.55)
College degree or higher	0.18 (-0.51 to 0.88)	2.16 (0.68 to 6.90)	0.41 (0.10 to 0.72)	0.33 (0.05 to 0.61)

[a] See the Study Participants subsection in the Methods section for a descripton of the study groups.

[b] Testing whether overall trajectories differ by group using *testparm* commands in Stata, after fitting the adjusted models.

[c] $P < .001$.

[d] $P = .50$.

[e] $P = .001$.

[f] Testing whether the trajectory of 1 group differs from the near-limit group using *testparm*, after fitting the adjusted models. Footnotes f through p refer to differences in trajectories.

[g] $P = .03$.

[h] $P = .45$.

[i] $P = .48$.

[j] $P = .06$.

[k] $P = .58$.

[l] $P = .04$.

[m] $P = .003$.

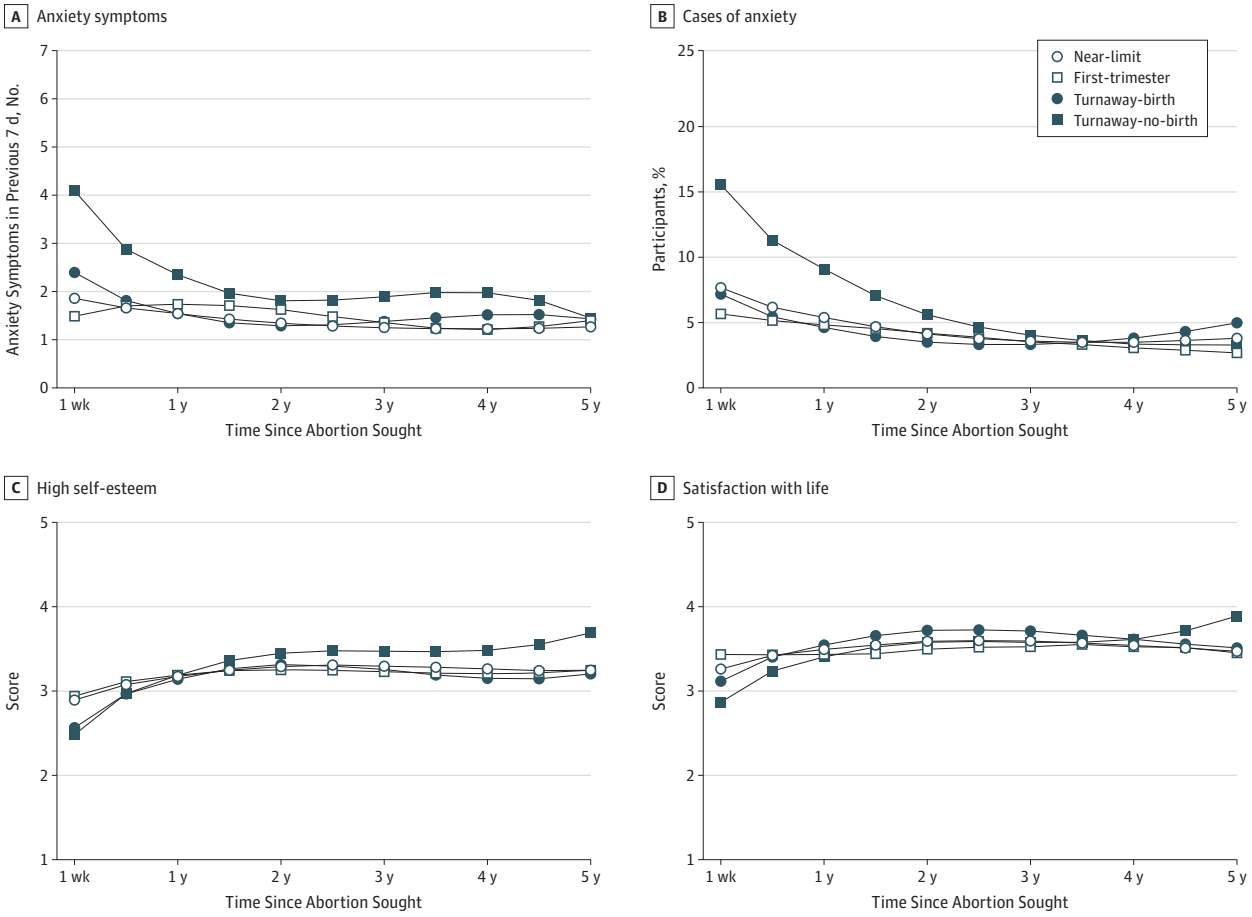
[n] $P = .52$.

[o] $P = .005$.

[p] $P = .10$.

[q] Blank cells for quadratic and cubic terms indicate that they were not included in the model because they did not improve the model fit.

Figure 2. Anxiety, Self-esteem, and Life Satisfaction Trajectories After Seeking Abortion



A, Anxiety symptoms in the previous 7 days as measured by the Brief Symptom Inventory. B, Cases of anxiety as measured by the Brief Symptom Inventory among participants since they sought an abortion. C, High self-esteem in the previous 7 days. 5 indicates extremely high; 3, moderately high; and 1, not at all. D, Satisfaction with life in the previous 7 days. 5 indicates extremely high; 3, moderately high; and 1, not at all.

first-trimester groups exhibited similar levels and trajectories of mental health and well-being. Women having first-trimester abortions initially had fewer depressive symptoms than those in the other groups, but levels among the groups converged by 6 months.

Similar to what has been found in other studies,[2,28] the most significant factors associated with experiencing adverse mental health outcomes following abortion was a history of mental health conditions and experiences of traumatic life events, such as child abuse and neglect. Women with such a history are at greater risk of experiencing adverse outcomes and may have poorer mental health outcomes if they are denied an abortion than if they receive a wanted abortion. By understanding that each woman's experience is unique and that women will vary in their responses to having an abortion or being denied an abortion, we can better serve women's individual needs.

One of the greatest strengths of this study lies in its longitudinal design and use of an appropriate comparison group. We compare women who have obtained an abortion with women who also sought but were denied an abortion, 2 similar groups of women. Prior studies have relied on women with wanted pregnancies that end in miscarriage or birth as their comparison groups,[29-31] which is problematic given that women with wanted pregnancies may differ on several confounding factors from women seeking abortions. By observing women semiannually for 5 years, we were able to assess the levels and trajectories of women's mental health and well-being experiences over a long period with more precision than if we had collected data at fewer time points. Furthermore, while our reliance on self-report measures did not allow us to confirm the diagnosis of mental health conditions, the use of validated screening tools provides a good assessment of whether patients were at risk of adverse mental health outcomes.

Limitations

Our participation rate of less than 40%, our loss of 42% of our sample by the end of the 5-year period, and our differential loss by study group from wave 10 to wave 11 raise some concerns that attrition could bias our results. Although our loss to follow-up represented good participant retention of about 5% from wave to wave, we cannot rule out the possibility that

women with adverse mental health outcomes may have been less likely to participate and/or to be retained. Mitigating concerns of bias include the lack of differential loss to follow-up based on mental health history, as well as our ability to control for history of mental health conditions, child abuse and neglect, and substance use. Furthermore, our use of mixed model regression protects against bias owing to loss to follow up that is predictable from previously measured covariates or outcomes. Concern about bias introduced by low study participation is further lessened by the consistent findings in our sensitivity analyses restricted to sites with more than 50% participation. The lack of change from wave 10 to wave 11 on any of our outcomes lessens our concerns that differential loss by study group at the last interview wave affected our findings.

Another limitation is that because this is an observational study, confounding is a possibility and causal inference can be problematic. By choosing 2 similar groups of women, both of whom were seeking abortion, and adjusting for known confounders and observed differences at baseline we have addressed the threats to the validity of our findings on the effects of abortion on mental health outcomes. Nevertheless, there may have been confounders we did not measure, and our baseline measurement occurred 1 week after the women sought an abortion and thus may not adequately account for unobserved factors.

Although the authors of the Brief Symptom Inventory scales advise that an individual should score 9 or more on at least 2 of their 3 subscales,[22] our measure is broader, with cases defined solely on scores from 1 subscale. We excluded the third subscale—somatization—from our analysis, as somatization is normally higher among pregnant women.[32] This slightly altered use of the scale is likely to result in a higher proportion of women falling within the range of clinically relevant symptoms. Thus, a case does not necessarily indicate mental illness but a need for further screening.

Conclusions

Our study demonstrates that, during a 5-year period, women receiving wanted abortions had similar or better mental health outcomes than those who were denied a wanted abortion. The convergence of most outcomes between groups by 6 months to 1 year suggests that future divergence is unlikely. Given the large number and range of recruitment facilities representing geographically diverse regions in the United States (30 clinics from 21 states), and that our sample demographics are consistent with those of nationally representative samples of women seeking abortion, we believe these results are generalizable.[33,34] Thus, there is no evidence to justify laws that require women seeking abortion to be forewarned about negative psychological responses. Women considering abortion are best served by being provided with the most accurate, scientific information available to help them make their pregnancy decisions. These findings suggest that the effects of being denied an abortion may be more detrimental to women's psychological well-being than allowing women to obtain their wanted procedures.

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Study concept and design: Foster.
Acquisition, analysis, or interpretation of data: All authors.
Drafting of the manuscript: Biggs.
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