Preterm Birth Update

Byron C. Calhoun, M.D.

Dr. Calhoun is a fellow of the American College of Obstetricians and Gynecologists and the American College of Surgeons, and has a master's in business administration. He is professor and vice chair in the Department of Obstetrics and Gynecology at West Virginia University. He may be reached at Byron.calhoun@camc.org.

Abstract

Preterm birth plagues modern society, with over three million deaths worldwide annually. When combined with low birth weight, preterm births are estimated to cost over one hundred million disability-adjusted life years. In the U.S., the low birth weight (newborn less than 2,500 gms) delivery rate in 2002 increased to 7.8 percent from 6.8 percent in 1985. This marks the highest rate in over thirty years. A large meta-analysis from 2009 analyzing abortion and preterm birth found an increased risk for preterm birth with an odds ratio of 1.35 (95 percent CI 1.20–1.52) for preterm demonstrating a 35 percent increase in the preterm birth rate in patients with only one abortion. The odds ratio for preterm birth for greater than two induced abortions was 1.72 (95 percent CI 1.45–2.04) demonstrating a 72 percent increase in the preterm birth rate and the important epidemiological principle of a dose-related effect: The more abortions one has prior to first pregnancy, the higher the risk for preterm birth. Finally, it is estimated that the concomitant expense due to prematurity from abortion may cost well over \$1.2 billion per year in the U.S. in hospitalization (neonatal intensive care unit) costs alone.

Summary

Preterm births plague modern society with over three million deaths worldwide annually and, combined with low birth weight, are estimated to cost over one hundred million disability-adjusted life years.¹ The incidence of preterm delivery before 37 completed weeks of gestation ranges from 6 to 8 percent in Europe, Australia, and Canada, to 9 to 12 percent in Asia, Africa, and the United States.² There has been no change over the last three decades, and in fact, some authors believe the trend may be increasing.³ In the U.S., the low birth weight (newborn under 2,500 gms) delivery rate in 2002 (with most low birth weight infants being under 35 weeks gestation) increased to 7.8 percent from 6.8 percent in the 1985.⁴ This marks the highest rate in over thirty years. The rate of increase of newborns born at less than 32 weeks gestation, early preterm births, in singletons increased 5 percent since the 1980s compared to the overall increase of 15 percent in preterm deliveries. The majority of the increased early preterm births appear as a result of multiple gestations due to assisted reproduction. The incidence of newborns born under 1,500 gms—very low birth weight—was 1.46 percent, which reflected little change from the 1.44 percent rate of 2001.⁵

Previous articles by the author and others began exploring the association with preterm birth and induced abortion in 2003.⁶ Rooney and Calhoun reviewed studies from 1966 to 2003 and found forty-nine studies with a statistically significant risk for preterm birth after abortion.⁷ However, the impact of abortion has been known in the international community since at least 1973. The Hungarian government was warned about the evidence of an abortion-preterm birth link in a 1973 article:

A recent article in *Magyar Hírek*, a journal sponsored by the government, contained detailed explanations for the new legislation. The columnist referred extensively to the research of Jeno Sarkany, who had presented evidence considered conclusive by the government, that, artificially induced abortions predisposed to premature births in subsequent pregnancies. His study of perinatal and infant morbidity statistics revealed a striking increase in physically and/or mentally handicapped babies among those born to mothers who had had a therapeutic abortion previously. Apparently, this unforeseen social burden outweighed the benefits on economic pressures of free abortion, and the government, while emphasizing the unchanged importance of population control, felt compelled to repeal its abortions laws.⁸

Modification to access, mandatory counseling, and other social factors reduced the abortion rate in Hungary from a high of 57 percent of pregnancies in 1969 to 38 percent in 2000.⁹

Fueled by the overwhelming findings on the medical effects of abortion on the increased incidence of preterm birth, Calhoun, Shadigian, and Rooney (2007), made the public health argument for the

United States from the fifty-nine statistically significant studies (up to 2005) that induced abortion increased the incidence of preterm birth by approximately 31.5 percent.¹⁰ Calhoun, Shadigian, and Rooney calculated, based on the 31.5 percent increased risk associated with abortion, that the concomitant hospital costs due to prematurity were over \$1.2 billion per year in the United States. These hospital expenses did not include any of the significant costs after discharge to home related to the morbidity of prematurity: cerebral palsy, retinopathy, bronchopulmonary dysplasia, deafness, and early intervention programs. As of 2011, no one had disputed with the authors these estimates of abortion's associated increased risk for prematurity (3.1 percent) or the impact on health-care dollars by induced abortion.

The most remarkable finding as of January 2011 is the 122 published, peer-review articles all documenting increased risk for preterm birth with induced abortion.¹¹ Yet, the leading medical organizations for women's health care (including the American College of Obstetricians and Gynecologists [ACOG] in their new online compendium for 2011) refuse to acknowledge the increased associated risk for preterm labor or acknowledge the substantial body of literature raising this concern.¹²

Recent Literature

There are five large studies published in 2008 and 2009 that have done much to put to rest the notion that there is no associated increased risk for preterm birth with abortion. Each study shall be discussed in some detail (see table 1 for summary). The first study, by Reime, Schuecking, and Wenzlaff (2008), used a record-linked German cohort of teen patients in Saxony that included 8,857 total patients from 1990 to 1999.¹³ Data was available in all data fields in 87 to 98 percent of the participants all who were less than nineteen years old. There were 7,845 nulliparous patients, with 801 women in the control cohort with no previous induced abortions and 211 in the observational cohort with one previous induced abortion prior to the incident pregnancy. Controlling for all demographic variables and possible cofactors (age, tobacco, substance use, etc.) between the women with prior induced abortions and those without abortions, there was an OR (odds ratio) of 2.21 (CI 95 percent 1.07, 4.58) increased risk for preterm birth with only one abortion versus no abortions or previous births. This translates into a *doubling* of the increased risk for delivery of a preterm infant prior to 37 weeks.

Freak-Poli et al. (2009) performed a data registry and linked study on all South Australian women from 1998 to 2003 to examine the etiologies associated with preterm birth.¹⁴ There were 42,269 women included in the study. Demographic factors among women who delivered prematurely and at term were similar with regard to socioeconomic status and medical complications of pregnancy. Risk factors related to preterm birth included Aboriginal race, unmarried single status, smoking more than ten cigarettes/day, more than forty years old (increased

Table 1 Five Recent, Representative Key Studies Linking Induced Abortion and Preterm Birth

Year published	Year data collected	Author	Country	Details	OR, one induced abortion	OR, two or more induced abortions
2008	1990–1999	Reime ^a	Germany 8,857 women <19 years	Unmatched case control	2.21 (1.07, 4.58) ^b	N/A
2009	1998–2003	Freak-Poli ^c	South Australia 42,269 women	Registry-matched data	1.25 (1.13, 1.40)	N/A
2009	1980–2008	Van Oppenraaij ^d	Medline and Cochrane database search	Used OR 2.0 for significance	<37 weeks 1.2 (1.1, 1.3) <34 weeks 1.5 (1.1–2.0) <37 weeks 1.25 (1.03,1.48) <34 weeks 1.64(1.38–1.91)	<37 weeks 1.9 (1.4, 2.5) <34 weeks 2.6 (1.1–5.9) <37 weeks 1.51 (1.21, 1.75) <34 weeks 1.64 (1.38–1.91)
2009	1995–2007	Swingled ^e	Meta-analysis	30 induced abortion and 26 SAB papers	1.35 (1.20–1.52) 1.36 (1.24–1.50) NS*	1.79 (1.45–2.04) 1.93 (1.38–2.71) NS*
2009	1980–2008	Shah ^f	Meta-analysis	18 studies low birth weight 22 studies preterm birth 3 small for gestational age studies		

^a American College of Obstetricians and Gynecologists, “Compendium 2011,” <http://www.acog.org>.
^b 1.3 OR (95 percent CI 1.0–1.7) all numbers are noted in this fashion; NS = not significant; See Appendix A for a full list of statistically significant studies involving induced abortion and preterm birth.
^c B. Reime, B.A. Schuecking, and P. Wenzlaff, “Reproductive Outcomes in Adolescents Who Had a Previous Birth or an Induced Abortion Compared to Adolescents’ First Pregnancies,” *BMC Pregnancy and Childbirth* 8 (2008): 4.
^d R. Freak-Poli et al., “Previous Abortion and Risk of Preterm Birth: A Population Study,” *Journal of Maternal-Fetal Medicine* 22 (2009): 1–7.
^e R.H.F. van Oppenraaij et al., “Predicting Adverse Obstetric Outcome after Early Pregnancy Events and Complications: A Review,” *Human Reproductive Update* 1 (2009): 1–13.
^f H.M. Swingle et al., “Abortion and the Risk of Subsequent Preterm Birth: A Systematic Review with Meta-analyses,” *Journal of Reproductive Medicine* 54 (2009): 95–108.

medical problems), in vitro fertilization (multiples), and intrauterine growth delay. Spontaneous abortion did not increase the risk for preterm birth in the study. The adjusted odds ratio (AOR) for preterm birth associated with spontaneous miscarriage was 1.11 (95 percent CI 1.00–1.31) and not statistically significant. However, induced abortion *increased risk* for preterm birth with an AOR of 1.25 (95 percent CI 1.13–1.40), which translates into an increased risk by 25 percent over normal rates.

The next study is interesting since it was an attempt to down-play the risk of preterm birth with abortion but did not succeed. For their 2009 study, van Oppenraaij et al. performed a Medline and Cochran database search 1980 to 2008, but did not call their study an actual meta-analysis of the literature.¹⁵ They also arbitrarily used a 2.0 odds ratio as a statistically significant finding, when generally, any finding of an OR that does not cross over an OR of 1.0 is thought to be statistically significant. In spite of this limitation, van Oppenraaij et al. actually found that previous abortion increased the OR for preterm birth before 37 weeks: One abortion had an OR of 1.2 (95 percent CI 1.1–1.3), and two or more abortions had an OR of 1.9 (95 percent CI 1.4–2.5). The risk for very preterm birth before 34 weeks with previous induced abortions was even more startling, with one abortion demonstrating at OR of 1.5 (95 percent CI 1.1–2.0), and two or more abortions with an OR of 2.6 (95 percent CI 1.1–5.9) of delivering prior to 34 weeks.

Finally, van Oppenraaij et al. found that previous spontaneous abortions may also increase the OR for preterm birth before 37 weeks and before 34 weeks. One spontaneous abortion had an OR of 1.1 (95 percent CI 1.1–1.2), and two or more spontaneous abortions had an OR of 1.6 (95 percent CI 1.3–1.9) for delivery before 37 weeks. One previous spontaneous abortion had an OR of 1.5 (95 percent CI 1.2–1.7) for very preterm birth before 34 weeks, and two or more spontaneous abortions had an OR of 2.7 (95 percent CI 1.8–4.0). These findings are not consistent with Freak-Poli et al.'s study and others demonstrating that there is no increased risk of preterm delivery with spontaneous abortions.¹⁶ Further, induced abortion is an *avoidable* risk factor for preterm birth, but spontaneous miscarriage is not. Finally, the etiologies for preterm birth may very well be the very reasons patients undergo spontaneous miscarriages in the first place. Therefore, spontaneous miscarriages are not an appropriate comparison group with induced abortions.

Next are the two most powerful studies: the meta-analyses by Swingle et al. (2009) and Shah and Zao (2009).¹⁷ Swingle et al. performed a meta-analyses of the literature from 1995 to 2007.¹⁸ The paper's authors included two pro-abortion and two pro-life authors per their admission. They believed this would reduce any bias. They searched 7,891 titles, 349 abstracts, and 130 papers. After reading the papers and using their inclusion criteria for data and ability to analyze the data, they found thirty induced abortion and twenty-six spontaneous abortion

papers. The authors analyzed data from twelve induced abortion and nine spontaneous abortion papers. Four of twelve studies on induced abortion had data available for common ORs for calculation for induced abortion before 32 weeks. The common OR for these studies was 1.64 (95 percent CI 1.38–1.91).¹⁹ The authors therefore demonstrated a 64 percent increased risk of preterm birth before 32 weeks with single induced abortion.²⁰

The Swingle et al. study also found an increased risk for preterm birth with spontaneous abortions. Out of the nine studies available for common OR for preterm birth with spontaneous abortions, seven had data for use in calculations. The authors found that spontaneous abortions OR for preterm delivery less than 37 weeks with one spontaneous abortion is an OR of 1.43 (95 percent CI 1.05–1.66) and with two or more spontaneous abortions is an OR of 2.27 (95 percent CI 1.98–2.81). Again, it must be noted that the etiologies of why women miscarry spontaneously are significantly different than those who have induced abortions. The very reasons women miscarry may also predispose them to preterm birth.

The final study is a large meta-analysis by Shah and Zao (2009).²¹ The authors screened 834 papers and excluded 765 for lack data and objectives. They retrieved sixty-nine citations and again excluded thirty-two for lack of data. Of the thirty-seven remaining studies, there were eighteen studies of low birth weight, twenty-two studies for preterm birth, and three for small for gestational age. Out of the eighteen studies for low birth weight, there were 280,529 patients available to compare no induced abortions versus one abortion prior to first pregnancy. Shah and Zao found an increased risk for preterm birth with an OR of 1.35 (95 percent CI 1.20–1.52) demonstrating a 35 percent increase in the preterm birth rate in patients with only one abortion. Only five of eighteen studies had two or more induced abortions and included 49,347 patients. The OR for preterm birth for two or more induced abortions was 1.72 (95 percent CI 1.45–2.04), which shows the important epidemiological principle of a dose related effect: The more abortions one has prior to first pregnancy, the higher the risk for preterm birth.

Examining the twenty-two studies on preterm birth that included 268,379 patients, the authors found an increased risk for preterm birth with an OR for one induced abortion of 1.36 (95 percent CI 1.24–1.50). In the seven studies of the twenty-two studies with two or more induced abortions, and including 158,421 patients, they found an increased risk for preterm birth with an OR of 1.93 (1.38–2.71). These are striking findings in a large meta-analysis that allows the inherent confounding variables to fall away due to the large numbers of patients in the database. Finally, they examined the effects of abortion on small size for gestational age and found no influence with either one or more induced abortions.

Finally, 2010 remained a busy year for abortion and preterm birth studies. There were seven informative studies on preterm birth and induced abortion.²² Watson et al. (2010) performed a population-based case-control study in Victoria, Australia, from April 2002 to April 2004 in seventy-three maternity hospitals.²³ The researchers used interviews of patients postpartum to collect complete reproductive histories based on a database of all deliveries of singleton patients delivering between 20 and 32 weeks. They analyzed 603 women with preterm birth and compared them to 796 randomly selected women with birth after 37 weeks. Logistic regression analysis was used to control for sociodemographic factors. From the analysis, estimated unadjusted odds ratios were calculated and adjusted odds ratios were found. Both groups were compared to each other, looking at term and preterm deliveries between spontaneous and induced abortions.

Watson et al. found that there was increased risk for preterm birth whether there was a spontaneous or induced abortion. They found the risk of preterm birth increased by (adjusted odds ratio—adjusted for confounders) of 1.53 (95 percent CI 1.3–1.8) per abortion *without* a previous preterm birth. The risk of preterm birth increased by (adjusted odds ratio—adjusted for confounders) of 2.79 (95 percent CI 1.8–4.3) per abortion *with* a previous preterm birth. What they did not share was the finding in their data that showed the higher AORs for two or more abortions in their study. The AOR for preterm birth with two spontaneous abortions was 2.54 (95 percent CI 1.3–4.8) and with two induced abortions the AOR was 4.93 (95 percent CI 1.5–17). The findings with three spontaneous abortions was an AOR of 2.88 (95 percent CI 1.1–7.5) and with three induced abortions the adjusted odds ratio was 3.53 (95 percent CI 1.1–11).

Watson et al. performed another study on the same group of patients as the previous study to evaluate the effects of a term delivery after an abortion to explore if a term delivery provided a protective effect on preterm birth after an abortion.²⁴ The purpose of this study was to examine if there was a “neutralizing effect” of a term birth after an abortion (both spontaneous and induced). The authors, however, did *not* separate out spontaneous and induced abortions (based on findings in their first study) when looking at abortions and preterm birth in the index pregnancy. The analysis also suffered from the effect of small numbers in both study groups with more than parity of three in each group (28 cases and 16 controls respectively). They found women with parity of two or more with an abortion prior to the index pregnancy and a previous term pregnancy had an AOR of 2.71 (95 percent CI 1.39–5.28) for preterm delivery in spite of the term pregnancy in their first gestation. Therefore, they noted that a term delivery *does not* obviate the effects of an abortion. The authors, as noted previously, did not separate out the type of abortion to be evaluated for the effect, so the findings must be taken cautiously.

Bhattacharya et al. (2010) performed a National Health Services Study in Scotland on data from the national database linked for all women delivering at the Aberdeen Maternity Hospital, Aberdeen, Scotland.²⁵ The study sought to examine the possible inherited predisposition to spontaneous preterm birth. The authors analyzed 22,343 pregnancies in two generations between September 1948 and March 2008. The database contained 35,096 pregnancy records of women with daughters available. The authors excluded induced labors (9,521) and cesarean deliveries (1,716) since these do not reflect spontaneous deliveries. There were also 2,103 maternal records lacking gestational age at delivery in the records and 108 daughters with no mode of delivery.

This left 13,845 daughters born to 11,576 mothers suitable for analysis. Bhattacharya et al. found the interesting risk factor for preterm birth in daughters (adjusted OR) of the daughter herself being born preterm OR 1.49 (95 percent CI 1.12–1.99). Other factors influencing preterm birth were found (AORs): less than 20 years OR 1.67 (95 percent CI 1.43–1.94), lower socioeconomic status OR 1.22 (95 percent CI 1.04–1.44), smoking ten or more cigarettes per day OR 1.47 (95 percent CI 1.27–1.71), and body mass index less than 20 kg/m² OR 1.48 (95 percent CI 1.24–1.77). A history of a previous spontaneous preterm birth in the daughter was also associated with an increased risk of preterm birth with an OR of 2.51 (95 percent CI 1.71–3.66). Most interesting of all in the daughters was the finding of an increased risk of preterm delivery in the daughter even if her mother had preterm delivery, not of her daughter, but another pregnancy demonstrating an OR 1.35 (95 percent CI 1.12–1.63).

However, perhaps one of the most startling findings in the paper was that spontaneous miscarriage increased the odds of a preterm birth in the mother OR 1.24 (95 percent CI 1.01–1.52), but spontaneous miscarriage in the mother had no effect on the preterm birth rates of the daughters OR 1.04 (95 percent CI 0.85–1.28). Further, the authors did not examine induced abortion in the daughters as a risk for preterm birth. Therefore, before generalizing to a genetic and heritable factor as a cause of spontaneous preterm birth in daughters of women with spontaneous preterm birth, induced abortion *must be included* as a comorbidity due to induced abortion's association with preterm birth.

The next study by Voigt et al. (2009) involved eight German federal states in a retrospective database linked study from 1998 to 2000, with reproductive data obtained from 247,593 patients at first obstetrical visit and verified in the database.²⁶ The authors found, even after controlling for specific occupational comparisons due to possible bias of activity/job for preterm birth, an increased rate of preterm delivery before 36 weeks and early preterm delivery before 31 weeks in women with induced abortions. When specifically analyzing the cohort of women aged 28 to 30 years, Voigt et al. found that one induced abortion carried a 7.8 percent risk of preterm birth and two or more induced

abortions had an 8.5 percent risk of preterm birth. The general population rate of preterm birth without any induced abortions was 6.5 percent and was statistically significant to ($p = 0.015$). Unfortunately, the authors did not calculate any odds ratios for preterm birth associated with induced abortions.

The next study came from a single institution in the United Kingdom. The study was a case-control study by Yuan et al. (2010).²⁷ The analysis was done at a National Health Services hospital in Bristol, U.K., a single tertiary hospital, from 2002 to 2004, and used record linkage analysis. The study group was 274 women with preterm singleton deliveries between 22 and 35 weeks and 559 randomly selected control deliveries from 37 to 42 weeks during the same time frame. Yuan et al. found that a previous termination of pregnancy in the study group was higher in the study patients delivering before 35 weeks when compared to the control group who delivered at term. In the study group of patients delivering before 35 weeks, 25.4 percent (58 of 228) of the patients had a termination of pregnancy, while only 15.9 percent (88 of 559) of the control patients delivering at term had terminations of pregnancy. This difference in rate was statistically significant to $p < 0.007$. Surprisingly, the authors gave no odd ratios for a termination of pregnancy and its associated risk for delivery before 35 weeks, even though the statistical significance was overwhelming. Finally, the authors found the spontaneous miscarriage rates were similar between the groups: 37 weeks or later, 5.4 percent, and 35 weeks or earlier, 3.9 percent.

The best study from the United States actually discussed cervical insufficiency in the context of abortion. Anum, Brown, and Strauss (2010) used birth certificate data from United States from 2004.²⁸ They utilized only primiparous patients and found 1,115,541 primiparous women to include in the study: 852,296 (76.4 percent) Caucasian, 166,966 (15 percent) black, 82,965 (7.4 percent) Asian/Pacific Islander, and the remainder American Indians. Blacks were found to have the highest percentage of two or more abortions (4.5 percent) compared to Caucasians (2.9 percent), Asians (3.0 percent), and American Indians (2.7 percent).

Cervical insufficiency was 3.15 percent in patients with four or more abortions compared to 0.15 percent in those without any abortions:

- 1 termination 0.46 percent;
- 2 terminations 0.99 percent; and
- 3 terminations 1.92 percent.²⁹

Using multivariate analysis to control for known risk factors (including abortion) the authors found that

- black women had an OR for cervical insufficiency of 2.45 (95 percent CI 2.22–2.71) compared to Caucasian women;
- American Indian women had an OR for cervical insufficiency of 1.62 (95 percent CI 1.10–2.37) compared to Caucasian women; and

- there was no difference between Caucasian women and Asian/Pacific Island women.³⁰

Pregnancy termination had a strong association with cervical insufficiency (compared to primiparous women without abortions):

- 1 termination OR 2.49 (95 percent CI 2.23–2.77);
- 2 terminations OR 4.66 (95 percent CI 4.07–5.33);
- 3 terminations OR 8.07 (95 percent CI 6.77–9.61); and
- 4 terminations OR 12.36 (95 percent CI 10.19–15.00).³¹

Therefore, the horrific effects of abortion are *synergistic* with the apparent race component of cervical insufficiency and may help explain the increased preterm birth rate amongst blacks.

The final study analyzed was Grote et al. (2010).³² The authors conducted a meta-analysis of depression's relationship to preterm birth, intrauterine growth delay, and low birth weight. They searched 592 articles on MEDLINE, 27 on PsycINFO, 106 on CINAHL, 63 on Social Work Abstracts, 73 on Social Services Abstracts, and 1 on Dissertation Abstracts International. In their analysis, twenty-nine studies met the inclusion criteria: twenty for preterm birth (9 significant), eleven for low birth weight (5 significant), and twelve for intrauterine growth delay (2 significant). Grote et al. found depression was increased in preterm birth patients with an OR 1.39 (95 percent CI 1.19–1.61). However, the authors did not look at the number of terminations of pregnancy that were associated with preterm birth. The paper failed to understand the implications of depression related to abortion and thus the interesting link to *both* a preterm birth and depression in the “double-effect” of abortion.

Conclusions

There are over 122 studies demonstrating statistically significant association with preterm birth and induced abortion.³³ The data on spontaneous miscarriages is not as clear, but the large meta-analyses that control for confounding variables seem to indicate that spontaneous miscarriages are not related to preterm birth.³⁴ Further, as has been noted earlier in the presentation of the data, the very disease processes and medical problems related to spontaneous miscarriages may also be operative in preterm birth. Lastly, one cannot avoid a spontaneous miscarriage, but may avoid the tragedy of preterm birth by never undergoing an induced elective abortion.

Notes

¹ J.E. Lawn et al., “Four Million Neonatal Deaths: When? Where? Why?” *Lancet* 365 (2005): 891–900.

² J. Tucker and W. McGuire, “Epidemiology of Preterm Birth,” *British Medical Journal* 329 (2004): 675–678; S. Wen et al., “Epidemiology of Preterm Birth

and Neonatal Outcome,” *Seminars in Fetal and Neonatal Medicine* 9 (2004): 429–435; J. Martin et al., “Annual Summary of Vital Statistics: 2006,” *Pediatrics* 121 (2008): 788–801; S. Beck et al., “The Worldwide Incidence of Preterm Birth: A Systematic Review of Maternal Mortality and Morbidity,” *Bulletin of the World Health Organization* 88 (2010): 31–38.

³ Beck et al., “The Worldwide Incidence of Preterm Birth.”

⁴ J. Martin et al., “Births: Final Data for 2002,” *National Vital Statistics Reports* 52 (2003).

⁵ Ibid.

⁶ J.M. Thorp, K.E. Hartmann, and E. Shadigian, “Long-Term Physical and Psychological Health Consequences of Induced Abortion: Review of the Evidence,” *Obstetrics and Gynecological Survey* 58 (2003): 67–79; B. Rooney and B. Calhoun, “Induced Abortion and Risk of Later Premature Births,” *Journal of American Physicians and Surgeons* 8 (2003): 46–49.

⁷ Rooney and Calhoun, “Induced Abortion and Risk of Later Premature Births.”

⁸ L. Iffy, “Letter,” *Obstetrics and Gynecology* 45 (1975): 115–116, citing J. Kovacs, “Nepesedespolitikánk nehány kérdése: A kulong utodokert,” *Magyar Hírek* 26 (1973): 10.

⁹ W. Johnston, “Historical Abortion Statistics, Hungary” (2012), <http://www.johnstonsarchive.net/policy/abortion/ab-hungary.html>.

¹⁰ B. Calhoun, E. Shadigian, and B. Rooney, “Cost Consequences of Induced Abortion as an Attributable Risk for Preterm Birth and Impact on Informed Consent,” *Journal of Reproductive Medicine* 52 (2007): 929–937.

¹¹ Brent Rooney, “Bibliography of 122 Studies,” <http://www.aaplog.org/complications-of-induced-abortion/induced-abortion-and-pre-term-birth/bibliography/>.

¹² American College of Obstetricians and Gynecologists, “Labor, Delivery, and Postpartum Care,” FAQ087 (May 2011).

¹³ B. Reime, B. Schuecking, and P. Wenzlaff, “Reproductive Outcomes in Adolescents Who Had a Previous Birth or an Induced Abortion Compared to Adolescents’ First Pregnancies,” *BMC Pregnancy and Childbirth* 8 (2008): 4.

¹⁴ R. Freak-Poli et al., “Previous Abortion and Risk of Preterm Birth: A Population Study,” *Journal of Maternal-Fetal Medicine* 22 (2009): 1–7.

¹⁵ R. van Oppenraaij et al., “Predicting Adverse Obstetric Outcome after Early Pregnancy Events and Complications: A Review,” *Human Reproductive Update* 1 (2009): 1–13.

¹⁶ Reime, Schuecking, and Wenzlaff, “Reproductive Outcomes in Adolescents.”

¹⁷ H.M. Swingle et al., “Abortion and the Risk of Subsequent Preterm Birth: A Systematic Review with Meta-analyses,” *Journal of Reproductive Medicine* 54 (2009): 95–108; P.S. Shah and J. Zao, “Induced Termination of Pregnancy and Low Birthweight and Preterm Birth: A Systematic Review and Meta-analysis,” *British Journal of Obstetrics and Gynecology* 116 (2009): 1425–1442.

¹⁸ Swingle et al., “Abortion and the Risk of Subsequent Preterm Birth.”

¹⁹ van Oppenraaij et al., “Predicting Adverse Obstetric Outcome.”

²⁰ Swingle et al., "Abortion and the Risk of Subsequent Preterm Birth."

²¹ Shah and Zao, "Induced Termination of Pregnancy and Low Birthweight and Preterm Birth."

²² L. Watson et al., "Modelling Prior Reproductive History to Improve Prediction of Risk for Very Preterm Birth," *Paediatric and Perinatal Epidemiology* 24 (2010): 402–415; L. Watson et al., "Modelling Sequence of Prior Pregnancies on Subsequent Risk of Very Preterm Birth," *Paediatric and Perinatal Epidemiology* 24 (2010): 416–423; S. Bhattacharya et al., "Inherited Predisposition to Spontaneous Preterm Delivery," *Obstetrics and Gynecology* 115 (2010): 1124–1133; M. Voigt et al., "Is Induced Abortion a Risk Factor in Subsequent Pregnancy?" *Journal Perinatal Medicine* 37 (2009): 144–149; W. Yuan et al., "Analysis of Preterm Deliveries Below 35 Weeks' Gestation in a Tertiary Referral Hospital in the United Kingdom: A Case-Control Study," *BioMed Central* 3 (2010): 119–128; N. Grote et al., "A Meta-analysis of Depression During Pregnancy and the Risk of Preterm Birth, Low Birth Weight and Intrauterine Growth Restriction," *Archives of General Psychiatry* 67 (2010): 1012–1024; E. Anum, H. Brown, and J. Strauss, "Health Disparities in Risk for Cervical Insufficiency," *Human Reproduction* 25 (2010): 1–7.

²³ Watson et al., "Modelling Prior Reproductive History."

²⁴ Watson et al., "Modelling Sequence of Prior Pregnancies."

²⁵ Bhattacharya et al., "Inherited Predisposition to Spontaneous Preterm Delivery."

²⁶ Voigt et al., "Is Induced Abortion a Risk Factor in Subsequent Pregnancy?"

²⁷ Yuan et al., "Analysis of Preterm Deliveries Below 35 Weeks' Gestation."

²⁸ Anum, Brown, and Strauss, "Health Disparities in Risk for Cervical Insufficiency," 1–7.

²⁹ Ibid.

³⁰ Ibid.

³¹ Ibid.

³² Grote et al., "A Meta-analysis of Depression During Pregnancy and the Risk of Preterm Birth, Low Birth Weight and Intrauterine Growth Restriction," 1012–1024.

³³ See note 11 above.

³⁴ Reime, Schuecking, and Wenzlaff, "Reproductive Outcomes in Adolescents"; Freak-Poli et al., "Previous Abortion and Risk of Preterm Birth"; Shah and Zao, "Induced Termination of Pregnancy and Low Birthweight and Preterm Birth."