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A majority of states require parental consent or notification before a minor may have an abortion. Parental involvement laws are based in part on the assumption that abortion poses a risk to the psychological health of adolescents. Previous research has catalogued the risks to adolescent mothers and their children posed by early childbearing, the alternative to abortion. The health risks of delaying abortion also have been documented. Few studies, however, have attempted to quantify the risks of abortion to adolescents' mental health. Research suggests that associations between abortion and depression demonstrated in some studies of adult women may be spurious and reflect unmeasured covariates, such as intendedness of the pregnancy. This study used secondary data from the National Longitudinal Study of Adolescent

Health (Add Health) to test whether having an abortion put adolescent women at risk for developing depression in the short term and over time. Respondents were interviewed three times, in 1994-1995 (Wave I), 1996 (Wave II), and in 2001 (Wave III). Logistic regression was used to test whether adolescents who had an abortion between Waves I and II had an increased risk for developing depression. Adolescents who had an abortion were compared with adolescents who also became pregnant but did not have an abortion and with the larger sample of female adolescents. Abortion was not associated with developing depression, either in the short term or over time. Unintended pregnancy between Waves I and II also was not significant in predicting depression. Prior pregnancy (before Wave I), however, did predict depression five years later. Thus, this study found no evidence to support legal restrictions on abortion for minors on the basis of increased risk of depression. However, findings do suggest that pregnancy in early adolescence may be a risk factor for developing depression in young adulthood. The relationship between adolescent pregnancy and later depression underscores the need for effective pregnancy prevention programs in early adolescence.

The Relationship between Abortion and Depression:

Evidence from the National Longitudinal Study of Adolescent Health

by

Jocelyn T. Warren

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I understand that my dissertation will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my dissertation to any reader upon request.

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Jocelyn T. Warren, Author

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CHAPTER 1: INTRODUCTION

Elective abortion is a common medical procedure among women in the

United States. In 2000, 25% of all pregnancies (excluding miscarriages) ended

in abortion (Jones, Darroch, & Henshaw, 2002). Abortion is also a contentious

social issue that returns to the forefront of public debate during presidential

campaigns and Supreme Court confirmations. Polling conducted in 2005 prior

to Supreme Court Chief Justice John Roberts' confirmation found that a

consistent majority of Americans (65%) oppose overturning the 1973 *Roe v.*

Wade decision establishing the right to abortion. The poll, however, also found

that most people favor restrictions on abortion access. Only 35% thought

abortion should be generally available, while 23% thought abortion should be

more limited and 31% favored making abortion illegal except in cases of rape,

incest, or to save a woman's life. Nearly three quarters of respondents (73%)

favored requiring women under age 18 to get parental consent for abortion

(Pew Research Center, 2005).

Laws restricting access to abortion are sometimes characterized as

protecting the health of women. In the recent Supreme Court decision

upholding the federal ban on so-called "partial birth abortion," Justice Anthony

Kennedy wrote: "[I]t seems unexceptionable to conclude some women come to

regret the choice to abort the infant life they once created and sustained…

Severe depression and lost of esteem can follow" (*Gonzales v. Carhart*, 2007).

Research, however, has not produced a clear picture of the psychological effects of abortion. Some studies have demonstrated an association between abortion and adverse outcomes such as depression, anxiety, and substance abuse. David Reardon, head of an anti-abortion advocacy group called the Elliot Institute, has co-authored many of the articles that link abortion with poor mental health (Mooney, 2005). In the journal, *Ethics & Medicine*, Reardon (2002) observed:

> In some cases, it is unnecessary to convince people of
> abortion's dangers. It is sufficient simply to raise enough
> doubts about abortion that they will refuse actively to oppose
> the proposed anti-abortion initiative. (p.26)

Studies conducted by Reardon and his colleagues have been faulted for deliberate failure to include appropriate controls in analysis, the use of biased and misidentified samples, mischaracterization of results, and drawing inappropriate conclusions from results (e.g., Billings, 2002; Lee, 2002; Major, 2003; Mooney, 2005; Rubin & Russo, 2004).

Previous reviews have noted that most well-designed studies have not shown any lasting, negative mental health effects of abortion (e.g., Adler & David, 1992; Wilmoth, de Alteriis, & Bussell, 1992). In a commentary on a study by Reardon, Cougle, Rue, Shuping, Coleman, and Ney (2003) that

appeared in the *Canadian Medical Association Journal*, Major (2003) argued

that associations between abortion and outcomes such as psychiatric

admissions demonstrated in the study are likely spurious and reflect

unmeasured differences that predate pregnancy between women in the abortion

and birth samples. Furthermore, Major contended, it is necessary to consider

the context in which women make abortion decisions.

> Women typically seek an abortion because they are faced with
> an unplanned and unwanted pregnancy. To compare the mental
> health of women who give birth (typically of a planned, wanted
> pregnancy) to those who have abortions (typically of an
> unintended, unwanted pregnancy), as Reardon and colleagues
> did, is to compare apples to oranges. (p.1257)

Based on study findings, professional organizations such as the American

Psychological Association (APA) have concluded that abortion does not pose

harm to women (Adler, David, Major, Roth, Russo, & Wyatt, 1992).

A more recent study conducted by New Zealand researchers, however,

also lends support to the claim that abortion may increase the risk of

subsequent mental health problems. The authors found that New Zealand

women who had had an abortion had higher rates of depression, suicidal

behaviors, substance use disorders, and overall number of mental health

problems than women who had a pregnancy but no abortion after controlling

for social, family and childhood characteristics (Fergusson, Horwood, &

Ridder, 2006). The researchers noted that their findings ran contrary to the

official APA position and suggested that further research was necessary before professional organizations such as APA make a "relatively strong conclusion" about the effects of abortion on mental health (Fergusson, Horwood, & Ridder, 2006, p.23). APA is currently updating its position paper on the impact of abortion on women (American Psychological Association, 2008).

The purpose of the present research was to examine whether abortion increased the risk of depressed mood among a representative sample of adolescent women in the United States. Data used are from the National Longitudinal Study of Adolescent Health (Add Health), a comprehensive, longitudinal study of U.S. adolescents in grades 7 through 12. Respondents were interviewed in 1995, 1996, and 2001. In this chapter, abortion incidence among U.S. women and specific subgroups is described. In addition, the relationship between abortion, pregnancy, and contraception is discussed. Next, theoretical explanations for a relationship between abortion and mental health are explored. Finally, the significance of the research is discussed and the objectives are presented.

<p align="center">Abortion in the U.S.</p>

Abortion is common among all groups of women in the United States (Henshaw, 1998). Abortion rates, however, vary among population groups, particularly as defined by age and socioeconomic status. Although the abortion rate (21.3 per 1,000 women 15-44 years old) fell 11% between 1994

and 2000, the decrease in the abortion rate for adolescents (39% among women aged 15-17) was larger than for adult women (10% women aged 20 or older) (Jones, Darroch, & Henshaw, 2002). Although abortion rates decreased among middle- and higher-income women, they increased among poor and low-income women. The abortion rate for women whose incomes were between 100-199% of poverty (based on the federal poverty measure) increased 23% between 1994 and 2000 and increased 25% for those living at or below the poverty line. At the same time, rates for women whose incomes were between 200-299% of poverty decreased 13% and the rate for those with incomes above 300% of poverty decreased 39%.

<div align="center">Abortion, Pregnancy, and Contraception</div>

The variations in abortion rates among age and socioeconomic groups reflect variations in pregnancy rates. Among adolescents aged 15-17, the pregnancy rate decreased dramatically between 1994 and 2001 (from 76 per 1,000 women to 46 in 2000) (Finer & Henshaw, 2006). Pregnancy rates for poor women (those living below the poverty line) increased from 142 per 1,000 women in 1994 to 182 in 2001.

Contraceptive prevalence and the effectiveness of methods used may explain much of the variance in pregnancy rates. Santelli and colleagues (2007) estimated that 77% of the decrease in pregnancy rates among adolescents aged 15-17 was attributable to contraceptive use, including

increases in the use of many individual methods, increases in the use of

multiple methods, and substantial declines in nonuse. Decreased sexual activity

accounted for the remaining decline (23%).

Less is known about why unintended pregnancies have increased

among poor women. Ranjit and colleagues (2001) found that poor women

were more likely than other women to experience contraceptive method

failure. Poor and low-income women are also less likely to have received

family planning services within the previous year (Mosher, 2004). Another

study found an association between socioeconomic disadvantage and both

long-term contraceptive nonuse and having periods of risky nonuse. The

authors said this association could be related to difficulties disadvantaged

women have in accessing health care or to other unmeasured factors such as

unemployment, transient living conditions, or personal or familial instability

(Frost, Singh, & Finer, 2007).

Variations in abortion rates noted above, however, are only partially

explained by changes in pregnancy rates among subgroups. Although the

overall abortion rate has declined, the overall unintended pregnancy rate and

the proportion of pregnancies that were unintended between 1994 and 2001

remained fairly constant (Finer & Henshaw, 2006). In 2001, approximately

49% of the 6.4 million pregnancies in the U.S. were unintended, or 3.1 million

unintended pregnancies. The unintended pregnancy rate in 2001, 51 per 1,000

women or approximately 5% of women of reproductive age, was virtually unchanged from 1994. Therefore, overall, fewer women faced with unintended pregnancy are having abortions and more are giving birth. Unintended birth rates have increased most among poor and low-income women and women aged 25-34 (Finer & Henshaw).

Increases in rates of unintended birth among particular subgroups may be explained in part by limited access to health care, both before and during pregnancy. As noted above, poor women are less likely to have received family planning services than other women and, therefore, may be more likely to experience an unintended pregnancy (Frost, Singh, & Finer, 2007). Abortion services, too, may be difficult to access. For many women, barriers to obtaining abortion services are significantly more common than are barriers to other common types of reproductive health care (Henshaw & Finer, 2003). Only 13% of U.S. counties have an abortion provider, which means some women must travel long distances to obtain services (Henshaw & Finer).

Access to abortion is further constrained by laws, enacted primarily at the state level. A majority of states have physician and hospital requirements for abortion provision, allow individual health care providers to refuse to participate in an abortion, require state-mandated counseling for women and require parental involvement for minors (Guttmacher Institute, 2008). The justifications given for these laws often include concerns for the safety and

health of women (Cannold, 2002). For example, women who seek abortion in

Texas are given a booklet called, "A Woman's Right to Know" produced by

the state Department of Health in response to the Women's Right to Know Act

(HB 15) passed in 2003 (Texas Department of Health, 2003). In the booklet,

the "emotional side" of abortion is described:

> Some women have reported serious psychological effects after
> their abortion, including depression, grief, anxiety, lowered
> self-esteem, regret, suicidal thoughts and behavior, sexual
> dysfunction, avoidance of emotional attachment, flashbacks,
> and substance abuse. (p. 16)

In addition to receiving the booklets, minor women in Texas are

required to obtain written consent from a parent before obtaining an abortion.

Parental involvement laws are common in the United States. Thirty-four other

states mandate parental involvement, either notification or consent, in minors'

abortion decisions (Guttmacher, 2008).

Research suggests some women delay obtaining an abortion because of

laws restricting abortion, while other women carry unintended pregnancies to

term (Dobie, et al., 1999; Drey, et al., 2006; Henshaw, 1995; Joyce &

Kaestner, 2000; Joyce, Kaestner, & Colman, 2006). The risks associated with

unintended childbearing on economic, social, and health outcomes for women

and children have been well-documented over the past several decades (e.g.,

Brown & Eisenberg, 1995; Hofferth, Reid, & Mott, 2001; Hoffman, 1998).

Delayed abortion, however, also threatens women's health. The overwhelming

majority of deaths caused by complications related to second trimester abortion between 1988 and 1997 could have been avoided if the abortion had been performed before 8 weeks gestation (Bartlett, et al., 2004).

Laws that result in women delaying abortions or having unwanted children undermine women's health and the health and well-being of their families. Therefore, claims that laws restricting abortion are in the interest of women's health and the evidence upon which these claims are based deserve close scrutiny.

The Abortion and Mental Health Relationship

Several theoretical explanations for observed relationships between abortion and mental health outcomes such as depression have been proposed. Adler and colleagues (1992) noted that early research focused on psychopathological responses following abortion and used psychoanalytic theory as a basis for explaining responses. More recently, Speckhard and Rue (1992) have relied on psychoanalytic theory as a basis for "post-abortion syndrome" (PAS) to explain adverse effects of abortion on mental health. PAS is modeled on post-traumatic stress disorder (PTSD) and is characterized as an extreme emotional response that is long-lasting and recurring. The symptoms of PAS include sadness, depression, anger, flashbacks of abortion experience, low self-image, suicidal thoughts, nightmares and hallucinations related to the abortion experience, and feelings of "craziness."

Several researchers have cited PAS as an explanation for an association between abortion and mental health outcomes, such as depression and substance abuse (e.g., Reardon & Ney, 2000; Coleman, Reardon, Strahan, & Cougle, 2005). They have argued that effects of abortion may be immediate or only evident in the long-term (e.g., Reardon, Rue, Shuping, Coleman, & Ney, 2003), but in all cases are certain (Reardon, 2002a): "I do argue that because abortion is evil, we can expect, and even know, that it will harm those who participate in it. Nothing good comes from evil" (p.26). PAS is not recognized by the American Psychological Association (APA) or the American Psychiatric Association, nor is it included in the *Diagnostic and Statistical Manual of Mental Disorders* (DSM IV) (American Psychiatric Association, 1994).

Effects of abortion also have been examined in contemporary research within a stress and coping framework. From this theoretical perspective, stress results from a situation an individual appraises as exceeding his or her resources and endangering his or her well-being (Lazarus & Folkman, 1984). Unlike the abortion-as-trauma model, the stress and coping model examines abortion within the context of unintended pregnancy and conditioned by individual, partner, and societal factors. Studies using this ecological model (implicitly or explicitly) have had two major aims: 1) to determine whether women with unintended pregnancies who have abortions fare better or worse

than women who carry unintended pregnancies to term (e.g., Russo & Zierk, 1992; Schmiege & Russo, 2005; Zabin, Hirsch, & Emerson, 1989) and 2) to identify those individual and situational factors which are most likely to predict negative outcomes among women who have abortions (e.g., Major & Cozzarelli, 1992; Miller, 1992; Pope, Adler, & Tschann, 2001; Russo & Denious, 2001).

Despite rigorous methodologies employed by some researchers, all studies of abortion and mental health are limited to a degree by a necessary reliance on observational data. A definitive study of abortion would require random assignment of women with unwanted pregnancies to continue or terminate their pregnancies and is clearly unethical (Adler, 2007; Major, 2003). In addition to this limitation, studies of abortion's effects have also been subject to a number of other limitations, including small or biased samples, psychological measures that have not been validated, cross-sectional methods, and short-term follow-up.

<div style="text-align:center">Significance of the Study</div>

In 2001, approximately 1.3 million women in the U.S. had an abortion (Finer & Henshaw, 2006). Although the abortion rate has been steadily decreasing, rates vary dramatically by age and income, with some groups experiencing increases or smaller declines in abortion rates. High abortion rates reflect high rates of unintended pregnancy among some subgroups. Laws

restricting access to abortion, such as state laws that mandate parental involvement and waiting periods, may result in delays in obtaining abortion and higher rates of unintended birth (Bitler & Zavodny, 2001; Henshaw, 1995; Henshaw & Finer, 2003). Delayed abortion and unintended birth both threaten women's health (e.g., Bartlet, et al, 2004).

Research on the psychological effects of abortion is necessary to determine whether abortion poses harm to women and, by extension, whether restrictions intended to protect women's health are therefore justified. This study has the potential to advance understanding of the effects of abortion on adolescents' mental health in the short-term and over time. The findings from this study may be used to inform state and federal policies regulating abortion. Findings may also be used by counselors and others who advise pregnant adolescents on reproductive options and their potential consequences.

<div align="center">Study Objectives</div>

The study had two objectives: 1) to determine whether adolescents who had an abortion had an increased risk of depressive symptoms in the short term and five years later compared with their peers who did not have an abortion; and 2) examine whether increased risk of depressive symptoms in young adulthood was associated with unintended pregnancy in adolescence.

The following chapter is a review of the literature on the relationship between abortion and depression among adolescents and adult women. The

subsequent chapter presents the research methods used to address the objectives listed above. The results of the study are then presented. Finally, the results are discussed, implications for public health are addressed, and suggestions for future research are presented.

CHAPTER 2. LITERATURE REVIEW

This chapter begins with a discussion of earlier reviews of studies that examine the psychological effects of abortion on women. The next section examines recent research on the relationship between abortion and depression. Most studies on the effects of abortion on depression involve adult women; therefore, this section includes studies that focused on adult women, as well as studies on adolescents. The next section discusses the relationship between unintended pregnancy and depression. Finally, the current study is described and research hypotheses are presented.

Early Reviews of the Psychological Effects of Abortion

Earlier research reviews concluded that no evidence existed to support the claim that abortion had severe or persistent negative effects on mental health (Adler, David, Major, Roth, Russo, & Wyatt, 1992; Wilmoth, de Alteriis, & Bussell, 1992). Adler and colleagues (1992) reviewed research on the psychological factors in abortion for the American Psychological Association (APA). They noted that, although much of the research on abortion was descriptive rather than theory-based, two broad theoretical perspectives formed the bases for abortion research. Earlier research, informed by psychoanalytic theory, focused primarily on psychopathological responses to abortion whereas more recent research, based on stress and coping theory, evaluated a broader range of responses. Differences in theoretical perspectives

generated different research questions and methodologies used to study women who had abortions. The authors limited their review to empirical studies with definable samples that reflected contemporary legal abortion practices in the U.S. and provided quantitative measures of psychological responses following abortion. The authors noted that some individual women may experience severe distress or psychopathology following abortion, but that it is not clear whether these effects are caused by abortion. They concluded that severe negative reactions to abortion are rare and that abortion is "usually psychologically benign" (p.1203).

In their review, Wilmoth, de Alteriis, and Bussell (1992) were cautious in characterizing the psychological effects of abortion. The authors noted that methodological limitations made it impossible to determine conclusively the prevalence of adverse psychological reactions to abortion and whether abortion itself was the cause of negative effects. However, they concluded that studies that found abortion to have psychological effects similar to childbirth were more methodologically rigorous than studies that found "post-abortion syndrome" to be a common reaction.

In the years since these reviews appeared, the two major theoretical perspectives noted above by Adler and colleagues (1992) persist in studies of abortion's effects, although the focus on psychopathological responses and "post-abortion syndrome" has become a more common orientation in abortion

research than it had been previously. Those who pursue this line of research posit that a psychopathological response to abortion is expected given the traumatic nature of abortion itself and that abortion is the cause of a broad range of adverse psychological effects, from regret to schizophrenia (Coleman, Reardon, Rue, & Cougle, 2002).

Another development in abortion research is a greater reliance on secondary data analysis to answer questions about the psychological effects of abortion. National surveys rarely include extensive abortion-specific information (e.g., partner support for abortion decision, reasons for abortion) and the depth of the analyses can be somewhat limited. Findings from studies using secondary data, however often have the advantage of wider generalizability than those from studies using regional samples.

Recent Research on the Relationship between Abortion and Depression

Studies included in this discussion are empirical studies of the relationship between abortion and depression and other psychological outcomes. The psychological effects of abortion have been described very broadly and some studies include outcomes in addition to or other than depression, such as anxiety and self-esteem. For the purposes of this discussion, depression is the primary outcome of interest. However, other psychological outcomes are reported when studies included multiple measures of psychological effects including depression, had alternative measures of

mental health and have been widely cited, or, as is the case with Coleman (2006), utilized the same dataset (Add Health) as the present study. Studies are limited to those conducted in the United States, with the exception of the New Zealand study by Fergusson, Horwood, and Ridder (2005). The New Zealand study is included because its findings has been frequently cited as evidence of a causal relationship between abortion and adverse psychological outcomes. Findings from studies in adult women are presented first, followed by findings from studies in adolescents.

Abortion and Depression in Adult Women

Original Studies

The largest and most comprehensive study of psychological responses to abortion in adult women was conducted by Major and colleagues (Major, Cozzarell, Cooper, et al., 2000; Major & Gramzow, 1999; Major, Richards, Cooper, Cozzarelli, & Zubeck, 1998; Quinton, Major, & Richards, 2001). The study built on previous work that evaluated the role of social support and personality factors in adjustment to abortion (Major Cozzarelli, Schiacchitano, Cooper, Testa, & Mueller, 1990; Mueller & Major, 1989). Women obtaining a first-trimester abortion were recruited from one of three providers in Buffalo, New York in 1993. Participants completed questionnaires before the abortion and at 1-2 hours, 1 month, and 2 years after the abortion. Data were used for four individual studies, three of which are described below and followed by a

general discussion of the larger study's strengths and limitations. The fourth study addressed differences between adolescents and adults and is discussed later.

In the first study, Major, Richards, Cooper, Cozzarelli, and Zubeck (1998) used structural equation modeling to test an integrative model of postabortion adjustment, derived from a general theory of adaptation to stressful life events. The sample included 527 women (60% of the original sample) who completed the preabortion questionnaire and the first two follow-up questionnaires (1-2 hours and 1 month following abortion). Preabortion measures included demographic information, pregnancy history (including number of prior pregnancies and their outcomes), personality measures, psychological distress (a composite index of the depression, hostility, and anxiety subscales from the Brief Symptom Inventory [BSI]) and measures of preabortion adjustment (Positive and Negative Affect Scales, or PANAS).

Outcome measures of adjustment included coping, positive well-being, decision satisfaction, and psychological distress. Positive well-being was operationalized as self-esteem and measured with a shortened 4-item version of the Rosenberg Self-Esteem Inventory. Decision satisfaction was measured with two items that gauged general feelings about and satisfaction with the abortion decision. The distress measure was the same BSI scale. The authors found that women who had more resilient personality resources (self-esteem,

perceived control, and optimism) were less likely to appraise upcoming abortions as stressful, had higher self-efficacy for coping with them, and had better outcomes following abortion (higher well-being and decision satisfaction and lower distress). The authors note that these findings are consistent with those of other prospective studies showing that the relationship between personality and adjustment is not direct, but is mediated by situation-specific appraisals.

Another important finding was that the type of coping strategy (emotional support seeking, instrumental support seeking, venting, denial, mental disengagement, acceptance, positive reframing, and religious coping) determined postabortion adjustment. The more women coped with their abortions through support seeking, acceptance and positive reframing, the better adjusted they were on all outcome measures. Women who depended more highly on disengagement, venting, and denial had lower levels of adjustment. Religious coping was associated with lower satisfaction with the abortion decision but was not related to either distress or well-being. Because of the roles that personality and appraisal appeared to play in postabortion adjustment, it is inappropriate, the authors noted, to claim that all women respond to abortion in a particular way. The findings also suggested that women who are not adjusting well after an abortion could be helped by being taught more beneficial forms of coping.

In the second study, Major and Gramzow (1999) examined whether feeling stigmatized by abortion had implications for adjustment. The sample was comprised of 442 women (50% of the original sample) who completed all 4 interviews. The outcome, psychological distress, was measured as it was in the previous study. Structural equation modeling was used to test whether women who felt stigmatized by abortion felt a greater need to keep their abortions secret which, in turn, led to attempts to suppress thoughts about the abortion and more frequent intrusive thoughts about the abortion experience. Thought suppression and intrusive thoughts were hypothesized to predict distress. The findings indicated that over half of participants felt vulnerable to being stigmatized because of having an abortion and so felt compelled to conceal the abortion from family and friends two years later. Secrecy predicted higher levels of distress in this sample through thought suppression and intrusive thoughts. The authors noted that, as long as abortion is stigmatized, there likely will be psychological consequences for some women whether they disclose or conceal their abortions.

In the third study, Major, Cozzarelli, Cooper, Zubeck, and colleagues (2000) used data from the 442 women who had completed all four questionnaires to examine women's decision satisfaction, evaluations, and mental health after abortion and whether these changed over time. Mental health outcomes included depression, positive well-being, and Post Traumatic

Stress Disorder (PTSD). Current depression was measured with the scale from the BSI described above and history of depression was measured using an adapted version of the Diagnostic Interview Schedule. Positive well-being was measured with the abbreviated Rotter Self-Esteem scale and PTSD was assessed using an abortion-specific scale that was adapted from PTSD criteria in the *Diagnostic and Statistical Manual of Mental Disorders (DSM III-R)*. Two years postabortion, 72% of the women were satisfied with their decision; 72% reported more benefit than harm from the abortion; and 80% were not depressed. PTSD symptoms were reported by 1% of the sample, which, the authors observed, is lower than the rate in the general population (10%). Overall, mental health did not decline over time. Depression decreased and self-esteem increased. However, decision satisfaction decreased and negative emotions increased. Although sadness and regret are not psychological disorders, the authors noted, the finding should not be ignored. The most important predictor of depression postabortion was history of depression. The authors suggested that women with a history of depression may be vulnerable to regret and depression no matter how an unintended pregnancy is resolved.

Strengths of the studies above included long-term follow-up, comprehensive assessment of outcomes, including PTSD, and a strong theoretical basis for research hypotheses. The two-year follow-up period made the detection of long-term effects of abortion more likely. Multiple follow-ups

over that period also enabled the researchers to test for changes in outcomes over time. This study is the first to include PTSD as an outcome and test directly the theory of "postabortion syndrome." The study is also notable for its explicit theoretical modeling of abortion's effects and, thus, represents a strong contribution to abortion research.

Limitations for the three studies described above included a high attrition rate, reliance on self-report data, and limited generalizability. Half of the original sample was lost to follow-up and it is possible the final sample is not representative of the original sample. However, the authors noted that the original and final samples did not differ on any demographic or psychological variables, implying an absence of retention bias. Reliance on self-report data is typically a concern in abortion research because abortion may be underreported (Fu, Darroch, Henshaw, & Kolb, 1998). In this case the sample was identified through an abortion experience and abortion underreporting is unlikely. However, other variables susceptible to socially desirable responding may have been biased (Hunt, Auriemma, & Cashaw, 2003), such as feelings about the abortion experience and depression. Finally, the sample was recruited from one U.S. city and findings may not be representative of a wider population.

Medi-Cal Studies

Two studies have used secondary data from California Medicaid (Medi-Cal) records to compare claims for mental health treatment between women who had an abortion and women who gave birth in 1989. Coleman, Reardon, Rue, and Cougle (2002) used outpatient claims as outcome measures and Reardon, Cougle, Rue, Shuping, Coleman, and Ney (2003) used inpatient claims.

In the Coleman et al. (2002) study, women who gave birth in 1989 but had an abortion before 1994 were excluded from analysis. Also excluded were women who had prior in- or outpatient psychiatric treatment in the previous year and those who had "aberrant and missing data" (p.144). The final study sample was 14,297 women who had an abortion during the study period (1989-1994) and 40,122 women who delivered and had no abortions during the time period.

Logistic regression, adjusted for age, months of Medi-Cal eligibility, and number of prior pregnancies, yielded odds ratios for obtaining mental health outpatient treatment at four time points (90 days, 180 days, 1 year, 2 years) after pregnancy resolution. Similarly adjusted analyses were also conducted on dichotomized outcomes for major treatment categories, including depressive psychosis, bipolar disorder, neurotic depression, schizophrenia, alcohol and drug abuse, psychalgia (mental pain or distress), and acute stress.

The authors reported that, after adjustment for other factors, women who had an abortion in the time period studied had a significantly higher first-time outpatient treatment rate than women in the birth group at 90 days, 180 days, 1 year, and 2 years. Also, women who had an abortion had significantly higher rates of outpatient claims overall and of treatment claims within the categories of adjustment reaction, bipolar disorder, neurotic depression, and schizophrenic disorders. No significant differences between groups in outpatient treatment for other types of depression (unclassified depression, single episode and recurrent episode depressive psychosis) were found (Coleman, et al., 2002).

The Coleman et al. (2002) study has several shortcomings. First, the composition of comparison groups is problematic and limits the generalizability of findings. The authors refer to the groups as "delivery" and "abortion," however, the delivery group may have included women who had abortions before the study period and the abortion group did include women who subsequently carried pregnancies to term. Dropping women from analysis who gave birth in 1989 and subsequently had an abortion in the following four years further biased the sample, as did eliminating women who received psychiatric treatment in the previous year. Also, a large number of women were dropped for "aberrant and missing data," a much larger percentage of which were in the abortion group. Furthermore, the creation of "abortion" and

"birth" groups ignores the reality that abortions are more likely than births to

result from unwanted and unintended pregnancies. The life circumstances of a

woman who terminates an unwanted pregnancy are likely to vary from those of

a woman who carries a wanted pregnancy to term in important and complex

ways that affect mental health (Major, 2003). In addition to information about

wantedness of pregnancy, the data also lack information about other

confounding factors such as race and ethnicity and marital status. Finally, the

authors draw inappropriate conclusions from their findings. For example, the

authors say that women in the "aborting" group had more subsequent

pregnancies than those in the "birth" group which may have obscured larger

differences between the groups because

> many women may perceive their abortions as personal failures
> and as a result are driven to become pregnant again to achieve
> some degree of success by carrying to term. Other women who
> find themselves pregnant relatively soon after an abortion may
> feel that the abortion was a mistake, as they actually desired to
> have a child. In such cases, it is easy to see how a replacement
> pregnancy might attenuate mental health risks. (p.148)

The authors ignore the fact that almost half of pregnancies in the U.S. are

unintended (Henshaw, 1998) and that women who experience one unintended

pregnancy are at risk for future unintended pregnancies (Jones, Singh, Finer, &

Frohwirth, 2006; Raneri & Wiemann, 2007). Furthermore, the authors

misrepresent and disregard previous studies that have found no adverse

psychological effects of abortion when they conclude, "the evidence for a causal model is accumulating" (p.149).

In the second study using Medi-Cal data, Reardon, Cougle, Rue, Shuping, Coleman, and Ney (2003) reported that women who had an abortion had significantly higher rates of inpatient treatment for single-episode depressive psychosis, recurrent depressive psychosis, adjustment reaction, and bipolar disorder. Limitations associated with the earlier Medi-Cal study also apply to this study because the samples were the same. In a commentary included in the same journal issue, Major (2003) notes that Reardon and colleagues, in this and other studies, fail to control for important social and psychological variables associated with both poorer mental health and abortion, such as socioeconomic status and not being involved in an intimate relationship, which may explain an association between them. She also notes that Reardon and colleagues fail to cite studies that do not support their own conclusions.

NLSY79 Studies

Other studies relying on secondary data analysis have used data from the National Longitudinal Study of Youth (NLSY79). NLSY79 is a nationally representative sample of 14-22 year olds first surveyed in 1979. The survey was intended to provide information on labor market experiences of Americans; however, it also contains information on many other variables,

including educational attainment, health conditions, alcohol and substance use, marital and fertility history, and sexual activity. The NLSY79 was administered annually, starting in 1979, then biennially since 1994.

The first NLSY79 study involving abortion and mental health was done by Russo and Zierk (1992). The outcome in this study was positive mental health, operationalized as self-esteem. Although depression was not an outcome in the study, findings are included in this discussion because the study has been frequently cited in the abortion literature (e.g., Adler, 2000; Pope, Adler, & Tschann, 2000; Major, Cozzarelli, Cooper, Zubek, et al., 2000; Cougle, Reardon, & Coleman, 2005). The sample for the study included all women for whom there were self-esteem measures in 1987 (N=5,295, 90% of the women interviewed in 1979). Self-esteem was assessed by the validated Rosenberg Self-Esteem Scale (Rosenberg, 1965). The authors posed three research questions:

> 1) Is the well-being of women having abortions less than that of other women?
> 2) If there is a relationship between abortion and well-being, can it be explained by other variables, such as the impact of a (a) childbearing or contextual variables or (b) the level of well-being that existed before the abortion?
> 3) Is the relationship of abortion to well-being greater with increased time since the last abortion? (p. 271)

To answer the first question, the authors provided descriptive statistics on self-esteem scores for 1987 and 1980 (conceptualized as prior self-esteem),

and numbers of abortions, children, and wanted and unwanted pregnancies for five subgroups: all women; women having abortions; mothers; mothers with wanted births; and mothers with unwanted births. These groups were not exclusive—each group included some percentage of women who also had abortions. Therefore, although the table is illustrative of the overlapping experiences of women who have abortions and give birth, the authors noted that it is not appropriate to make comparisons between the groups.

Correlations between the major study variables indicated that the only abortion variable that was significantly correlated with 1987 self-esteem was having had one abortion, and the association was positive, though slight (.03, $p<.05$). However, ANOVA showed no significant differences in self-esteem between women who had no abortions, one abortion, and repeat abortions. The authors also reported that only unwanted birth showed a significant main effect (negative) on self-esteem when both unwanted birth and abortion status were considered. A similar analysis included abortion status, unwanted births, and poverty and found a significant main effect (negative) only for poverty on self-esteem. The authors noted these findings affirm the need to take into account unwanted births and income when investigating the relationship between abortion and women's well-being.

To answer the second question, the authors conducted hierarchical multiple regression. The first model included variables related to childbearing

and coping resources and the second model added abortion variables (one abortion and repeat abortion). Neither of the abortion variables was significant in the model. The childbearing variables included whether or not a woman had children, number of wanted births, number of unwanted births, and the number of children. Only number of children was significant and its relationship to well-being was negative. Although one might expect collinearity among related childbearing variables, no collinearity diagnostics for the regression equations are reported.

Similar analyses were conducted to evaluate the relationship of prior self-esteem (measured in 1980) to current self-esteem. Again, the abortion variables were not significant, while prior self-esteem was significant and positive, and number of children was significant and negative.

To answer the third question, the authors conducted correlation analyses between variables representing year of first abortion, year of last abortion, and last abortion greater than seven years prior and found that none were correlated with self-esteem. ANOVA tests indicated that women whose last abortion was more than seven years prior (before 1980) and women whose last abortion was within the previous seven years did not differ in mean self-esteem. Also, the authors examined self-esteem levels among four groups defined by whether or not a woman ever had children and whether the last abortion was more or less than seven years previously. Women without

children who had the abortion more than seven years previously had the highest self-esteem, followed by childless women who had abortions less than seven years previously, mothers who had abortions more than seven years previously, and, lastly, mothers who had had an abortion within the previous seven years.

In summary, Russo and Zierk (1992) found that abortion status was not a significant predictor of self-esteem although unwanted birth was. The best predictor of self-esteem in 1987, they found, was self-esteem in 1980. They maintained that, because of likely underreporting, NLSY data should not be used for constructing population estimates. The authors also note that their findings may not reflect current conditions because high-profile anti-abortion groups such as Operation Rescue have contributed to a systematic stigmatization of abortion since the early 1990s. Effects of abortion, the authors noted, may be different given an increase in social stigma that may affect women's self-esteem.

Russo and Dabul (1997) conducted a follow-up study to Russo and Zierk (1992) to test whether race and religion moderated the relationship of abortion to well-being. The first set of analyses repeated the Russo and Zierk (1992) analyses, but analyses were stratified for Black women and White women. The second set of analyses concerned religious identification (particularly whether a woman is Catholic or not) and religiosity.

In the first set of analyses, the authors found that Black women did not differ significantly from White women in mean levels of self-esteem, though they did have more abortions, more children, fewer years of education, and lower incomes. Abortion was not correlated with and did not predict self-esteem in Black or White women. Also, similar to White women, there were no differences in mean levels of self-esteem between Black women who had no abortions, one abortion and repeat abortions. In the second set of analyses, the authors repeated the analyses with Catholic and non-Catholic women and found that self-esteem before the abortion persisted as the best predictor of self-esteem after abortion and that being Catholic was not significant in the analyses.

Reardon and Cougle (2002) also conducted analyses using the NLSY79 data. The authors intended to test whether prior psychological state was equally predictive of subsequent depression among women with unintended pregnancies regardless of whether the women had an abortion or carried their pregnancies to term. The items used to measure depression in 1992 comprised a validated scale for the identification of those with clinically significant depressive symptoms (Center for Epidemiological Studies depression scale, or CES-D). The items used to measure "prior psychological state" were four items from the Rotter internal-external locus-of-control scale. The sample included women for whom there was complete information on all control

variables and who had their first abortion or first unintended delivery between 1980 and 1992. The sample size was 421. Logistic regression stratified by marital status in 1992 was used to compare the percentage of women in both groups who scored within the "high risk" range for depression (CES-D score >15). Among married women, those who terminated their first pregnancy were significantly more likely to be at high risk of depression. The difference was not significant among unmarried women.

The findings of this study are compromised by a number of shortcomings as noted by Kahn (2002) and others (Billings, 2002; Lee, 2002). First, the procedures used to identify the sample underidentified women with unintended births. Reardon and Cougle, however, reported that results did not change in a corrected analysis (Reardon, 2002b). Also, the marriage variable could be misleading. Marriage was measured in 1992 and the pregnancy events occurred between 1980 and 1992, thus women in the married category may or may not have been married at the time of their abortions. Furthermore, as Kahn noted, the four Rotter scale items have a Cronbach's α of 0.35 and were likely an inadequate proxy for prior psychological state.

Cougle, Reardon, and Coleman (2003) also used data from the NLSY79 to determine if women whose first pregnancies ended in abortion had higher rates of long-term depression than women who carried to term (the average time span was about eight years after abortion or birth). The four-item

Rotter locus-of-control scale was again used as a proxy for prior psychological health, and the CES-D scale was used to measure depression. A single item from the scale was analyzed as a separate outcome because it was conceptually similar to self-esteem ("as good as other people"). Women whose first birth was carried to term and who later had an abortion were dropped from the analysis. The number of women who had a first abortion or delivery between 1980 and 1992 and who had 1979 Rotter scores and 1992 CES-D scores was 1,884.

Logistic regression analyses were conducted with controls for age, race/ethnicity, education, income, marital status, history of divorce, and locus of control scores. The result was significant, OR=1.65, p=.011, indicating the women whose first pregnancies ended in abortion were more likely to be depressed than women who carried their first pregnancies to term. Analysis of covariance indicated that there was no difference between the groups on the single item from the CES-D conceptually similar to self-esteem. The authors said their findings were consistent with Russo and Zierk (1992) and at the same time demonstrate that women whose first pregnancy ended in abortion have higher risks of long-term depression than women whose first pregnancies are carried to term.

As noted in the earlier study, the 4-item Rotter scale is likely an inadequate proxy for prior psychological health. A range of other important

covariates were not included in the analysis, including the absence of information about subsequent pregnancies and their outcomes. The absence of information about subsequent pregnancies (which is available in the NLSY79 data) and the choice to drop women in the birth group who later had abortions biased the findings.   That is, the experience of abortion is not isolated and the effect found in this study could reflect other unmeasured variables, such as repeated unintended pregnancy.

The most recent study that relied on NLSY79 data was conducted by Schmiege and Russo (2005) in response to the earlier Reardon and Cougle (2002) study. The authors examined whether outcome of a first pregnancy, either abortion or delivery, was associated with depression. Pregnancies were limited to those that were unwanted, as described by Reardon and Cougle. The sample for the study was 1247 for unadjusted analyses and 1004 for adjusted analyses (including the same explanatory variables used in the previous study). The authors noted the sample differed from Reardon and Cougle's and attributed the difference to 1) coding errors in the previous study and in the corrected version; 2) inclusion of women in the delivery group who subsequently had abortions, and 3) inclusion of women whose first pregnancy occurred before 1979. Schmiege and Russo relied on coding language used by the NLSY79 survey staff and conducted analyses with and without women

who had their first pregnancies before 1980, in order to parallel the previous study and use the 1979 locus of control measure.

The group that delivered first pregnancies before 1980 had a significantly higher proportion of those with depression than the other three groups (delivered first pregnancies after 1980, terminated first pregnancies before 1980, terminated first pregnancies after 1980). Results of logistic regression analyses indicated that outcome of first pregnancies that were unwanted did not predict depression in 1992, either before or after adjustment for explanatory variables. This finding was consistent for the full sample and the smaller sample of women whose first pregnancy was after 1980. The authors noted that the previous study's exclusion of a major proportion of adolescent pregnancies compromised their ability to generalize their findings to first pregnancies that are unwanted. Other differences between the studies are likely attributable to differences in coding and sample selection.

Other Studies with Secondary Data

New Zealand researchers used secondary data from the Christchurch Health and Development Study, a longitudinal study of a cohort of 1,265 children born in the Christchurch, New Zealand area followed from birth to age 25 (Fergusson, Horwood, & Ridder, 2006). The sample was young women for whom information on pregnancy history and mental health outcomes was complete, ranging from 506 to 520 (80-83% of the original

cohort of 630 females). Pregnancy and outcomes since the previous interview

were assessed at ages 15, 16, 18, 21 and 25. By age 25, 205 women (41%)

reported at least one pregnancy and 74 (14.6%) reported at least one abortion.

Of the total 422 pregnancies reported, 90 ended in abortion (21.3%). From this

information, three mutually exclusive groups were created for analysis: never

pregnant; pregnant without abortion; and pregnant with abortion. Depression,

anxiety disorder, alcohol dependence and illicit drug dependence were

assessed at ages 16, 18, 21, and 25 years using the Composite International

Diagnostic Interview (CIDI) and other measures not described by the authors.

From this information, the authors ascertained the proportion of women who

met DSM-IV criteria for each psychological outcome. Random effects models

for repeated measures were used to determine the association between group

membership and psychological outcome before and after adjustment for

possible confounding. Covariates included background factors, family

functioning, childhood conduct problems, teacher achievement ratings from

ages 11-13, personality ratings at age 14, adolescent adjustment measures

(early onset of sexual intercourse, substance and tobacco use, mental health

problems) and young adult living arrangements 18-25 (living with parents,

cohabitating).

For all outcomes except alcohol dependence, there were significant

associations between pregnancy history and psychological outcomes, with

proportions lowest among those who did not have a pregnancy. In pairwise comparisons, the pregnant with abortion group had higher proportions of disorder than the pregnant without abortion group, with the exception of anxiety disorder. The results showed similar patterns after adjustment for covariates, with women in the pregnancy with abortion group having higher proportions of disorder. A supplementary prospective analysis indicated that women with an abortion history prior to age 21 also had a greater number of mental health problems from ages 21-25 than women in the other two groups. This analysis was limited to overall number of disorders, the authors explain, because relatively sparse data for specific disorders was available in the age 21-25 interval.

The strengths of this study include the longitudinal design and assessment of mental disorders using standardized diagnostic criteria. The limitations noted by the authors that may threaten study validity are omitted covariates that might explain associations between abortion and mental disorders and the absence of contextual factors, such as pregnancy intendedness and other stressful life events.

Additionally, the context of abortion provision in New Zealand is specific to New Zealand and may limit the generalizability of findings beyond that country. According to Fergusson, Boden, and Horwood (2007), abortion in New Zealand is granted after two specialists agree that one of the following

conditions has been met: the pregnancy would seriously harm the life or the physical or mental health of the woman or future child; the pregnancy is the result of incest; or the woman is severely mentally handicapped. Abortion also may be considered when the pregnancy is the result of rape or on the basis of age. The experiences or conditions necessary to obtain an abortion in New Zealand may themselves be associated with subsequent mental health. Findings, therefore, may not be generalizable to women in the U.S, where abortion provision and access are determined by different factors (e.g., access to a provider, cost).

The most recent study using nationally representative data was conducted by Rees and Sabia (2007). The authors tested whether the risk of major depression associated with abortion is different than other pregnancy outcomes after adjusting for prior depression. Data were derived from the Fragile Families and Child Wellbeing Study, a representative study of U.S. women living in large urban areas who recently gave birth. Baseline interviews were conducted with new mothers in a hospital setting between February 1998 and September 2000. Two follow-up interviews were conducted, the first approximately one-year later and the second approximately three years after the baseline interview. Depression was measured using the Composite International Diagnostic Interview – Short Form (CIDI-SF). Fifteen mutually exclusive categories of fertility history were created based on

women's experiences between follow-up interviews. Ninety-five percent of respondents belonged to the first five categories: 1) women who had an abortion between follow-up interviews but no other pregnancy outcomes; 2) women who had a miscarriage or stillbirth but no other pregnancy outcomes; 3) women who had a live birth but no other pregnancy outcomes; 4) women who did not become pregnant again between interviews; and 5) women who were pregnant at the time of the second follow-up interview but had not other pregnancies since baseline. The other 10 categories included multiple pregnancy outcomes and adoption.

The change in the percentage of women with symptoms of depression between the first and second follow-up interviews was estimated for each category. The number of women in category 1 (abortion but no other pregnancy outcome) with depressive symptoms had increased by 11.3 percentage points and the number in category 3 (live birth but no other pregnancy outcome) had increased by 7 percentage points. Both categories 1 and 3 had increases higher than the reference group, category 4 (women who had not become pregnant again). Logistic regression was conducted to determine whether personal and household characteristics would explain the finding that both women who had an abortion and women who gave birth were more likely to develop depression.

For analyses, four variables were created to indicate whether the respondents reported abortion, miscarriage, birth, or ongoing pregnancy at the second follow-up interview. These categories were not mutually exclusive in the case of women who reported more than one pregnancy. The pregnancy outcome reference group was women who did not become pregnant between follow-up surveys. After adjusting for personal and household characteristics (age, income, marital status, race and ethnicity), abortion was associated with a 2.16 fold increase in the risk of depressive symptoms and giving birth was associated with a 1.51 fold increase. The two odds ratios were statistically indistinguishable. Adjusting for prior symptomology did not significantly alter the effects of abortion or birth.

As noted above, comparing women who have abortions to women who do not become pregnant is inappropriate because it confounds the experiences of unintended pregnancy and abortion. However, Fragile Families does not include information on intendedness. The authors, therefore, attempted to isolate the experience of abortion by comparing it with all pregnancy outcomes, including birth and multiple outcomes. The categorization of pregnancy outcomes acknowledges that birth and abortion are not exclusive categories for all women and is a particular strength of the study. It is important to emphasize that the results of this study are generalizable only to the population of new mothers living in large U.S. cities. The relationship

between abortion and depression could be different among rural women,

women living in small towns, and women who have not had children.

Abortion and Depression in Adolescents

Few studies of adolescents' responses to abortion have been conducted. In general, the studies have had three aims: 1) compare adolescents who had abortions with adolescents who did not; 2) compare adolescents who had abortions with adult women; and, 3) identify predictors of negative responses to abortion among adolescents.

Zabin, Hirsch, and Emerson (1989) followed 360 Black adolescents who sought pregnancy tests from two Baltimore family planning clinics in order to compare psychological responses of adolescents who had an abortion with adolescents who did not. Depression was not an outcome in the study; however, the study is included in this discussion because it is the only original study to include a comparison group of adolescents who did not have an abortion. Of eligible participants, 93% completed baseline interviews. Those with positive pregnancy results were divided into two groups, those who chose abortion (*n*=141) and those who carried the pregnancy to term (*n*=93). The third group was comprised of those whose pregnancy test was negative (*n*=100).

Ninety percent of the baseline sample participated in follow-up interviews at 6-month intervals for two years. Information collected included demographics, household economics, educational achievement and aspirations, contraceptive and sexual behavior, as well as measures of psychological

functioning, including anxiety, stress, and self-esteem. The adolescents who had an abortion did not differ significantly from their peers on measures of psychological functioning at baseline and were doing as well or better than the other two groups at the second year follow-up.

The authors noted a relationship in the findings between psychological functioning and educational and economic attainment. Those who had an abortion were less likely to experience a pregnancy during the subsequent study period than the other groups. However, those who had an abortion and who subsequently had a child were more likely than other members of the abortion group to experience both a negative educational change and a negative psychological change during the study period. Thus, the authors noted, the negative consequences, economic and psychological, observed in the study over time appeared to be a consequence of early motherhood.

As the authors also noted, given the sampling method, the findings are not generalizable to all adolescents. Furthermore, additional psychological measures, particularly validated measures of depression, would have provided a fuller picture of psychological functioning and enabled comparisons with other studies that use depression as an outcome. The longitudinal nature of the study, however, and the excellent retention rate contributed to the strength of the findings.

Franz and Reardon (1992) conducted a study of adolescent and adult women drawn from groups whose members self-identify as having "postabortion problems." Two hundred and fifty-two women from 42 states in the U.S. completed mail surveys. The response rate was not reported. Information collected included demographic information, age at abortion and gestational age, as well as items about the abortion experience on which the respondent rated her agreement, for example, "the feeling of being misinformed about the abortion experience, the severity of the physical problems related to the abortion, the severity of the psychological problems related to the abortion" (p. 164). No validated scales of psychological functioning were included. The authors reported that adolescents in this sample had greater psychological stress following abortion than adult women and that they were more dissatisfied and were more likely to have felt pressured into having the abortion. As the authors noted, results from this study cannot be generalized. Despite the authors' caution, this study is frequently cited by some (including the second author) as demonstrating the increased susceptibility of adolescents to adverse psychological problems following abortion (e.g., Cougle, Reardon, & Coleman, 2005; Coleman, 2005; Coleman, Reardon, Strahan, & Cougle, 2005; Coleman, 2006; Doctors for Life International, n.d.).

Pope, Adler, and Tschann (2001) compared adolescents with adult women and identified predictors of negative responses to abortion among

adolescents. Women ages 14-21 were recruited from four clinics in the San Francisco area. Ninety-six women were interviewed 1-2 days before having an abortion. Sixty-three women (66%) were interviewed 4 weeks later. The number of eligible women who declined participation is not reported. The preabortion questionnaire included information on sociodemographics (age, race/ethnicity, religion, frequency of attendance at religious services, marital status, living situation, and level of education), prior pregnancies and prior abortions, perceived pressure to have an abortion from partner and from parents, emotions related to the planned abortion, and depression as measured by the validated Beck Depression Inventory (BDI) scale. The postabortion questionnaire included emotions and depression as well as validated measures of anxiety, self-esteem, stress and positive states of mind. Chi-square and Student's *t*-tests were used to compare groups and paired *t*-tests to compare pre- and postabortion measures.

In comparison with women aged 18-21, women aged 14-17 were less comfortable with their abortion decision, though both groups were relatively comfortable (3.80 and 3.08 on a 5-pt. scale from "not at all comfortable" to "very comfortable"). There were no other differences between the groups, including on depression scores.

In the comparison of pre- and postabortion scores for adolescents, there was a significant decrease in depression scores and internally based negative

emotions and a significant increase in positive emotions. To analyze

postabortion adjustment, a single measure was generated by summing

standardized scores on the BDI, self-esteem, anxiety, stress, positive states of

mind and emotion scales (without the positive emotions subscale, as indicated

by principal components analysis). Significant predictors of poor postabortion

adjustment were baseline emotional state and the degree to which a woman felt

pressured by her partner to have an abortion. Generalizability of the findings is

limited because the sample was small and recruited from a single, though

diverse, location. Despite this limitation, the finding that abortion does not

pose a psychological risk to adolescents is strengthened by the use of validated

scales and pre- and postabortion measures.

Quinton, Major, and Richards (2001) also compared the responses of

adolescent and adult women to abortion as part of a larger study of the

psychological effects of abortion (see earlier discussion of Major, Richards,

Cooper, Cozzarelli, & Zubeck, 1998). The sample for the study of adolescent

response to abortion was comprised of 442 women (50% of the original

sample) recruited from clinics in Buffalo, New York who had completed two

follow-up questionnaires, at one month and at two years. Outcomes included

depression, decision satisfaction and benefit-harm appraisals. Depression was

measured using the BSI, as described in Major et al. (1998). The authors used

chi-square analyses and analyses of variance to test whether there were differences between minor and adult women in postabortion adjustment.

At one month, adolescents were slightly less satisfied and perceived less benefit from the abortion than adult participants. There was no difference, however, in depression scores between minors and adults. At two years postabortion, there were no differences between adult and adolescent women in depression, decision satisfaction or perceived benefit of the abortion. The long-term follow-up period was a particular strength of this study. However, generalizability is again limited due to recruitment from a single city and a moderately high percentage of initial participants lost to follow-up.

One more recent study attempted to address the generalizability limits of earlier studies of adolescent responses to abortion. Coleman (2006) used nationally representative data from Wave I (1995) and Wave II (1996) of the National Longitudinal Study of Adolescent Health (Add Health) to compare adolescents who terminated an unintended pregnancy with those who carried an unintended pregnancy to term. In the first set of analyses, a series of logistic regressions was used to test whether demographic, education, psychological, and family factors were related to pregnancy outcome. Only self-characterization as a risk-taker and desire to leave home were related. Those two factors were than included in another series of logistic regressions examining the role of abortion in a range of outcomes related to mental health,

substance use, and problem behavior. Results indicated that adolescents who had an abortion in the previous year were more likely to have received psychological counseling, reported more frequent sleep problems and more frequent marijuana use than those who carried to term. There were no significant effects of abortion on cigarette smoking, alcohol use, problems with parents or school problems.

The author said that sleep problems may indicate the presence of PTSD or something less serious among women who had an abortion.

> For example, women who have had an abortion may be more
> prone to nightmares than women who have carried to term due
> to negative experiences during the procedure or unresolved
> feelings about the abortion, which may not have been dealt
> with effectively during the day and could intrude upon sleep.
> (p.909)

These conclusions are not justified by the study findings. The items that measured receipt of psychological or emotional counseling and frequent sleeping problems referred to the previous year, that is, whether the respondent had received counseling in the previous 12 months and how often the respondent had experienced trouble sleeping in the previous 12 months. Because abortion was measured in the same time frame, it is impossible to determine which came first, abortion or counseling and sleep problems. An equally plausible explanation for the findings is that adolescents faced with unintended pregnancy were more likely to experience sleep problems and seek

counseling. However, Coleman does not suggest alternative explanations, saying instead the findings "provide some support for the notion of a direct causal link between abortion and mental health" (p. 909).

Sample misidentification also undermines confidence in the findings. The author noted the sample was comprised of 130 female adolescents who reported an "unwanted" pregnancy (unwanted at the time of conception), 65 of whom had an abortion and 65 who carried the pregnancy to term. Examination of the Add Health data, however, indicated that there were 52 adolescents who terminated an unwanted pregnancy (as defined by Coleman) and 85 women who carried a similarly described pregnancy to term. That is, the sample the author described included more cases of abortion than exist in the data and fewer cases of pregnancies carried to term. Coleman did not respond to this author's request for clarification about how the sample was constructed.

Unintended Pregnancy and Depression

Studies on pregnancy and depression have overwhelmingly concentrated on postpartum depression (e.g., Dole, Savitz, Siega-Riz, et al., 2004; Lobel, Dunkel-Schetter, & Scrimshaw, 1992), and the outcomes of interest are typically the well-being of infants and children born to depressed mothers (Orr & Miller, 1997). Depression in the postpartum (in the period following delivery), however, may be unlike depression at other times in women's lives. Gotlib at al. (1989) found that women who were depressed

during pregnancy were younger, less educated, had more children in their

households, and were more likely to characterize their occupation as

"housewife" than their nondepressed peers. In contrast, postpartum depression

was not related to any of the sociodemographic variables, with the exception of

the housewife occupation. The authors concluded that it is likely that

postpartum and pregnancy depressions are associated with different

psychological or etiological factors.

Gotlib and colleagues (1989) did not consider pregnancy intention in

their study; in fact, the role of unwanted and unintended pregnancy in the

etiology of depression among women is seldom investigated. However, the

few studies that have focused on pregnancy intention have had compelling, if

limited, findings.

Orr and Miller (1997) examined whether exposure to unwanted and

unintended pregnancy increased the risk of depression among pregnant

women. The sample was 1,163 Black women enrolled in prenatal care clinics

that served low-income residents in the Baltimore area. Fewer than 5% of

those asked to participate declined. The self-administered questionnaire

included information on intendedness of pregnancy (measured as in the

National Survey of Family Growth or NSFG), exposure to stressors (measured

by a 40-item checklist that included information on relationships, finances,

employment, neighborhood characteristics, etc), social support, life

satisfaction, and depressive symptoms measured by the CES-D. Unintended

pregnancy was associated with lower levels of education and being younger

and unmarried. Those with unintended pregnancies, both mistimed and

unwanted, had significantly higher rates of elevated depression scores (10.2%

and 20.7%, respectively) than did those whose pregnancies were wanted at the

time of conception (5.4%).

The particular strength of the study is that pregnancy intendedness was

assessed before childbirth and was, therefore, less likely to be biased than

measures collected retrospectively. The study, however, could have been

strengthened by including multivariate analysis. The data were analyzed using

contingency tables and χ^2 only and, therefore, it is not known whether the

relationship between pregnancy intention and depression persists after

controlling for other factors, for example, education, age, and marital status.

Messer, Dole, Kaufman, and Savitz (2005) also measured intendedness

prior to delivery in their study of the relationship between pregnancy intention

and maternal psychosocial factors related to preterm birth. Of the 2533 women

recruited from prenatal care clinics in central North Carolina, over 80%

completed a mail-back psychological assessment and over 90% of those also

completed an additional telephone interview. The interview included

information on pregnancy intention, demographic characteristics and

pregnancy history, for a final sample of 1908 participants.

Pregnancy intention in the Messer et al. study (2005) was measured using questions from the NFSG. Depression was measured using the CES-D and two cut-points to describe medium and high levels of depressive symptoms. Logistic regression was used to generate odds ratios for the associations between pregnancy intention and maternal psychosocial variables, including depression. Additional findings on the relationships between psychosocial factors and women's risk of preterm birth (the major aim of the study) are not included here.

Women with unintended pregnancy (not wanted at all and mistimed) had higher risks of medium and high levels of depression compared with those with intended (wanted at the time) pregnancies. Women with unintended pregnancy were more than 3 times more likely to have high levels of depressive symptoms than women with intended pregnancies (Messer, et al., 2005).

The authors noted that assessing pregnancy intention only in a population of women who plan to deliver may be problematic because it does not include women who terminate unintended pregnancies. They also noted that the analyses are cross-sectional and cannot test whether the unintended pregnancy was a cause of depression, whether depression put women at risk for unintended pregnancy, or whether those who are depressed defined their pregnancies as unintended because of their emotional state. Despite the

weaknesses and perhaps limited generalizability based on regional recruitment, the study had several strengths. The sample was large enough to detect modest effects of intendedness on depression and a range of other psychosocial variables and, taken together, the findings begin to elucidate the relationship between pregnancy intendedness and maternal mental health.

Summary

Relatively few studies of the effect of abortion on depression have been conducted. Most studies on abortion have found abortion to be "psychologically benign." Other studies, however, have documented higher rates of poor mental health outcomes, such as depression, among women who had an abortion. Prior research suggests the importance of considering the context in which women seek abortions when examining the mental health consequences of abortion (Major, 2003). Women who seek an abortion are typically faced with an unwanted or unintended pregnancy. The effects of unintended pregnancy itself on mental health have not been widely studied and are not well understood. However, findings from studies in pregnant women suggest that unintended pregnancy is associated with increased risks of depression. It is possible that ignoring the context of unintended pregnancy when examining the role of abortion in depression leads to spurious conclusions about the relationship between abortion and depression. That is, associations demonstrated in some previous studies between abortion and depression may actually reflect effects of unintentional pregnancy or factors related to unintended pregnancy.

The present study had two objectives: 1) to determine whether adolescents who had an abortion had an increased risk of depressed mood in the short term and five years later compared with their peers who did not have

an abortion; and 2) to examine whether increased risk of depressed mood in young adulthood was associated with unintended pregnancy in adolescence.

This study has the potential to increase understanding of abortion's effect on women's mental health. The data used in the study are representative of U.S. adolescents, include validated measures of depression, and follow adolescents over time. Based on the research objectives, the primary research hypotheses were:

1) The effect of abortion on short-term depressive symptoms is not significant after adjustment for confounders,

2) The effect of abortion on long-term depressive symptoms is not significant after adjustment for confounders, and

3) Unintended pregnancy is associated with long-term depressive symptoms after adjustment for confounders.

CHAPTER 3. METHODS

Overview and Rationale

This study utilized data from the National Longitudinal Study of Adolescent Health (Add Health), the largest and most comprehensive study of adolescent health yet conducted (Harris, Florey, Tabor, Bearman, Jones, & Udry, 2003). More specifically, data for this study were drawn from the in-home interviews from Waves I, II, and III of the Add Health restricted-use contractual dataset (Udry, 2003). Data security plans were approved by the University of North Carolina at Chapel Hill and Oregon State University. Study procedures were approved by the Oregon State University Institutional Review Board.

The Add Health dataset has several important features that make it uniquely suitable for this study. First, the data are representative of U.S. adolescents in grades 7 through 12 in 1995. Many of the studies on the effects of abortion have been conducted with samples drawn from a particular subgroup or from clinics in one city (e.g., Major, Cozzarelli, Cooper, et al., 2000; Zabin, Hirsch, & Emerson, 1989). Although these studies were well-designed and comprehensive, the generalizability of findings was limited. Furthermore, studies that have used representative samples have relied on data primarily from the National Longitudinal Survey of Youth (NLSY) and were not specific to adolescents (e.g., Reardon & Cougle, 2002; Russo & Zierk,

1992). Other studies have used data collected in New Zealand (Fergusson,

Boden, & Horwood, 2007; Fergusson, Horwood, & Ridder, 2006) or data

collected only from new mothers in U.S. cities (Rees & Zabia, 2007). As with

other large, national data sets, Add Health data were not collected for the

purpose of evaluating the effects of abortion on mental health and did not

include specific information on the abortion experience. Add Health data are,

however, both recent and representative of U.S. adolescents and young adults

and, therefore, findings can be broadly generalized.

Second, the measure of depressed mood used in Add Health is a

modified version of the Center for Epidemiological Studies Depression scale

(CES-D, Radloff, 1977), a validated scale that reliably identifies those with

clinically significant depression (Dierker, Albano, Clarke, et al., 2001; Gotlib

& Cane, 1989; Roberts, Lewinsohn, & Seeley, 1991). Depression has been

called the most significant mental health risk for women, especially younger

women (Glied & Kofman, 1995). According to the World Health

Organization, depression is expected to be a leading cause of disability

worldwide by 2020 (Murray & Lopez, 1996). Therefore, advancing the

understanding of the relationship between abortion and depression could have

wide-reaching consequences.

Finally, the Add Health data are longitudinal and allow for both the

establishment of the temporal association between abortion and depression

and for the detection of long-term effects. Some studies have found an association between abortion and depression but have been unable to establish whether abortion preceded or followed depression (e.g., Coleman, 2006). Other studies have suggested that effects of abortion may only be evident after months or years have passed (e.g., Miller, 1992; Reardon, Rue, Shuping, Coleman, & Ney, 2003).

This chapter begins with a description of the Add Health study, followed by a description of the study sample. Next, details of the measures used are provided. Finally, the analyses used to answer the research questions are presented.

The National Longitudinal Study of Adolescent Health

This study used secondary data from the National Longitudinal Study of Adolescent Health (Add Health), a nationally representative survey of U.S. adolescents in grades 7 through 12 in 1995 (Resnick, Bearman, Blum, et al., 1997). Add Health is a project of the Carolina Population Center at the University of North Carolina at Chapel Hill and is funded by the National Institute of Child Health and Development in cooperation with other federal agencies. J. Richard Udry is the primary investigator and Udry, Peter S. Bearman, and Kathleen Mullan Harris are responsible for the study design (Harris, Florey, Tabor, et al., 2003).

The primary sampling frame for Add Health included all high schools in the United States that had at least 30 students in the school and an 11th grade (N=26,666). Schools were sorted by size, school type, region, level of urbanization, and percentage white. Of these, a stratified random sample of 80 schools was selected. Seventy-nine percent of the schools (n=52) agreed to participate. The remaining 28 schools were replaced by similar high schools, matched on size, type, level of urbanization, percentage white, percentage black, grade span, census region and division. For each high school, the largest "feeder school" (schools that included a 7th grade and sent graduates to the high school) also was recruited when available. Overall, 145 middle, junior high and high schools participated.

Of the 119,233 eligible students in grades 7 through 12 at participating schools, 90,118 (76%) completed a 45-minute questionnaire. The in-school questionnaire was administered once, in year 1 (between September 1994 and April 1995). Participants ranged in age from 11-21, though the vast majority of participants were between 13 and 18 years old. From the school rosters of students and the pool of participants who had completed an in-school questionnaire, a core sample of 15,243 stratified by sex and grade was selected to participate in in-home interviews.

Between April and December 1995, 12,105 respondents comprising the representative sample (only the adolescents selected to be in the group that

can be used to make nationally representative estimates were assigned sample weights) and 8,640 respondents comprising selected samples (ethnic samples, genetic samples, and a disabled sample, for a total of 20,745) completed the first in-home interview (Wave I, 78.9% response rate), which varied from one to two hours depending on the respondent's age and experiences. Less sensitive data, such as nutrition and health status, were collected via Computer Assisted Personal Interview (CAPI), in which the interviewer entered the respondent's answers into a laptop computer. For more sensitive topics, such as sexual behavior and substance use, data were collected via Audio Computer-Assisted Self Interview (ACASI), in which adolescents listened to questions through earphones and entered their own responses into the computer, minimizing the potential for interviewer or parental influence.

Wave II data were collected one year later, April through August 1996. Adolescents who were in the 12th grade at Wave I were not interviewed at Wave II because of grade restrictions. The interview was generally similar to that administered in Wave I and was completed by a total of 14,748 adolescents (88.2% response rate). Wave III data were collected five years after Wave II, from August 2001 through April 2002. Respondents had to be at least 18 years old and provide written consent. Of the original Wave I respondents, 15,170 were interviewed (77.4% response rate). The Wave III

questionnaire was modified to include new questions relevant to young

adulthood.

Study Sample

The study sample for the analyses of short-term depression was

comprised of female respondents with sample weights who participated in

both Wave I and Wave II in-home interviews and who had full information on

all study variables (*n*= 6,841) (see *Data Screening*). Sample weights were

only calculated for adolescents selected to be in the group that can be used to

make nationally representative estimates. This sample was reduced slightly for

the analyses of long-term depression due to attrition as noted above (*n*=5,621).

The subsample of female adolescents with at least one pregnancy

between Waves I and II was identified from pregnancy history reported at

Wave II. In Wave II, female respondents who reported ever having sexual

intercourse were asked a series of questions about pregnancy. Specifically,

they were asked, "Have you ever been pregnant? Be sure to include if you are

currently pregnant and any past pregnancy that ended in an abortion, stillbirth,

miscarriage, or a live birth after which the baby died." Respondents who

answered in the affirmative were then asked how many times they had been

pregnant. Respondents who said they had been pregnant two or more times

and whose most recent pregnancy was after January 1, 1994 were asked for

the date of the second pregnancy. Respondents were also asked how and when

each pregnancy ended and whether they had wanted to be pregnant.

To identify respondents with at least one completed pregnancy

between Waves I and II and to generate totals, data were converted to the long

format such that each line represented a pregnancy. Entries for cases without

weights were deleted. Six hundred eighty-seven pregnancies were included.

Pregnancies were first screened for duplicates. Seven pregnancies had

duplicate dates (a duplicate is a pregnancy that has the same date as another to

the same respondent) —six live births and one miscarriage. The duplicates

were dropped. Next, a variable was created to indicate whether the respondent

was currently pregnant. Then, 122 pregnancies that were ongoing (that is, not

completed) were deleted. To determine whether the pregnancy was resolved

after the Wave 1 interview, the pregnancy date (month and year) was

compared with the Wave I interview date. Pregnancies that occurred after the

Wave I interview date were retained. There were 60 pregnancies that had

indeterminate resolution dates. Nine had the month the pregnancy was

resolved but were missing the year, 17 were missing date information due to

respondent refusal and 34 were missing because the respondent said she did

not know the month and year of resolution. Four pregnancies that ended in

1996 but were missing the month were retained because all Wave 1 interviews

were completed by December, 1995. There were no missing months for

pregnancies reported in 1995. The retained pregnancies numbered 297

between Waves I and II from 292 respondents. There were 70 abortions, 159

live births, 67 miscarriages, and 1 still birth reported. One respondent reported

2 abortions and two respondents reported both live birth and miscarriage. The

final subsample included those who had full information on all study variables

(*n*=289) (see *Data Screening*). The subsample for analyses of long-term

depression was reduced due to attrition (*n*=227).

An important limitation in abortion research using self-reported data is

the likelihood of underreporting of abortion. Analyses of abortion reporting in

the National Survey of Family Growth (NSFG) indicated that, in the 1995

survey, approximately 60% of abortions were reported by women under the

age of 20 (Fu, Darroch, Henshaw, & Kolb, 1998). To assess reporting levels

in Add Health, abortion estimates were generated and compared with national

estimates. To calculate national abortion estimates, Henshaw and Feivelson

(2000) used data from the Guttmacher Institute's national survey of abortion

providers and from information compiled by state health statistics agencies

and the Centers for Disease Control and Prevention. Based on expert

recommendation (S. Henshaw, personal communication, October 12, 2005),

the abortion ratio reported in Add Health was compared with the national

abortion ratio to determine the extent of underreporting. The abortion ratio is

defined as the proportion of abortions per 100 pregnancies ending in abortion

or live birth within a 12-month period. The national abortion ratio in 1995 for women aged 15-19 was 34.6 (Henshaw & Feivelson). The ratio in this study was 30.6. By these estimates, approximately 88.6% of abortions were reported by Add Health respondents.

Measures

Depressive Symptoms

Short-term depressive symptoms. The presence of depressive symptoms at Wave II was assessed with a modified version of the Center for Epidemiologic Studies-Depression scale (CES-D) (Radloff, 1977). The CES-D is a valid and reliable measure of depression (Gotlib & Cane, 1989) and has been used to successfully assess levels of depressive symptoms among adolescents (e.g., Dierker, Albano, Clarke, et al., 2001; Radloff, 1977; Roberts, 1980; Roberts, Lewinsohn, & Seeley, 1991). Items gauged the frequency of symptoms in the previous seven days, such as having trouble keeping focused, feeling depressed, and being too tired to do things. Response options ranged on a four-point scale from "never or rarely" (0) to "most of the time or all of the time" (3). Items that were positively worded were reverse coded so that a higher score indicated more depressive symptoms. Two items were rephrased from the original 20-item CES-D scale (items on frequency of crying and restless sleep) and referred to the past 12 months. Because of the different time frame, these two items were not included in the scale.

Responses to the remaining 18 items were summed for a total CES-D score. For those with invalid responses on a single item, the average of the remaining 17 items was used to calculate the score.

Overall scale scores for female adolescents ranged from 0-48, with internal consistency reliability (Cronbach's α) at .88 for this sample. Previous research indicates that a cutoff score of one standard deviation above the mean provides an optimal balance between sensitivity and specificity of the CES-D for identifying respondents with major depressive disorder (Gotlib, Lewinsohn, & Seeley, 1995). The unweighted sample mean and standard deviation were used to set the cut-off score because standard deviation cannot be calculated from weighted population estimates (see *Data Analysis* below). The unweighted mean for the 18-item CES-D scale among female adolescents was 11.41 (the weighted mean was only slighter lower at 11.21), with a standard deviation of 7.80. The cut-off score was rounded down to 19, for a slightly less conservative cut-off. A dummy variable was created for short-term depressive symptoms such that 0= CES-D score below 19 and 1=CES-D score of 19 or above.

Long-term depressive symptoms. Presence of depressive symptoms at Wave III was calculated similarly, however, items from the modified CES-D scale used in Waves I and II were cut to nine in Wave III. The CES-D scale has been shortened to as few as 4 items and found to retain predictive power

similar to the full scale (e.g., Grzywacz, Hovey, Seligman, Arcury, & Quandt, 2006). Also, the abbreviated CES-D used in Wave III has been used in other studies of depression, including studies on alcohol use (Paschall, Freisthler, & Lipton, 2005), stress (Meadows, Brown, & Elder, 2005), obesity (Goodman & Whitaker, 2002), and smoking (Goodman & Capitan, 2000). Overall scale scores ranged from 0 to 25 among female adolescents, with internal consistency reliability (Cronbach's α) at .83 for this sample. The unweighted sample mean for the Wave III CES-D scale was 5.04 (weighted mean was 5.00), with a standard deviation of 4.34. The cut-off score was rounded down to 9. A dummy variable was created for long-term depressive symptoms such that 0 = Wave III CES-D score below 9 and 1 = Wave III CES-D score of 9 and above.

Unintended Pregnancy and Abortion

Wave II pregnancy-related variables were constructed from the pregnancy information described above and included *unintended pregnancy* and *abortion.* For each completed pregnancy since January 1994, respondents were asked, "Before you got pregnant, did you want to get pregnant by your partner at that time?" Response options were: "definitely no," "probably no," "neither wanted nor didn't want," "probably yes," and "definitely yes." Widely used measures of unintended pregnancy typically distinguish pregnancies that are wanted at the time of conception from those that are

mistimed (wanted later) and unwanted (not wanted at the time or later).

Conceptions in either of the latter two categories are considered *unintended*

(Abma, et al., 1997). The single measure used in Add Health can only

distinguish between *wanted* and *unintended* pregnancies, as conventionally

defined, because timing is not addressed. However, the question is partner-

specific. Zabin, Huggins, Emerson, and Cullins (2000) found that pregnancy

intention depended more on a woman's perceptions of her partner and their

partnership than on timing. The Add Health question, therefore, may have

captured the concept of pregnancy intention better than questions limited to

pregnancy timing.

For this study, a completed pregnancy was considered *unintended* if

the respondent chose "definitely no," that is, the pregnancy was definitely not

wanted at the time. Adolescents rarely plan pregnancies (Finer & Henshaw,

2006); however, previous research has shown that ambivalence about

pregnancy is a strong predictor of pregnancy among this age group (Schoen,

Astone, Kim, & Nathanson, 1996; Zabin, Astone, & Eemerson, 1993).

Therefore, pregnancies that were definitely not wanted were identified in

order to distinguish pregnancies to adolescents committed to remaining

nonpregnant but who later became pregnant from pregnancies to adolescents

who were ambivalent or who wanted to be pregnant. Pregnancies that were

definitely not wanted are hereafter referred to as *unintended*. A dummy

variable was created such that 0 = no unintended pregnancies between Waves I and II and 1 = at least one unintended pregnancy between Waves I and II.

Abortion indicated whether the respondent had at least one abortion between Waves I and II. The intention associated with the pregnancy ending in abortion was not considered because theories that postulate negative effects of abortion are not based on pregnancy intention but rather on the nature of abortion itself (Reardon, 2002a; Speckhard & Rue, 1992). Pregnancy outcome information obtained in Wave II described above was used to create a dummy variable such that 0 = no abortion between Waves I and II and 1= at least one abortion between Waves I and II.

Sociodemographics

Sociodemographic characteristics were measured at Wave I and included in analyses were *age, race/ethnicity, family structure*, and *family economics*. *Age* was calculated by subtracting the Wave I interview date from the respondent's date of birth and, for analysis, was rounded to two decimal points.

Race/ethnicity was measured by three questions. Respondents were asked, "Are you of Hispanic or Latino origin?" and "What is your race?" For those respondents who chose more than one race, a follow-up question was asked: "Which one race best describes your racial background?" Response categories were (a) White; (b) Black or African American; (c) American

Indian or Native American; (d) Asian or Pacific Islander; and (e) other. From this information, the following exclusive categories were created: Hispanic (all races); non-Hispanic Black; non-Hispanic White; and non-Hispanic other (mostly Asian/Pacific Islander). Dummy variables were created with non-Hispanic White as the referent category.

Family structure was determined from household roster information. Respondents were asked to list all household members and the relationship of each to the respondent. From this information, a variable was created to indicate whether the respondent lived with two parents (any combination of biological or step), one parent, or in some other arrangement (group home, etc.). Dummy variables were created with two-parent household as the referent.

A proxy measure of *family economics* was created from the adolescent's report of whether a resident parent had ever received federal assistance, such as welfare. Other measures, such as family income, contained large amounts of missing data and could not be used in the present analyses. A dummy variable was created such that 0=no receipt of federal assistance and 1=receipt of federal assistance by at least one resident parent.

Psychological and Behavioral Covariates

Psychological and behavioral covariates were identified from previous research on abortion and depression. Psychological and behavioral covariates

were all measured at Wave I and included *prior depressive symptoms, prior pregnancy, binge drinking, general physical health, importance of religion*, and *forced sex*.

Prior depressive symptoms. The measure *prior depressive symptoms* was constructed from CES-D items identical to those used for *short-term depressive symptoms*. Overall scale scores for the 18-item Wave I CES-D scale ranged from 0-51 for female adolescents and internal consistency reliability (Cronbach's α) in the study sample was .87. The sample mean for the Wave I scale was 12.02 (weighted mean was 11.76), with a standard deviation of 7.88. The cut-off score was rounded to 20. A dummy variable was created for prior depressive symptoms such that 0 = Wave I CES-D score below 20 and 1 = Wave 1 CES-D score of 20 or above.

Prior pregnancy. In Wave I, female respondents were asked, "Have you ever been pregnant? Be sure to include if you are currently pregnant and any past pregnancy that ended in an abortion, stillbirth, miscarriage, or a live birth after which the baby died." A dummy variable was created for pregnancy prior to Wave I with 0 = no pregnancy prior to Wave I and 1 = at least one pregnancy prior to Wave I.

Binge drinking. Respondents who reported drinking alcohol in the previous 12 months were asked how many drinks they usually had each time. Drink was defined as "a glass of wine, a can of beer, a wine cooler, a shot

glass of liquor, or a mixed drink." In the study sample, responses ranged from 1-50. For analysis, binge drinking was defined as typically having three or more drinks on one occasion (CDC, 2006). A dummy variable was created for binge drinking such that 0 = usually did not have three or more drinks each time and 1 = usually had three or more drinks each time.

General health. In Wave I, respondents were asked, "In general, how is your health?" Response categories ranged from (1) excellent to (5) poor. To reduce skewness, general health was collapsed into two categories: good/very good/excellent health and fair/poor health. A dummy variable was created with 0 = good and better health and 1 = fair and poor health.

Importance of religion. In Wave I, respondents who said they practiced a religion were asked, "How important is religion to you?" Response categories ranged from (1) very important to (4) not important at all. To reduce skewness, categories 2 (fairly important) though 4 were collapsed and a dummy variable was created such that 0= religion fairly important/fairly unimportant/not important at all and 1=religion very important.

Forced sex. In Wave I, respondents were asked, "Were you ever physically forced to have sexual intercourse against your will?" From this information, a dummy variable was created with 0 = no history of forced sex and 1 = history of forced sex.

Data Screening

The extent of missing data was analyzed using unweighted data. Missing values were examined separately for the larger sample of female adolescents and those with pregnancy between Waves I and II. Among both groups, those with full information on all study variables exceeded 95%. The study sample, therefore, was limited to those with full information (Lee & Forthofer, 2006). Collinearity diagnostics, including measures of tolerance and VIF (variance inflation factor) were generated for the unweighted independent variables to test the extent of multicollinearity among the full sample of female adolescents and the subsample of those with pregnancy between Waves I and II. There were no individual tolerance values below .6 and mean VIF for the full sample was 1.15 and 1.12 for the subsample, indicating that high collinearity was not an issue for analyses among either group (UCLA Academic Technology Services, 2006).

Data Analysis

Unless otherwise noted, all analyses were performed using sample weights, regional strata and primary sampling unit (cluster) information to account for Add Health's complex sampling design and yield nationally representative population estimates following Chantala and Tabor (1999). Appropriate weights were identified for analyses using different waves of data according to Add Health specifications. For example, analyses involving data

from Waves I, II, and III used longitudinal weights that were adjusted for attrition between Waves II and III (Add Health, April 2003). Data were analyzed using Stata version 8.2 (College Station, Texas) statistical software. Stata survey (*svy*) commands, which are appropriate for complex survey data analysis, were used for bivariate and multivariate analyses (Stata, 2003).

Descriptive analysis

Population means for the continuous variable (i.e., age) and proportions for categorical variables (e.g., race/ethnicity, prior depressed mood, general health) were calculated to describe the full sample and the subsamples of respondents who reported at least one completed pregnancy since Wave I. Unweighted sample sizes and weighted means and percentages are reported, as well as unadjusted odds ratios for associations with depressive symptoms. The next section includes descriptions of analyses conducted to test each research hypothesis.

Hypothesis 1: The effect of abortion on short-term depressive symptoms is not significant after adjustment for confounders.

Lagged logistic regression was used to assess whether the effect of abortion between Waves I and II on short-term depressive symptoms was significant after adjusting for sociodemographic variables and psychological and behavioral covariates. Separate analyses were conducted for the larger

sample of female adolescents and the subsample of adolescents who had at least one pregnancy between waves.

Lagged models (also called transitional models) include previously observed value(s) of the outcome as a covariate(s) for future observations (Hosmer & Lemeshow, 2000). In this case, the measure *previous depressive symptoms* (measured at Wave I) was included as a covariate predicting the outcome, *short-term depressive symptoms*. By including the lagged response (prior depressive symptoms), it was possible to test whether abortion contributed to an increase in depressive symptoms at Wave II. In addition, the lagged model provided a form of statistical control for other factors besides abortion that might cause depression but were unmeasured, such as genetic predisposition.

Lagged logistic multivariate regression was used to model the likelihood of developing depressed mood as a function of abortion in the previous year, following the procedures for population average models as described by Hu, Goldberg, Hedeker, Flay, and Pentz (1998). The model may be written thus:

$$\text{logit } Y_{ij} = \log \frac{\Pr\left(Y_{ij} = 1\right)}{1 - \Pr\left(Y_{ij} = 1\right)} = \beta_0 + \beta_1 y_{i\,j-1} + \beta_2 x_i + \dots \beta_k x_k$$

where Y_{ij} is the binary outcome (i.e., depressive symptoms, 0=no and 1=yes) for subject *i* at time *j*, t_{ij-1} denotes the lagged depressive symptoms score, β_0 is

the constant, and subsequent βs are the coefficients for independent variables

χ_i through χ_k including abortion.

The model is a population-averaged model (Carriere & Bouyer, 2002).

That is, the model assumes the relationships between the outcome, in this

instance, short-term depressive symptoms, and the covariates, such as abortion

and prior depressive symptoms, are the same for all subjects. In contrast, a

subject-specific model (conditional or random-effects model) allows the

relationships between the outcome and covariates to differ between subjects

(Carriers & Bouyer; Hu, Goldberg, Hedeker, Flay, & Pentz, 1998). The

choice between the two types of models for analyzing longitudinal data

depends primarily on a study's aims. The population averaged model is the

more appropriate model for the present study because the goal of the study,

from a public health perspective, is to provide evidence as to whether abortion

has a population-level effect on depression and whether, therefore, policies

restricting abortion on the basis of its adverse effects are justified.

Full models were first tested that included abortion and all the

demographic characteristics and psychological and behavioral covariates.

Variables that did not contribute to the fit were eliminated and the models

retested. Abortion, age, and race/ethnicity were retained in the models because

of their clinical significance and relevance to the research question. Other

variables were retained because of statistical significance. Reduced models

were compared to the full models and adjustments made until a model which was judged to include all important variables and exclude unimportant variables was achieved (Hosmer & Lemeshow, 2000). Interactions among the variables were tested; however, no significant interactions were identified or, therefore, retained in the final model. Adjusted Wald tests, which are appropriate for complex data and population average models (Hosmer & Lemeshow, 2000), were used to compare the models and results are reported for the full and final models.

Hypothesis 2: The effect of abortion on long-term depressive symptoms is not significant after adjustment for confounders.

Analyses that paralleled those of the first hypothesis were used to test whether abortion had a significant effect on the development of long-term depressive symptoms after adjusting for sociodemographic variables and psychological and behavioral covariates. Separate analyses were conducted for the larger sample of females and the subsample of those who had a pregnancy between Waves I and II.

Hypothesis 3: Unintended pregnancy is associated with long-term depressive symptoms after adjustment for confounders.

Analyses were conducted to determine whether there was evidence to support an association between long-term depressive symptoms and unintended pregnancy. Unintended pregnancy was not included in analysis

with abortion due to concerns about high collinearity. Lagged logistic regression and procedures similar to those described above were used to test whether unintended pregnancy between Waves I and II predicted an increase in long-term depressive symptoms. The sample included female adolescents with Wave III depressive symptoms scores and information about pregnancy between Waves I and II.

CHAPTER 4. RESULTS

This chapter reports the results of the analyses of whether abortion increases depressive symptoms among adolescents. The first section presents descriptive characteristics for female respondents who had at least one pregnancy between baseline and the one-year follow-up interview. This group was compared to the group of other female respondents who did not report a pregnancy in that year. The descriptive characteristics include sociodemographic characteristics and behavioral and psychological covariates. The next section provides the results of analyses conducted to test each research hypothesis.

Sample Characteristics

Tables 4.1 and 4.2 present the characteristics separately for female adolescents and female adolescents with pregnancy between Waves I and II. Table 4.1 presents the characteristics for the analysis of short-term depression and Table 4.2 for the analysis of long-term depression. Two tables are presented because the sample for the analysis of long-term depression included fewer respondents due to attrition. Although numbers vary between the two tables, weighted percentages are similar.

The weighted percentages for the larger sample of female adolescents reflect the sociodemographic profile of females in grades 7 though 11 in the United States in 1995. The tables indicate that about two-thirds were non-

Hispanic White. Slightly more than one in ten respondents were non-Hispanic Black while about one in six were Hispanic. A majority lived in two-parent households, but close to 30% were from single-parent families. About one in ten lived in families in which at least one parent had received some type of federal assistance, such as welfare. About 15% of female adolescents reported prior depressive symptoms. One in four reported binge drinking. Over 40% said that religion was very important to them. Far smaller percentages reported fair/poor health or history of forced sex. One in twenty female adolescents reported having ever been pregnant by Wave I. Just over 2% reported unintended pregnancy between Waves I and II and fewer than 1% had an abortion.

The tables also indicate that over half of females with a pregnancy between Waves I and II reported an unintended pregnancy and 20% reported an abortion. A higher percentage of respondents with a pregnancy were from single-parent households than two-parent households. One in four reported prior depressive symptoms. Over 40% of adolescents in this subgroup reported binge drinking and pregnancy at Wave I. Fewer than 1 in 3 reported that religion was very important to them.

Table 4.1: Characteristics among Female Adolescents and Female Adolescents with Pregnancy between Waves I and II Unadjusted Associations with Short-term Depression

Characteristic	Female Adolescents (n=6823)			Female Adolescents with Pregnancy (n=289)		
	n	Mean or % (SE)	Unadjusted OR (95 % CI)	n	Mean or % (SE)	Unadjusted OR (95 % CI)
Unintended pregnancy	163	2.45(.00)	1.42(0.88, 2.29)	163	58.33(.04)	1.01 (0.52, 1.95)
Abortion	69	0.87(.00)	0.99(0.48, 2.05)	69	20.68(.03)	0.65 (0.29, 1.46)
Age	6823	15.53(.11)	1.20 (1.10, 1.30)***	292	16.72(.11)	0.81 (0.52, 1.26)
Race/ethnicity						
White/non-Hispanic	3557	65.74(.03)	1.00 (Referent)	133	60.82(.06)	1.00 (Referent)
Hispanic (all races)	1534	16.04(.01)	1.44 (1.16, 1.78)**	93	23.87(.05)	1.36 (0.53, 3.47)
Black/non-Hispanic	1118	11.94(.02)	1.90 (1.46, 2.46) ***	49	13.12(.04)	2.15 (0.92, 5.02)
Other	614	6.27(.01)	1.75 (1.31, 2.35) ***	14	2.18 (.01)	1.68 (0.34, 8.14)
Household composition						
Two-parent	4376	65.31(.02)	1.00 (Referent)	115	40.81(.05)	1.00 (Referent)
Single-parent	2084	29.84(.01)	1.60 (1.32, 1.94)***	128	42.37(.05)	0.80 (0.34, 1.89)
Other	363	4.85 (.00)	1.63 (1.13, 2.36) **	46	16.82(.03)	1.02 (0.36, 2.89)
Receipt of federal assistance	787	11.40(.01)	1.72 (1.38, 2.13)***	53	17.94(.02)	1.02 (0.45, 2.31)
Prior depressive symptoms	1125	15.59(.01)	8.27 (6.85, 9.98)***	82	25.46(.03)	6.25 (3.07, 12.73)***
Prior pregnancy	400	5.26 (.05)	2.09 (1.42, 3.08)***	128	44.76(.04)	1.52 (0.68, 3.37)
Binge drinking	1672	25.45(.01)	1.70 (1.34, 2.15)***	114	41.33(.04)	0.93 (0.46, 1.90)
Fair/poor health	573	8.18 (.01)	3.07 (2.37, 3.97)***	35	11.37(.02)	0.94 (0.34, 2.65)
Religion very important	3125	43.83(.02)	0.84 (0.70, 1.01)	110	29.91(.04)	0.89 (0.42, 1.88)
Forced sex	444	6.60 (.01)	2.83 (2.19, 3.67)***	56	21.37(.03)	1.68 (0.77, 3.66)

Notes: Pregnancy-related factors measured at Wave II. Sociodemographics, behavioral and psychological covariates measured at Wave I. Ns are unweighted; percentages are weighted and do not always add to 100 because of rounding.
 * *p*<.05, ** *p*<.01, *** *p*<.001 according to the weighted, design-based Wald tests of significance.

Table 4.2: Characteristics among Female Adolescents and Female Adolescents with Pregnancy between Waves I and II and Unadjusted Associations with Long-term Depression

Characteristic	n	Female Adolescents (n=5621)		n	Females Adolescents with Pregnancies (n=227)	
		Mean or % (SE)	Unadjusted OR (95 % CI)		Mean or % (SE)	Unadjusted OR (95 % CI)
Unintended pregnancy	125	2.20(.00)	1.67(1.06, 2.64)*	125	57.30(.05)	0.80 (0.35, 1.79)
Abortion	51	0.77(.00)	1.97(0.81, 4.82)	51	20.00(.03)	1.09 (0.39, 3.05)
Age	5630	15.50(.11)	0.96 (0.87, 1.06)	227	16.80(.12)	0.54 (0.32, 0.90)*
Race/ethnicity						
White/non-Hispanic	2998	66.44(.03)	1.00 (Referent)	107	64.13(.06)	1.00 (Referent)
Hispanic (all races)	1271	16.01(.02)	1.52 (1.19, 1.93)**	72	22.69(.05)	0.96 (0.38, 2.44)
Black/non-Hispanic	854	11.45(.02)	1.69 (1.30, 2.19)***	38	11.83(.05)	1.42 (0.56, 3.60)
Other	507	6.10(.01)	1.42 (1.02, 1.98)*	10	1.35(.01)	0.70 (0.11, 4.47)
Household composition						
Two-parent	3724	67.54(.01)	1.00 (Referent)	92	40.44(.05)	1.00 (Referent)
Single-parent	1617	27.90(.01)	1.47 (1.18, 1.84)**	101	43.16(.05)	1.10 (0.43, 2.81)
Other	289	4.56(.00)	1.55 (1.01, 2.37)*	34	16.40(.03)	0.32 (0.09, 1.11)
Receipt of federal assistance	599	10.35(.01)	1.55 (1.20, 2.00)**	46	21.17(.03)	0.75 (0.26, 2.15)
Prior depressive symptoms	895	15.04(.01)	3.02 (2.43, 3.76) ***	65	25.16(.04)	1.24 (0.55, 2.79)
Prior pregnancy	328	5.27(.01)	2.01(1.42, 2.84)***	128	44.76(.04)	1.83 (0.78, 4.28)
Binge drinking	1343	24.27(.01)	1.22 (1.01, 1.47)*	91	43.08(.05)	0.86 (0.40, 1.88)
Fair/poor health	484	8.29(.01)	2.08 (1.57, 2.77) ***	30	12.35(.03)	0.51 (0.15, 1.72)
Religion very important	2631	44.78(.02)	0.86 (0.72, 1.04)	87	29.53(.04)	0.74 (0.37, 1.49)
Forced sex	362	6.58(.01)	1.53 (1.08, 2.16) *	43	21.03(.03)	0.90 (0.36, 2.23)

Notes: Pregnancy-related factors measured at Wave II. Sociodemographics, behavioral and psychological covariates measured at Wave I. Ns are unweighted; percentages are weighted and do not always add to 100 because of rounding.

 * $p<.05$, ** $p<.01$, *** $p<.001$ according to the weighted, design-based Wald tests of significance.

Tables 4.1 and 4.2 also include the unadjusted odds ratios and 95% confidence intervals from the bivariate analyses used to determine the associations between depressive symptoms and the characteristics. Among the larger sample, older respondents, those who were not non-Hispanic White or from two-parent households and whose families received federal assistance were more likely to have short-term depressive symptoms (see Table 4.1). Additionally, those with prior depressive symptoms, prior pregnancy, binge drinking, fair or poor health, and who reported ever having been forced to have sex against their will also had increased risks of short-term depressive symptoms. In contrast, among the subsample of females with pregnancy, only prior depressive symptoms was a significant predictor of short-term depression.

Characteristics that were associated with long-term depressive symptoms among female adolescents were only slightly different than those associated with short-term depression. Age was not a significant predictor, and unintended pregnancy between Waves I and II was significant. In general, the strength and direction of the other factors were similar, although the odds ratios for prior depressive symptoms and forced sex were reduced. Among the subsample, only age was a significant predictor of long-term depression.

Pregnancy intention and outcome

Table 4.3 presents the number of each pregnancy outcome and the weighted proportion of these that were from unintended pregnancies. Over half of pregnancies were unintended (56.63%). Three quarters of pregnancies ending in abortion were unintended, while slightly under half of births were from unintended pregnancies. Over half of pregnancies ending in either stillbirth or miscarriage were also unintended.

Table 4.3: Pregnancy Outcomes and Unintendedness

Outcome	Total (n=297)	Unintended (n=166)	Percentage (%)
Abortion	70	54	75.87
Birth	159	71	51.80
Other	68	39	59.10

Note: "Other" includes miscarriage and stillbirth. Ns are not weighted; percentages are weighted.

Research Hypothesis 1.

The effect of abortion on short-term depressive symptoms is not significant after adjustment for confounders.

The results of the lagged logistic regression analysis conducted to determine whether abortion affects short-term depressive symptoms are summarized in Tables 4.4 and 4.5. Table 4.4 presents the results of the full and final models for the sample of all female respondents at Wave II. Significant predictors of depressive symptoms among female adolescents were Black/non-

Hispanic and other/non-Hispanic race/ethnicity, single-parent household, prior depressive symptoms, general health and forced sex. Respondents with prior depressive symptoms were seven times more likely to have short-term depressive symptoms than those without prior depressive symptoms. Abortion was not a significant predictor of depressive symptoms.

Table 4.4: Lagged Logistic Regression Analysis: Predicting Short-term
Depressive Symptoms among Female Adolescents at Wave II (N=6824)

Variable	Full Model			Final Model		
	Coefficient (SE)	OR	95% CI	Coefficient (SE)	OR	95% CI
Abortion	-0.34 (0.45)	0.71	(0.29, 1.72)	-0.30 (0.45)	0.73	(0.30, 1.78)
Age	0.02 (0.04)	1.02	(0.94, 1.11)	0.03 (0.04)	1.03	(0.95, 1.12)
Race/ethnicity						
White/non-Hispanic	Referent	1.00		Referent	1.00	
Hispanic (all races)	0.11 (0.12)	1.12	(0.88, 1.42)	0.12 (0.11)	1.12	(0.90, 1.41)
Black/non-Hispanic	0.62 (0.15)	1.86	(1.39, 2.48) ***	0.63 (0.14)	1.82	(1.37, 2.42)***
Other	0.46 (0.15)	1.59	(1.18, 2.14) **	0.46 (0.14)	1.58	(1.20, 2.07)**
Household composition						
Two-parent	Referent	1.00		Referent	1.00	
Single-parent	0.25 (0.11)	1.28	(1.03, 1.59) *	0.30 (0.10)	1.35	(1.10, 1.65)**
Other	0.05 (0.22)	1.05	(0.68, 1.64)	0.08 (0.22)	1.09	(0.70, 1.67)
Receipt of federal assistance	0.18 (0.13)	1.19	(0.92, 1.56)			
Prior depressive symptoms	1.93 (0.1.)	6.83	(5.66, 8.32) ***	1.94 (0.10)	7.08	(5.79, 8.65)***
Binge drinking	0.17 (0.13)	1.18	(0.91,1.56)			
Fair/poor health	0.64 (0.14)	1.90	(1.42, 2.48) ***	0.66 (0.14)	1.94	(1.43, 2.54)***
Religion very important	-0.00 (0.1.)	0.99	(0.82, 1.22)			
Forced sex	0.66 (0.15)	1.93	(1.41, 2.60) ***	0.70 (0.14)	2.02	(1.53, 2.66)***
Prior pregnancy	0.11 (0.24)	1.13	(0.70, 1.81)			
Adjusted Wald	$F(14, 128)=40.78$, p<.0001			$F(10, 128)=49.37$, $p<.0001$		

Note: Data are weighted and estimation procedures take complex sampling design into
account. Coefficient refers to the logit coefficients. * $p<.05$, ** $p<.01$, *** $p<.001$

Table 4.5 presents the results of the full and final models predicting short-term depressive symptoms for the subsample of females who reported at least one pregnancy between Waves I and II. The only significant predictors of depressive symptoms in the final model were prior depressive symptoms and non-Hispanic Black race/ethnicity. Respondents with prior depressive symptoms were six times more likely to have short-term depressive symptoms than those who did not have prior depressive symptoms. Non-Hispanic Black respondents were about twice as likely to have depressive symptoms. Overall, there was no evidence that abortion predicted short-term depression among female adolescents.

Table 4.5: Lagged Logistic Regression Analysis: Predicting Short-term Depressive Symptoms among Female Adolescents with Pregnancy between Waves I and II (N=289)

Variable	Full Model			Final Model		
	Coefficient (SE)	OR	95% CI	Coefficient (SE)	OR	95% CI
Abortion	-0.30 (0.50)	0.74	(0.29, 1.72)	-0.37 (0.46)	0.69	(0.30, 1.78)
Age	-0.22 (0.23)	0.80	(0.94, 1.11)	-0.1 (0.24)	.88	(0.95, 1.12)
Race/ethnicity						
White/non-Hispanic	Referent	1.00		Referent	1.00	
Hispanic (all races)	0.22 (0.22)	1.25	(0.37, 4.23)	0.24 (0.58)	1.28	(0.41, 4.00)
Black/non-Hispanic	0.72 (0.39)	2.06	(0.94, 4.48)	0.74 (0.37)	2.10	(1.01, 4.33)*
Other	1.06 (0.94)	2.88	(0.45, 18.60)	0.77 (0.99)	2.16	(0.30, 15.30)
Household composition						
Two-parent	Referent	1.00				
Single-parent	-0.20 (0.46)	0.82	(0.33, 2.05)			
Other	-0.13 (0.63)	0.88	(0.25, 3.06)			
Receipt of federal assistance	-.27 (0.44)	0.76	(0.32, 1.81)			
Prior depressive symptoms	1.79 (0.40)	5.96	(2.68, 13.27) ***	1.79 (0.36)	6.01	(5.79, 8.65)***
Binge drinking	0.13 (0.38)	1.01	(0.48,2.15)			
General health	-0.43 (0.52)	0.65	(0.23, 1.83)			
Religion very important	-0.01 (0.43)	0.99	(0.42, 2.32)			
Forced sex	0.40 (0.47)	1.48	(0.59, 3.75)			
Prior pregnancy	0.29 (0.46)	1.34	(0.0.54, 3.32)			
Adjusted Wald	$F(14, 128)=2.80, p<.001$			$F(7, 128)=5.16, p<.0001$		

Note: Data are weighted and estimation procedures take complex sampling design into account. Coefficient refers to the logit coefficients. * $p<.05$, ** $p<.01$, *** $p<.001$

Research Hypothesis 2.

<u>The effect of abortion on long-term depressive symptoms is not significant</u>

<u>after adjustment for confounders.</u>

The results of the lagged logistic regression analysis conducted to determine whether abortion affects long-term depressive symptoms are summarized in Tables 4.6 and 4.7. Table 4.6 presents the results of the full and final models for the sample of all female respondents at Wave II. Significant predictors of long-term depressive symptoms among the sample were age, non-Hispanic Black or Hispanic race/ethnicity, prior depressive symptoms, fair and poor health, and prior pregnancy. Increasing age was associated with a decreased risk of depressive symptoms, while prior depressive symptoms, fair and poor health and prior pregnancy were associated with an increased risk. Abortion was not a significant predictor.

Table 4.6: Lagged Logistic Regression Analysis: Predicting Long-term
Depressive Symptoms among Female Adolescents (N=5621)

Variable	Full Model			Final Model		
	Coefficient (SE)	OR	95% CI	Coefficient (SE)	OR	95% CI
Abortion	0.62 (0.56)	1.86	(0.62, 5.60)	0.66 (0.54)	1.94	(0.66, 5.69)
Age	-0.17 (0.05)	0.84	(0.76, 0.93)	-0.15 (0.05)	0.86	(0.78, 0.95)**
Race/ethnicity						
White/non-Hispanic	Referent	1.00		Referent	1.00	
Hispanic (all races)	0.29 (0.14)	1.33	(1.03, 1.72)*	0.32 (0.12)	1.38	(1.08, 1.76)**
Black/non-Hispanic	0.47 (0.13)	1.61	(1.21, 2.14)**	0.48 (0.14)	1.62	(1.23, 2.13)**
Other	0.32 (0.18)	1.38	(0.97, 1.95)	0.31 (0.17)	1.36	(0.97, 1.90)
Household composition						
Two-parent	Referent	1.00				
Single-parent	0.21 (0.12)	1.23	(0.96, 1.57)			
Other	0.21 (0.22)	1.24	(0.80, 1.92)			
Receipt of federal assistance	0.14 (0.13)	1.15	(0.88, 1.51)			
Prior depressive symptoms	1.00 (0.12)	2.71	(2.15, 3.40) ***	1.04 (0.11)	2.84	(2.27, 3.54)***
Binge drinking	0.08 (0.11)	1.08	(0.88, 1.33)			
Fair/poor health	0.43 (0.17)	1.54	(1.11, 2.14)*	0.47 (0.17)	1.60	(1.15, 2.23)**
Religion very important	-0.11 (0.10)	0.90	(0.74, 1.09)			
Forced sex	0.13 (0.19)	1.14	(0.79, 1.66)			
Prior pregnancy	0.48 (0.20)	1.61	(1.08, 2.42)*	0.58 (0.20)	1.78	(1.20, 2.66)**
Adjusted Wald	F(14, 128)=13.27, p<.0001			F(8, 128)=22.08, p<.0001		

Note: Data are weighted and estimation procedures take complex sampling design into
account. Coefficient refers to the logit coefficients. * *p*<.05, ** *p*<.01, *** *p*<.001

Table 4.7 presents the results of the full and final models predicting long-term depressive symptoms for the subsample of female respondents who reported pregnancy between Waves I and II. As a whole, the variables do a poor job predicting depressive symptoms among the subsample. Interactions were tested for all the variables. Prior pregnancy did not interact with abortion, age, race/ethnicity, household composition or receipt of federal assistance. Dropping prior pregnancy led to poorer fit of the model and no marked differences in coefficients among the other variables. The final model could not be improved without removing prior depressive symptoms and race/ethnicity. Once again, abortion was not significant. Age and prior pregnancy were significant predictors, with the odds of depressive symptoms decreasing with age and the odds increasing for those with pregnancy prior to Wave I. Overall, there is no evidence that abortion predicts long-term depressive symptoms among female adolescents.

Table 4.7: Logistic Regression Analysis: Predicting Long -term Depressive Symptoms among Female Adolescents with Pregnancy between Waves I and II (N=227)

	Full Model			Final Model		
Variable	Coefficient (SE)	OR	95% CI	Coefficient (SE)	OR	95% CI
Abortion	0.19 (0.58)	1.21	(0.38, 3.82)	0.18 (0.55)	1.14	(0.36, 3.31)
Age	-0.66 (0.26)	0.52	(0.31, 0.87)*	-0.74 (0.27)	0.48	(0.31, 0.93)**
Race/ethnicity						
White/non-Hispanic	Referent	1.00				
Hispanic (all races)	-0.36 (0.63)	0.70	(1.03, 1.72)			
Black/non-Hispanic	0.48 (0.56)	1.61	(0.20, 2.45)			
Other	-0.27 (0.90)	0.76	(0.13, 4.53)			
Household composition						
Two-parent	Referent	1.00				
Single-parent	0.21 (0.60)	1.23	(0.38, 4.06)			
Other	-1.33 (0.66)	0.26	(0.07, 0.97)*			
Receipt of federal assistance	-0.55 (0.49)	0.58	(0.22, 1.53)			
Prior depressive symptoms	0.19 (0.43)	1.21	(0.52, 2.85)			
Binge drinking	-0.51 (0.42)	0.60	(0.26, 1.38)			
General health	-0.33 (0.78)	0.72	(0.15, 3.37)			
Religion very important	-0.52 (0.47)	0.59	(0.23, 1.52)			
Forced sex	0.29 (0.50)	1.33	(0.49, 3.62)			
Prior pregnancy	1.22 (0.43)	3.39	(1.44, 7.94)**	0.86 (0.26)	2.36	(1.02, 5.44)*
Adjusted Wald	*F*(14, 128) = 2.19, *p*< .05			*F*(3, 128) = 3.59, *p*<.05		

Note: Data are weighted and estimation procedures take complex sampling design into account. Coefficient refers to the logit coefficients. * *p*<.05, ** *p*<.01, *** *p*<.001

Hypothesis 3.

<u>Unintended pregnancy is associated with long-term depressive symptoms after</u>

<u>adjustment for confounders.</u>

Table 4.8 presents the results of the lagged logistic regression analysis to test whether having an unintended pregnancy is a risk factor for developing long-term depressive symptoms. Results are similar to those in Table 4.6, testing the effect of abortion on long-term depressive symptoms among female respondents. Unintended pregnancy between Waves I and II was not significant in the model. Significant predictors were age, Hispanic or Black/non-Hispanic race/ethnicity, prior depressive symptoms, fair and poor health, and prior pregnancy. No evidence supports the hypothesis that unintended pregnancy in adolescence is predictive of long-term depressive symptoms.

Table 4.8: Lagged Logistic Regression Analysis: Predicting Long-term Depressive Symptoms among Female Adolescents (N=5621)

Variable	Full Model			Final Model		
	Coefficient (SE)	OR	95% CI	Coefficient (SE)	OR	95% CI
Unintended pregnancy	0.30 (0.30)	1.36	(0.75, 2.47)	0.36 (.31)	1.43	(0.77, 2.63)
Age	-0.17 (.05)	0.84	(0.46, 0.93)**	-0.16 (.05)	0.85	(0.77, 0.95)**
Race/ethnicity						
White/non-Hispanic	Referent	1.00		Referent	1.00	
Hispanic (all races)	0.28 (0.13)	1.33	(1.02, 1.72)*	0.32 (0.12)	1.62	(1.09, 1.75)**
Black/non-Hispanic	0.48(0.14)	1.61	(1.21, 2.14)**	0.48 (0.14)	1.62	(1.23, 2.13)**
Other	0.33 (0.18)	1.40	(0.98, 1.98)	0.31 (0.17)	1.37	(0.97, 1.93)
Household composition						
Two-parent	Referent	1.00				
Single-parent	0.21 (0.12)	1.23	(0.97, 1.57)			
Other	0.21 (0.22)	1.23	(0.79, 1.91)*			
Receipt of federal assistance	0.14 (0.14)	1.15	(0.88, 1.50)			
Prior depressive symptoms	0.99 ((0.12)	2.70	(2.15, 3.40)***	1.04 (0.11)	2.83	(2.27, 3.54)***
Binge drinking	0.08 (0.10)	1.08	(0.88, 1.34)			
General health	0.43 ((0.17)	1.54	(1.11, 2.14)*	0.47 (0.17)	1.60	(1.15, 2.22)**
Religion very important	-0.11 (0.10)	0.90	(0.75, 1.09)			
Forced sex	0.12 (0.19)	1.13	(0.78, 1.64)			
Prior pregnancy	0.46 (0.21)	1.59	(1.05, 2.41)*	0.55 (.06)	1.74	(1.15, 2.64)**
Adjusted Wald	$F(14, 128) = 13.00, p<.0001$			$F(8, 128) = 21.54, p<.0001$		

Note: Data are weighted and estimation procedures take complex sampling design into account. Coefficient refers to the logit coefficients. * $p<.05$, ** $p<.01$, *** $p<.001$

CHAPTER 5. DISCUSSION AND CONCLUSIONS

This chapter begins with a discussion of the results of this study. The next section presents the public health implications of the findings. The limitations of the study are discussed next, followed by suggestions for future research. Finally, the study conclusions are presented.

In 1987, President Ronald Reagan announced in a speech to Right-to-Life leaders that he was directing Surgeon General C. Everett Koop to prepare a report on abortion's physical and psychological health effects (Wilmoth, 1992). After a year and a half of reviewing published studies, Koop sent a letter to Reagan in which he declined to issue a report, saying that the available research was inadequate for determining the psychological effects of abortion (Mooney, 2004). Koop did testify before Congress as part of an abortion health policy discussion, as did others, including representatives from the American Psychological Association (APA), the American Public Health Association (APHA), and the Family Research Council of America (Wilmoth, 1992). In his Congressional testimony, Koop said he did not report on the physical health risks associated with abortion because there was a long-standing consensus among obstetricians and gynecologist that abortion did not represent a greater physical danger to women than childbirth. He also testified that, from a public health perspective, the psychological risks following abortion were "miniscule" (Koop, 1989).

Since that time, research on the psychological effects of abortion has expanded. One research priority has been to identify predictors of abortion adjustment among women. The goal of studies of this type is to improve pregnancy counseling and postabortion care. Studies conducted by Major and colleagues (e.g., Major & Cozzarelli, 1992; Major, Cozzarelli, Cooper, et al., 2000; Mueller & Major, 1989) tested comprehensive theoretical models of postabortion adjustment. Their findings confirmed the importance of social stigma, personality factors, and cognitive processes in individual responses to abortion.

Other studies, such as this one, have had a different aim, which is to examine whether abortion increases the risks of mental health problems among women. Laws restricting abortion, such as mandatory counseling and waiting periods, are often based on claims that abortion is dangerous to women. The goal of studies of this type, therefore, is to test whether that assumption is true and whether restrictions are justified. Findings, however, have been conflicting. Some studies comparing women who had an abortion with women who did not have found, as Koop testified, that abortion did not cause psychological problems (e.g., Russo & Zierk, 1992; Schmiege & Russo, 2005). Other studies have found that abortion was associated with outcomes such as depression, anxiety, and substance abuse (e.g., Cougle, Reardon, & Coleman,

2003; Fergusson, Horwood, & Ridder, 2006; Reardon, Cougle, Rue, Shuping, Coleman,& Ney, 2003).

Most studies that have estimated the risks of abortion have been conducted with adult women. However, the assumption of greater psychological risk to adolescents is sometimes used to justify laws that mandate parental involvement in minors' abortion decisions. Studies of adolescent abortion have examined whether adolescents who have an abortion fare worse than adult women (Franz & Reardon, 1992; Pope, Adler, & Tschann, 2001; Quinton, Major, & Richards, 2001). Studies, such as this one, also have compared adolescents who had an abortion to their peers who carried a pregnancy to term (Coleman, 2006; Zabin, Hirsch, & Emerson, 1989). Findings in studies of adolescents also have been inconsistent. Zabin, Hirsch and Emerson (1989) found that adolescents who had an abortion and no subsequent pregnancies fared better than those who carried to term up to two years after the target pregnancy. The sample was large, however, it was also fairly homogenous and findings were not generalizable. Coleman (2006) used nationally representative data to compare adolescents who had an abortion with those who carried an unintended pregnancy to term. However, the dependent measures used were not validated scales of psychological functioning. Also, they were measured in the same time frame as the

pregnancy so that it was not possible to determine if pregnancy outcome preceded or followed the psychological "outcomes."

This study addressed some of the limitations of previous research. The data used were from the National Longitudinal Study of Adolescent Health, the largest study and most comprehensive study of adolescent behavior and health yet undertaken. The study is representative of U.S. adolescents who were in grades 7 through 11 in 1995 and included a range of variables demonstrated in previous research to be relevant to abortion and mental health. The outcomes were based on a validated measure of depressive symptoms, the Centers for Epidemiological Studies Depression Scale (CES-D) appropriate for adolescents (Roberts, Andrews, Lewinsohn, & Hopes, 1990). The longitudinal nature of the data also allowed for the evaluation of effects on both short-term and long-term depressive symptoms, while also controlling for depressive symptoms prior to abortion. Findings from this study did not support the claim that abortion increases the risks of depression. More specifically, adolescents who had an abortion in the year preceding the Wave II interview in 1996 were no more likely to be depressed at Wave II and five years later at Wave III than those who did not have an abortion.

Major (2003) suggested that associations between abortion and adverse psychological outcomes documented in previous studies might be spurious and reflect unobserved differences before pregnancy. She noted that pregnancies of

women who choose abortion are more likely to have been unintended than those of women who carry to term. Other researchers have found a relationship between unintended pregnancy and depression among pregnant women (Messer, Dole, Kaufman, & Savitz, 2005; Orr & Miller, 1997). Also, Rees and Sabia (2007) found similar effects for abortion and birth on depression which suggested that pregnancy outcome was perhaps less important than the pregnancy itself. It was hypothesized, therefore, that unintended pregnancy is related to depression among women. Evidence of an association would have provided support for the idea that previous associations documented between abortion and depression may have been spurious, reflecting the effects of unmeasured differences such as unintended pregnancy and factors related to it.

Findings from this study, however, did not support an effect of unintended pregnancy on depression. Although unintended pregnancy was a significant predictor of long-term depressive symptoms in bivariate analysis, the effect was not significant after adjustment for confounders. The importance of contextual variables may explain effects found in previous studies that did not adjust for them (Messer, Dole, Kaufman, & Savitz, 2005; Orr & Miller, 1997). Evidence of confounding in the relationship between unintended pregnancy and depression highlights the importance of including prior depression in studies of the effects of pregnancy and pregnancy outcomes.

The failure to find an effect for unintended pregnancy also could be due to several other factors. As Zabin (1999) noted, the most commonly used measures of pregnancy intention (adapted from the National Survey of Family Growth) are not psychometric measures. Furthermore, pregnancy intention may be different for adolescents than adults. The most commonly used measures were refined after World War II and were intended to measure "surplus fertility" among married couples at the end of the family-building cycle, rather than unexpected pregnancies at the beginning (Luker, 1999). Zabin, Astone, and Emerson (1993) found that only young women who were unequivocal in their desire to avoid pregnancy and who also had absolutely positive attitudes toward contraception were able to protect themselves effectively against pregnancy. Pregnancy intention in adolescence may be related to the perceived ability to protect oneself against pregnancy.

The Add Health measure may be an improvement over more general measures because it is partner-specific (Zabin, Huggins, Emerson, & Cullins, 2000). It seems reasonable, though, to suspect that a single question is not sufficient to capture the complex concept of pregnancy intention. More research is needed to clarify and refine the concept of pregnancy intention, particularly among adolescents.

Although unintended pregnancy was not significant in predicting long-term depressive symptoms, prior pregnancy was significant. Furthermore, over

40% of adolescents pregnant between Waves I and II reported a pregnancy prior to Wave I. Previous research indicates that repeat pregnancy is a common occurrence among adolescents (Jones, Singh, Finer, & Frohwith, 2006; Raneri & Wiemann, 2007). The finding suggests that pregnancy among adolescents, particularly among younger adolescents, is a risk factor for developing depressive symptoms years later.

Findings from this study help clarify the results of an earlier study on abortion and psychological effects which used the same data (Coleman, 2006). The author asserted that findings from the study provided some support of a "direct causal link between abortion and mental health" (Coleman, 2006, p. 909). However, both abortion and the receipt of psychological services were measured within the previous year. An equally if not more plausible explanation for the findings is that pregnant adolescents considering abortion were more likely than those not considering abortion to seek and/or receive counseling. In fact, counseling is mandated in many states (Guttmacher, 2008). To clarify the temporal ordering of abortion and adverse psychological outcomes, this study utilized a validated scale of depressive symptoms, the CES-D scale (Radloff, 1977), which measured the frequency of symptoms within the previous two weeks. Adolescents who had an abortion were not at a higher risk for depressive symptoms than other adolescents, thus, there was no evidence of a causal link, direct or otherwise.

The absence of an effect of abortion is consistent with findings of Zabin, Emerson, and Hirsch (1989). Taken together, research findings indicate that adolescents do not have an increased risk for developing depression as a result of abortion, either in the short or long term. Early pregnancy, however, may be a risk factor for long-term depression. Pregnancy prevention efforts among this age group, including improved contraception and comprehensive sex education, may contribute to improved mental health while also alleviating the need for abortion.

Public Health Implications

Findings from the present study do not support claims that women who have an abortion are more likely to develop depression than other women. Taken together with findings from previous studies, restrictions on abortion based on protecting women from psychological harm are not justified. These restrictions include waiting periods, mandated consent materials, and parental involvement. In this study, the only pregnancy-related factor that did increase women's risk of depression in the long-term was prior pregnancy. The mechanism for this effect is not well understood, and future research is necessary to help clarify the role of early pregnancy in long-term depression. However, this finding suggests that enhancing efforts to prevent pregnancy among adolescents could reduce the burden of depression in young women.

The application of findings from this study and others on the relationship between abortion and depression to abortion policy will require a renewed commitment to evidence-based policy in women's health (Chavkin, 2004). Advances in women's health have been compromised by ideological assaults on abortion and other reproductive health services, including family planning and comprehensive sex education. Abortion in particular has been defined as a moral issue rather than a public health issue (Harvey, Beckman, & Bird, 1998). As a consequence, the development of abortion policy has been driven by many factors other than research findings, including religious ideology. The public health benefits of access to safe and legal abortion have been well-documented and include significant improvements in maternal morbidity and mortality (e.g., American Medical Association Council on Scientific Affairs, 1992; Cates, Grimes, & Schulz, 2003; Tietze & Henshaw, 1986). However, these benefits have been eclipsed in the recent focus on psychological effects. Additionally, a small number who have strong moral objections to abortion are engaged in a campaign to characterize abortion as a threat to women's mental health in order to turn the tide of public opinion against legal abortion (Reardon, 1987, 2002). These studies may have had the desired effect of creating uncertainty about the effects of abortion and dissuading some from actively working against abortion restrictions.

Evidence-based public health policy depends on the integrity of the scientific process. It is the responsibility of researchers to conduct ethical research, to make their research available for peer review, and to disseminate their findings (Sonfield, 2005). Recent attempt to manipulate science to advance ideological agendas, noted by groups such as the Union of Concerned Scientists, suggests that researchers may have an additional responsibility (Union of Concerned Scientists, 2008). More specifically, scientists need to engage with the larger society in ensuring that research findings are not misrepresented and that the evidence upon which policy is based represents prevailing professional consensus.

Public health policy has the most direct effect on public health outcomes when it is informed by evidence. Our country's public health objectives, outlined in Healthy People 2010, include improving pregnancy planning and spacing and preventing unintended pregnancy (U.S. Department of Health and Human Services, 2000). However, public policy does not consistently support this objective. For example, evidence demonstrates the efficacy of comprehensive sex education over abstinence-only programs for the prevention of pregnancy and adverse outcomes such as sexually transmitted diseases among young people. However, abstinence-only programs have been mandated in areas all over the country. Recent figures released by the Centers for Disease Control and Prevention (CDC) suggest, for the first

time in 14 years, the fertility rate among teenagers increased in 2006. It is too soon to tell whether the increase represents a new trend. However, reversals in public health are often felt first and most acutely by the most vulnerable in our society, including adolescents and the poor. An increase in the pregnancy rate might be expected when successful pregnancy prevention curriculums are scrapped in favor of ideologically-driven programs that lack theoretical bases for behavior change. We may expect similar reversals in maternal mortality and morbidity gains if safe and legal abortion is not guaranteed and, again, we might expect reversals to be borne most heavily by the powerless in our society.

Limitations

As previously discussed, the strengths of the study include the focus on adolescents and the use of nationally representative, longitudinal data and valid measures of depressive symptoms. Despite these strengths, limitations of the study must be considered with the findings. First, failing to find an effect for abortion could be due to other factors, including insufficient sample size to detect an effect and underreporting of abortion by those most likely to have had negative experiences. Because of concerns about adequate power, effects for abortion were examined among the full sample of females as well as the subsample of those with a pregnancy between Waves I and II. As noted, abortion did not have a significant effect in either group.

The reliance on self-reported data is also a limitation of the study. The underreporting of abortion could impact the ability to detect an effect of abortion if those who were most negatively impacted by abortion did not report it. In comparison with national estimates, the Add Health sample reported 88.6% of abortions. Although this is a marked improvement over other national surveys such as the National Survey of Family Growth (Fu, Darroch, Henshaw, & Kolb, 1998; Jones & Kost, 2007), it falls short of a full-accounting.

Also, the prior pregnancy measure included in this study was an imperfect measure. The question included those who were currently pregnant at Wave I and, due to an Add Health programming error that resulted in incomplete pregnancy information, it was not possible to identify respondents who were currently pregnant and whose pregnancy, therefore, was resolved after Wave I (and the outcome included in Wave II measures).

The final limitation is the time frame for evaluating the effect of adolescent abortion. Only abortions that occurred in the year between the Wave I and Wave II interviews were included in analysis. It was not possible to include information about previous abortions (before Wave I) to respondents. Thus, the time period for abortion is fairly restricted and the analyses do not provide a comprehensive evaluation of the effect of abortion during adolescence.

Future Research

This was the first study to use nationally representative and longitudinal data to test for the effects of abortion in adolescence on depression. There was no evidence of a causal relationship between abortion and depressive symptoms, either in the short-term or in the long-term. However, given some of the study limitations, future research is warranted.

As discussed, the time frame during which abortion was measured was limited to a single year. Future research using more comprehensive reproductive histories would help clarify the role of pregnancy and its outcomes on young women's mental health. Also, pregnancy intention did not appear to have an effect on depressive symptoms, although prior pregnancy did. Given that the overwhelming proportion of adolescent pregnancies are not planned, the role of pregnancy intention in depression among women warrants further investigation. Future research should explore better measures of pregnancy intention among adolescents, as well as its antecedents and consequences based on theoretical models of adolescent behavior.

The role of contraception is particularly salient in pregnancy intention. Contraceptive methods and options continue to improve, particularly with the widespread availability of long-acting hormonal methods. However, despite availability, unintended pregnancy in the U.S. accounts for almost half of all pregnancies, a proportion higher than in other developed countries (Finer &

Henshaw, 2006). Previous research using the Add Health data found that contraceptive attitudes, more so than pregnancy attitudes, were the best predictor of unintended adolescent pregnancy (Brückner, Martin, & Bearman, 2004; also see Zabin, Astone, & Emerson, 1993). It is possible that the perceived inability to control one's fertility and protect oneself from unintended pregnancy is associated with adolescent depression. This relationship should be further explored.

<div align="center">Conclusions</div>

Abortion continues to be an emotionally-charged and contentious social issue in the U.S. Recently, objections to abortion have focused on negative mental health effects of abortion on women. The study of abortion's psychological effects has been complicated by the complex context in which women typically seek abortion. Failure to control for factors related to unintended and unwanted pregnancy may lead to spurious conclusions about the relationship between abortion and negative psychological effects (Major, 2003). Furthermore, much of the research supporting the risk of abortion to mental health has been conducted by a small group of researchers and anti-abortion advocates interested in further restricting legal abortion (Reardon, 2002a). Findings from these studies are often mischaracterized to further an ideological agenda (Mooney, 2005). However, some recent studies by researchers who are not affiliated with anti-abortion groups have suggested

that abortion may be associated with increased risks of mental health problems (e.g., Fergusson, Horwood, & Ridder, 2005; Rees & Zabia, 2007). This was the first representative study of U.S. adolescents to examine the effects of abortion on depression. Abortion in adolescence did not increase the risks of depressive symptoms in either the short or long term. This study did not find evidence, therefore, to support restrictions on abortion to adolescents based on increased risk of depression. Prior pregnancy, however, was a risk factor for the development of depression in young adulthood. The relationship between adolescent pregnancy and depression in young adulthood underscores the need for effective pregnancy prevention programs in early adolescence.

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