Psychological Responses After Abortion

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A review of methodologically sound studies of the psychological responses of U.S. women after they obtained legal, nonrestrictive abortions indicates that distress is generally greatest before the abortion and that the incidence of severe negative responses is low. Factors associated with increased risk of negative response are consistent with those reported in research on other stressful life events.

ABORTION HAS BEEN A LEGAL MEDICAL PROCEDURE throughout the United States since the 1973 Supreme Court decision in *Roe* v. *Wade*, with 1.5 million to 1.6 million procedures performed annually. U.S. abortion patients reflect all segments of the population. In 1987, almost 60% of abortion patients were under 25 years of age. Most (82%) were not married, and half had no prior births. Nearly 69% of women obtaining abortions were white (*1*). Abortions are most often performed in the first trimester; the median gestational age is 9.2 weeks; 97% of abortions are performed by instrumental evacuation (*2*).

Although much literature exists on the psychological consequences of abortion, contradictory conclusions have been reached. Disparate interpretations are due in part to limitations of the research methods and in part to political, value, or moral influences. In this review of studies with the most rigorous research designs, we report consistent findings on the psychological status of women who have had legal abortions under nonrestrictive circumstances (*3*). This article is limited to U.S. studies; however, results from a study in Denmark are also relevant because of the existence of a uniform national population registration system not available in the United States (*4*).

Responses After Abortion

Responses after abortion reflect the entire course of experiencing and resolving an unwanted pregnancy. Although there may be sensations of regret, sadness, or guilt, the weight of the evidence from scientific studies (*3*) indicates that legal abortion of an unwanted pregnancy in the first trimester does not pose a psychological hazard for most women.

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Descriptive studies have shown the incidence of severe negative responses after abortion to be low (*5–10*). After first-trimester abortion, women most frequently report feeling relief and happiness. In a study by Lazarus (*5*), 2 weeks after first-trimester abortions, 76% of women reported feeling relief, while the most common negative emotion, guilt, was reported by only 17%. Negative emotions reflecting internal concerns, such as loss, or social concerns, such as social disapproval, typically are not experienced as strongly as positive emotions after abortion (*5–8*). For example, Adler (*6*) obtained ratings of feelings over a 2- to 3-month period after abortion on Likert-type scales, with 5 representing strongest intensity. Mean ratings were 3.96 for positive emotions, 2.26 for internally based negative emotions, and 1.89 for socially based negative emotions.

Women show little evidence of psychopathology after abortion. For example, on the short form of the Beck Depression Inventory, scores below 5 are considered nondepressed (*11*). In a sample of first-trimester patients, Major *et al.* (*9*) obtained mean scores of 4.17 (SD = 3.92) immediately after the abortion and 1.97 (SD = 2.93) 3 weeks later.

Measures used in most studies were not designed to assess psychopathology, but, rather, emotional distress within normal populations. These indicators show significant (*12*) decreases in distress from before abortion to immediately after and from before abortion or immediately after to several weeks later (*9, 10*). For example, Cohen and Roth (*10*) found a drop in the depression subscale of the Symptom Checklist 90 (SCL-90) from a mean of 24.1 (SD = 11.8) at the time of arrival at a clinic to a mean of 18.4 (SD = 12.2) in the recovery room. Similar drops were shown on the anxiety scale of the SCL-90 and on the Impact of Events scale, an indicator of distress.

Only two studies compared responses after abortion with those after birth. Athanasiou *et al.* (*13*) studied women after early (suction) abortion, late (saline) abortion, and term birth. Starting with 373 women, researchers matched 38 patients in each group for ethnicity, age, parity, and marital and socioeconomic status. Thirteen to sixteen months after abortion or delivery, women completed the Minnesota Multiphasic Personality Inventory (MMPI) and the SCL. None of the groups had a mean score on any subscales of the MMPI above 70, the cutoff indicating psychopathology. Few differences among groups were shown (*14*), and the authors concluded that the three groups were "startlingly similar."

Zabin *et al.* (*15*) interviewed 360 adolescents seeking pregnancy tests and compared those who had negative results, those who were pregnant and carried to term, and those who were pregnant and aborted. All three groups showed higher levels of state (transient) anxiety at base line than they did 1 or 2 years later (for example, for the abortion group $\bar{X}$ = 74.6 at base line versus 45.6 and 43.6 at 1 and 2 years later). Two years after the initial interview, the abortion group showed, if anything, a more positive psychological profile

than either of the other two groups. There were no differences on state anxiety, but the abortion group was significantly lower on trait anxiety than either of the other two groups, was higher on self-esteem than the negative pregnancy group, and had a greater sense of internal control than the childbearing group.

Factors Relating to Psychological Responses

Although most women do not experience negative psychological responses after abortion, case studies document some negative experiences. Various aspects of the abortion experience may contribute to distress. Ambivalence about the wantedness of the pregnancy may engender a sense of loss. Conflict about the meaning of abortion and its relation to deeply held values or beliefs, perceived social stigma, or lack of support may also induce negative reactions.

The decision process. The greater the difficulty of deciding to terminate a pregnancy, the more likely there will be negative responses after abortion (*6–8, 16*). For example, Adler (*6*) found that the difficulty of deciding to abort, reported several days before abortion, was positively associated with the experience of negative emotions reflecting loss 2 to 3 months after abortion ($r = 0.37$), but was not related to a statistically significant extent to the experience of positive emotions or of negative emotions reflecting social disapproval.

Although most women do not find the decision to abort difficult, some do (*16*), and it appears to be more difficult for women seeking termination later in pregnancy. Whereas only 7% of 100 first-trimester patients studied by Osofsky *et al.* (*17*) reported initial indecision and 12% reported difficulty in deciding about abortion, corresponding figures among 200 second-trimester patients were 36 and 51%. Women undergoing second-trimester abortions also report more emotional distress after abortion than do those terminating first-trimester pregnancies (*17–19*).

Women who perceive more support for the decision to abort are more satisfied with their decision (*7, 20*). Those with fewer conflicts over abortion are also more satisfied; in a sample of adolescents, Eisen and Zellman (*21*) found that satisfaction with the decision 6 months after an abortion was associated with a favorable opinion of abortion in general as well as for themselves.

The more a pregnancy is wanted and is viewed as personally meaningful by the woman, the more difficult abortion may be. Major *et al.* (*9*) found that among 247 first-trimester abortion patients, women who described their pregnancy as being "highly meaningful" compared to those who found their pregnancy to be less personally meaningful reported more physical complaints immediately after the abortion and anticipated more negative consequences. Three weeks after the abortion, women who had indicated having had no intention to become pregnant scored significantly lower on the Beck Depression Inventory ($\overline{X} = 1.68$, SD = 2.33) than did the minority of women who had at least some intention to become pregnant ($\overline{X} = 3.71$, SD = 5.03).

In summary, women who report little difficulty in making their decision, who are more satisfied with their choice, and who are terminating pregnancies that were unintended and hold little personal meaning for them show more positive responses after abortion. Women with negative attitudes toward abortion and who perceive little support for their decision have more difficulty deciding about abortion. These factors may also contribute to delay in obtaining abortions (*19*), potentially subjecting women to the greater stress of second-trimester procedures (*17–19*).

Perceived social support. Perceived social support can buffer some adverse effects of stressful life events (*22*). However, social support is complex. Support for having the abortion needs to be differentiated from support in general; the former is associated with more favorable outcomes; the latter may not be.

Women with greater support for their abortion from parents and the male partner generally show more positive responses after abortion (*8, 23, 24*). Intimacy with and involvement of the male partner was a significant predictor of emotional reaction in two samples (*8*). Together with satisfaction with the decision and the woman's initial emotional response to becoming pregnant, partner support accounted for almost 40% of the variance in psychological response 2 to 3 weeks after abortion. Moseley *et al.* (*24*) found that having negative feelings toward one's partner, making the abortion decision alone, and experiencing opposition from parents were associated with greater emotional distress on the Multiple Affective Adjective Check List both before a first-trimester abortion and immediately after. However, Robbins (*25*) found that single women who maintained a strong relationship with their partner reported more negative change on the MMPI 6 weeks after abortion and more regret 1 year later than those whose relationships deteriorated.

In a study of actual social support, Major *et al.* (*9*) recorded whether women were accompanied to the clinic by a male partner. Out of 247 women, 83 were accompanied. Compared to unaccompanied women, those with partners were younger and expected to cope less well beforehand; women who were more distressed about the abortion may have expressed a greater need for their partners to accompany them. Accompanied women were significantly more depressed and reported more physical complaints immediately after abortion than unaccompanied women. Differences in depression after abortion remained after controlling for age and coping expectations, but they did not remain in a 3-week follow-up of a subset of women.

Coping processes and expectancies. Generalized positive outcome expectancies and situation-specific coping expectancies and processes have been linked to a variety of health-relevant outcomes (*26*). Major *et al.* (*9*) found that among abortion patients, those who expected to cope well scored lower on the Beck Depression Inventory than those with more negative expectations ($\overline{X} = 2.98$, SD = 3.04 versus $\overline{X} = 5.93$, SD = 4.41, respectively). Those expecting to cope well also showed more positive mood, anticipated fewer negative consequences, and had fewer physical complaints both immediately after abortion and 3 weeks later.

Cohen and Roth (*10*) examined coping styles and levels of anxiety and depression before and immediately after abortion. As noted earlier, anxiety and depression decreased significantly from before the abortion to afterwards for all women, but those who used approach strategies (for example, thinking about the procedure, talking about it) showed a greater decrease in anxiety from before to after abortion than those not using these strategies. Women who used denial scored significantly higher in depression and anxiety than did those who did not deny.

Limitations of Research and Future Directions

Although each study has methodological shortcomings and limitations, the diversity of methods used provides strength in drawing general conclusions. Despite the diversity, the studies are consistent in their findings of relatively rare instances of negative responses after abortion and of decreases in psychological distress after abortion compared to before abortion. However, weaknesses and gaps found among studies provide challenges for future research.

First, samples of well-defined populations and information on subjects who choose not to participate are needed. Studies have sampled women from specific clinics or hospitals. Both public and

private clinics have been used, and samples have varied in their ethnic and socioeconomic character. Women whose abortions are performed by private physicians are not represented; they are estimated to be about 4% of women having abortions (*27*).

Of more concern is the necessary use of volunteers, which can introduce bias if women who agree to participate in research differ from those who do not on characteristics linked to more positive or negative outcomes. An analysis of studies that provide data on characteristics of research participants versus the population from which the sample was drawn suggests that women who are more likely to find the abortion experience stressful may be underrepresented in volunteer samples. However, the amount of bias introduced by this underrepresentation appears to be minor and unlikely to influence the general conclusions (*28*).

Second, the timing of measurement has been limited. Many studies lack base-line data from before the abortion. We know of no studies with data collected before the pregnancy, making it impossible to control for variables that may be associated with the initial occurrence of the pregnancy and which could influence responses after abortion. One of the best predictors of a woman's psychological status after abortion is likely to be her functioning before the occurrence of the unwanted pregnancy (*29*). Former Surgeon General C. Everett Koop has called for a prospective study of a nationally representative sample of women of childbearing age (*30*). Such a study would address both issues of representativeness and of base-line measurement.

Timing of assessment after abortion has also been limited. Some studies obtained measures within a few hours after the procedure, while the woman was still in the clinic. Responses at this time may not be indicative of longer term response. A few studies have obtained measures a few weeks or months after abortion; the longest follow-up is 2 years. Therefore, no definitive conclusions can be drawn about longer term effects. Although individual case studies have identified instances in which individuals develop severe problems that they attribute to an earlier abortion experience (*31*), the number of such cases is comparatively small. Moreover, research on other life stresses suggests that women who do not experience severe negative responses within a few months after the event are unlikely to develop future significant psychological problems related to the event (*32*). Longer term studies are needed to confirm this observation and to ascertain the influence of other life events attributed retrospectively to the abortion experience.

Finally, in studying psychological responses after abortion, it is important to separate the experience of abortion from the characteristics of women seeking abortion and from the context of resolving an unwanted pregnancy. A useful comparison would be women who carry an unwanted pregnancy to term and surrender the child for adoption; this would control both for the unwantedness of the pregnancy and the experience of loss. The study by Athanasiou *et al.* (*13*) matched women who were terminating pregnancies with those carrying to term on key demographic variables, but they were not matched on "wantedness" of the pregnancy. Similarly, the comparison used in the Danish study (*4*) for women aborting their pregnancies was women carrying to term, most of whom were likely to be delivering wanted pregnancies. One would expect more adverse outcomes for women carrying unwanted pregnancies to term (*33*).

A number of questions can be addressed without a comparison group. Theoretically grounded studies testing conditional hypotheses about factors that may put women at relatively greater risk for negative responses are particularly important. Such studies can address critical questions about the nature of the abortion experience and its aftermath, and can point the way to interventions if needed.

Conclusion

Scientific studies on psychological responses to legal, nonrestrictive abortion in the United States suggest that severe negative reactions are infrequent in the immediate and short-term aftermath, particularly for first-trimester abortions. Women who are terminating pregnancies that are wanted and personally meaningful, who lack support from their partner or parents for the abortion, or who have more conflicting feelings or are less sure of their decision beforehand may be at relatively higher risk for negative consequences.

Case studies have established that some women experience severe distress or psychopathology after abortion and require sympathetic care. As former Surgeon General C. Everett Koop testified before Congress regarding his review of research on psychological effects of abortion, such responses can be overwhelming to a given individual, but the development of significant psychological problems related to abortion is "minuscule from a public health perspective" (*34*).

Despite methodological shortcomings of any single study, in the aggregate, research with diverse samples, different measures of response, and different times of assessment have come to similar conclusions. The time of greatest distress is likely to be before the abortion. Severe negative reactions after abortions are rare and can best be understood in the framework of coping with a normal life stress.

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4. Through the use of computer linkages to national abortion and birth registers, the admissions register to psychiatric hospitals was tracked for women 3 months after abortion (n = 27,234) or delivery (n = 71,370) and for all women 15 to 49 years of age residing in Denmark (n = 1,169,819). To determine incidence rates, only first admissions to psychiatric hospitals were recorded, excluding women who had been admitted within the 15 previous months. The key finding was that for both never-married women and currently married women, the psychiatric admission rate after pregnancy was roughly the same for abortions or deliveries—about 12 per 10,000 compared to 7 per 10,000 for all women of reproductive age. Among the much smaller group of separated, divorced, or widowed women, those who had terminated pregnancies (which perhaps were originally intended) experienced a fourfold higher admissions rate (64 per 10,000) than the group of separated, divorced, or widowed women who delivered (17 per 10,000). However, because there may be a bias against hospitalizing a new mother, particularly if she is nursing, the relative psychological risk of delivery may be underestimated [H. P. David, N. Rasmussen, E. Holst, *Fam. Plann. Perspect.* **13**, 88 (1981)].
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The Human Genome Project: Past, Present, and Future

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This article presents a short discussion of the development of the human genome program in the United States, a summary of the current status of the organization and administration of the National Institutes of Health component of the program, and some prospects for the future directions of the program and the applications of genome information.

THE UNITED STATES HAS NOW SET AS A NATIONAL OBJECTIVE the mapping and sequencing of the human genome. Several other countries have joined in this exciting initiative, and we expect a number more to do so. Similar to the 1961 decision made by President John F. Kennedy to send a man to the moon, the United States has committed itself to a highly visible and important goal. Although the final monies required to determine the human DNA sequence of some 3 billion base pairs (bp) will be an order of magnitude smaller than the monies needed to let men explore the moon, the implications of the Human Genome Project for human life are likely to be far greater. A more important set of instruction books will never be found by human beings. When finally interpreted, the genetic messages encoded within our DNA molecules will provide the ultimate answers to the chemical underpinnings of human existence. They will not only help us understand how we function as healthy human beings, but will also explain, at the chemical level, the role of genetic factors in a multitude of diseases, such as cancer, Alzheimer's disease, and schizophrenia, that diminish the individual lives of so many millions of people.

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The possibility of knowing our complete set of genetic instructions seemed an undreamable scientific objective in 1953 when Francis Crick and I found the double helical structure of DNA (*1*). Then there existed no way to sequence even very short DNA molecules, much less any possibility of obtaining the totality of human DNA as a collection of discrete pieces for eventual chemical analysis. Only years later, with the 1973 birth of the recombinant DNA revolution, was it possible to think of routinely isolating individual genes (*2*). This breakthrough provided the incentive for Allan Maxam and Walter Gilbert (*3*) and Fred Sanger *et al.* (*4*) to develop their powerful sequencing techniques that now make it almost routine to establish in a single experiment 300 to 500 bp of DNA sequence.

The first complete DNA sequences to be established by these procedures were those of the smaller DNA viruses, such as the simian virus 40 (*5*) and the phage ϕX174 (*6*), each of which contains some 5000 bp. These sequences became known by 1977, and within the next 5 years the tenfold larger DNAs of the bacteriophages T7 (*7*) and lambda (*8*) were determined. Today, the more than 100,000 bp DNAs of several plant chloroplasts (*9*) and of the herpesvirus Epstein-Barr virus (*10*) have been established. The largest DNA now sequenced is that of cytomegalovirus (also a herpesvirus), which contains almost a quarter of a million base pairs (*11*).

Simultaneously, the sequences of a large number of individual genes have been worked out, with the total number of base pairs exceeding 37 million (*12*). The most completely known organism, in this regard, is the intensively studied bacterium *Escherichia coli*, with more than 800,000 bp of its 4.8×10^6 bp genome already established (*12, 13*). There are a number of academic laboratories in the United States and Japan geared up to complete the *E. coli* sequence, and there are good reasons for believing that success will come within the next decade. Today, DNA sequencing usually costs between $3 and $5 per base pair (*14*); so, at most, $25 million would be required—a large, but not unthinkable sum when spent