ACADEMY OF MEDICAL ROYAL COLLEGES

NATIONAL COLLABORATING CENTRE FOR MENTAL HEALTH

INDUCED ABORTION AND MENTAL HEALTH

A SYSTEMATIC REVIEW OF THE MENTAL HEALTH OUTCOMES OF INDUCED ABORTION, INCLUDING THEIR PREVALENCE AND ASSOCIATED FACTORS.

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The National Collaborating Centre for Mental Health (NCCMH) was established in 2001 at the Royal College of Psychiatrists, in partnership with the British Psychological Society. Its primary role is to develop evidence-based mental health reviews and clinical guidelines

CONTENTS

LIST OF TABLES

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EXECUTIVE SUMMARY

Background
The majority of abortions carried out in the UK are done so on the grounds that continuing with the pregnancy would risk physical or psychological harm to the woman or child. However, there has been some concern in recent years that abortion itself may increase psychological risk and adversely affect the woman's mental health. Opinion on this has varied, partly due to limitations in the research, different interpretations of the evidence and the ethical, religious and political issues surrounding abortion. This report was commissioned to review the best available evidence on any association between induced abortion and mental health outcomes, and draw conclusions where possible.

Review questions
The purpose of the review was to clarify the relationship between induced abortion and mental health problems. The review focused on women having a ***legal*** abortion for an ***unwanted*** pregnancy and the key questions posed were:

1. **How prevalent are mental health problems in women who have an induced abortion?**
2. **What factors are associated with poor mental health outcomes following an induced abortion?**
3. **Are mental health problems more common in women who have an induced abortion, when compared with women who deliver an unwanted pregnancy?**

The following findings are the result of a systematic review that built on previous reviews, synthesising a new narrative review and limited quantitative meta-analysis. Studies were only included in the review if they assessed outcomes in a follow-up period of at least 90 days. To ensure the best available evidence was used, all studies were subject to multiple quality assessments and the outcomes of the review comparing abortion with delivery of an unwanted pregnancy were rated using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) process. A period of public consultation generated comments that informed the review and this report.

Limitations
The majority of studies included in the review were subject to multiple limitations. These included: secondary data analysis of national surveys and retrospective study designs; heterogeneity in the mental health outcomes assessed and methods of assessment; inadequate control for confounding variables and inappropriate comparison groups, included comparing women who had had an abortion with those who had given birth without considering whether or not the pregnancy was wanted; and inadequate control of previous mental health problems.

Some studies were conducted in countries where abortion is available on demand, whereas others were carried out in countries where most abortions are offered specifically to reduce the risks of mental health problems thought likely to occur if the pregnancy went to term. The populations in different countries are likely to be different.

Failing to properly take account of important factors (such as previous mental health problems, whether the pregnancy was wanted or not, intimate partner violence and abuse) in many studies limits our understanding of the complex relationships between unwanted pregnancy, abortion, birth and mental health.

Findings
Taking into account the broad range of studies and their limitations, the steering group concluded that, on the best evidence available:

- The rates of mental health problems for women with an unwanted pregnancy were the same whether they had an abortion or gave birth.
- An unwanted pregnancy was associated with an increased risk of mental health problems.
- The most reliable predictor of post-abortion mental health problems was having a history of mental health problems before the abortion.
- The factors associated with increased rates of mental health problems for women in the general population following birth and following abortion were similar.
- There were some additional factors associated with an increased risk of mental health problems specifically related to abortion, such as pressure from a partner to have an abortion and negative attitudes towards abortions in general and towards a woman's personal experience of the abortion.

The steering group also noted that:

- The rates of mental health problems after an abortion were higher when studies included women with previous mental health problems than in studies that excluded women with a history of mental health problems.
- A negative emotional reaction immediately following an abortion may be an indicator of poorer mental health outcomes.
- Meta-analyses in this area were of low quality, at significant risk of bias and offered no advantage over a rigorous systematic narrative review.
- Future practice and research should focus on the mental health needs associated with an unwanted pregnancy, rather than on the resolution of the pregnancy.

Recommendations
In the light of these findings, it is important to consider the need for support and care for all women who have an unwanted pregnancy because the risk of mental health problems increases whatever the pregnancy outcome. If a woman has a negative attitude towards abortion, shows a negative emotional reaction to the abortion or is experiencing stressful life events, health and social care professionals should consider offering support, and where necessary treatment, because they are more likely than other women who have an abortion to develop mental health problems.

There is a need for good quality prospective longitudinal research to explore the relationship between previous mental health problems and unwanted pregnancy, especially in a UK context, to gain a better understanding of which women may be at risk of mental health problems and to identify those in need of support.

1 INTRODUCTION

1.1 Background

The Abortion Act 1967 (HMSO, 1967), amended by the Human Fertilisation and Embryology Act 1990 (HMSO, 1990), governs abortion service provision in England, Scotland and Wales (Great Britain). Under the Act, women can have access to safe legal abortions. However, a pregnancy may only be terminated *'if two medical practitioners*' are of the opinion, formed in good faith:

a) *that the continuance of the pregnancy would involve risk to the life of the pregnant woman greater than if the pregnancy were terminated* (Section 1(1)(c))

b) *that the termination is necessary to prevent grave permanent injury to the physical or mental health of the pregnant woman* (Section 1(1)(b))

c) *that the pregnancy has not exceeded its 24th week and the continuance of the pregnancy would involve risk, greater than if the pregnancy were terminated, of injury to the physical or mental health of the pregnant woman* (Section 1(1)(a))

d) *that the pregnancy has not exceeded its 24th week and the continuance of the pregnancy would involve risk, greater than if the pregnancy were terminated, of injury to the physical or mental health of any existing child(ren) of the family of the pregnant woman* (Section 1(1)(a))

e) *that there is a substantial risk that if the child were born it would suffer from such physical or mental abnormalities as to be seriously handicapped.'* (Section 1(1)(d)) (HMSO, 1967)

An abortion may also be carried out in an emergency, certified by the operating practitioner as immediately necessary:

a) *'To save the life [of the pregnant women]* (Section 1(4))

b) *[T]o prevent grave permanent injury to the physical or mental health of the pregnant woman.'* (Section 1(4)) (HMSO, 1967)

The Abortion Act 1967 does not apply to Northern Ireland where abortion is available only in exceptional circumstances.

The number of abortions has risen steadily since 1992, up to the last 3 years when the number either decreased slightly or remained the same (Department of Health, 2011). In 2010, the total number of abortions carried out for residents of England and Wales was 189,574; that is, 0.3% more than in 2009. Of these, 96% were funded by the National Health Service (NHS) with the remaining 4% privately funded. In that year, 34% of women undergoing abortions had previously had an abortion.

The majority (98%) of abortions carried out in the UK in 2010 were on the grounds that continuing with the pregnancy would risk physical or psychological harm to the women or child. However, there have been concerns that abortion, while being undertaken to end a pregnancy deemed likely to increase psychological risk, may in fact increase the risk of an adverse psychological reaction and mental ill health.

One view within the literature is that abortion can be considered a life event that could potentially trigger an adverse psychological reaction, including mental ill-health, particularly in vulnerable women. There is debate regarding the significance of abortion as a life event. For some individuals, abortion is comparable to a minor life event such

as undergoing a minor operation. In this view, the risk of negative psychological reactions or mental ill health following abortion may be comparable with to, or better than, continuing an unwanted pregnancy to term (American Psychological Association [APA] Task Force on Mental Health and Abortion, 2008).

An alternative view is that abortion is a more significant life event, perhaps similar to the loss of a child, and carries a much greater risk to a woman's mental health than continuing with an unwanted pregnancy to term. For example, Rue and Speckhard (1992) suggested that abortion can lead to a specific mental health problem that they termed 'post-abortion syndrome', whereas Broen and colleagues (2006) stated that feelings such as loss, grief and doubt might all be present around the time of the abortion. Consistent with this view, the report on The Physical and Psycho-Social Effects of Abortion on Women, known as the Rawlinson Report (Great Britain Commission of Inquiry into the Operation and Consequences of The Abortion Act, 1994) suggested that there was no psychiatric justification for post-abortion and that the procedure puts women at risk of psychiatric illness without alleviating previous suffering.

Since then, numerous studies have examined the relationship between abortion and mental health. However, these have been characterised by varying degrees of quality and bias. In particular, findings from early studies were limited by quality and/or the appropriateness of the study design. Although both quality and research design have improved in more recent research, findings still vary, with some studies suggesting an association between abortion and adverse mental health outcomes (for example, Cougle *et al*., 2005), and others suggesting no association (for example, Broen *et al*., 2004).

Importantly, guidance provided by the Royal College of Obstetricians and Gynaecologists (RCOG) (2004), based upon a review of the literature, concluded that there were studies suggesting that rates of psychiatric illness or self-harm may be higher among women who had an abortion compared with women who gave birth or with non-pregnant women of a similar age. However, the report noted that these findings did not imply a causal association.

The House of Commons Science and Technology Committee (2007) called on both the Royal College of Psychiatrists (RCPsych) and the RCOG to update advice on the mental health consequences of induced abortion. The RCPsych (2008) responded by publishing a position statement that, recognising the imperfect and conflicting evidence, called for a formal review to provide greater clarity on the nature and extent of the relationship between abortion and mental health.

The present systematic review was commissioned by the Academy of Medical Royal Colleges and funded by the Department of Health, partly in response to the call for a further review of the best available evidence about the relationship between induced abortion of an unwanted pregnancy and mental health problems. Consequently, the focus of the present review is on mental health outcomes as measured by standardised and validated assessment tools, clinical diagnosis, treatment records and suicide rates. Because the review aimed to assess mental health problems and substance use and not transient reactions to a stressful event, negative reactions and assessments of mental state confined to less than 90 days following the abortion were excluded from the review.

Furthermore, the impact of induced abortion on other outcomes, including the mental health and well-being of the father and other family members, and possible negative emotional reactions to abortion such as guilt, shame and regret, although considered important, were beyond the scope of the present review.

1.2 Terminology

The review examines the impact on a woman's mental health of the elected induced abortion of an unwanted pregnancy. Throughout the review, the following terms are used:

Abortion
The terms *abortion, termination, termination of pregnancy* and *induced abortion* are used interchangeably in the literature. This review uses the term abortion in the text to refer to legal induced abortion.

Unplanned pregnancy
The terms *unintended* and *unplanned* are also used interchangeably in the literature. This review uses the term *unplanned pregnancy* to refer to a pregnancy that was not planned or intended to occur. Clearly, many unplanned pregnancies are very much wanted; however, some are not.

Unwanted pregnancy
Some pregnancies, whether planned or unplanned, are unwanted. The term *unwanted pregnancy* is used in this review to refer to a pregnancy that the woman does not wish to continue with, that is, she does not wish to carry the pregnancy to term or give birth.

Pregnancy intention
The term *pregnancy intention* is used in this review to refer to whether the woman intended or wanted to become pregnant (that is, the pregnancy was planned or unplanned) and/or, once the woman became pregnant, whether the pregnancy was wanted or unwanted.

Medical reasons for abortion
This refers to abortions that are carried out on medical grounds, for example women who elect to have an abortion on the basis of fetal abnormalities. This review does not include abortions performed for medical reasons. This is due to the small percentage of abortions carried out on these grounds (Steinberg *et al*. 2008) and because abortions for this reason occur in both wanted and unwanted pregnancies.

1.3 Abortion Legislation

The focus of this work was to review the evidence of the impact of abortion of an unwanted pregnancy upon mental health, not to review the abortion law in the UK or elsewhere. Decisions about legislation are significantly complex and take more than scientific evidence into account, including public health safety and societal views on moral and ethical issues. However, the legal context does warrant some consideration because abortion laws differ around the world and researchers in this field extrapolate findings from one country to another, out of necessity. Furthermore, it is important that the legal context in which studies are conducted is taken into account when interpreting the findings.

Women in Great Britain have the right to seek an abortion in accordance with the Abortion Act as outlined in Section 1.1 of this report. Abortions are granted primarily to prevent potential physical or psychological harm to the woman, and in some cases her children. Abortion laws vary considerably throughout the world but are not simply polarised at one end of the spectrum or the other. There is a very small number of countries in which abortion is illegal without exception, but a greater number where abortion is only permissible to save the life of the woman. In countries where the law is less restrictive, women may have the right to seek abortion on a number of different

grounds including rape, to prevent harm to herself or her family, on socioeconomic grounds or simply because the woman chooses to have an abortion. When a decision is taken in the UK to allow an abortion on the grounds of preventing potential physical or psychological harm, some of the reasons for abortion listed above may be contributory factors. However, what almost all countries that permit abortion have in common are time limits within which the abortion must be carried out, and these generally relate to the age of the pregnancy or the development of the fetus.

This review focuses upon women who have been legally granted an abortion of an unwanted pregnancy, regardless of the grounds upon which the law has made it permissible.

1.4 Previous Reviews: The Relationship Between Induced Abortion And Mental Health

1.4.1 Recent systematic reviews

The literature searches identified three recent systematic reviews (two qualitative and one quantitative) that have assessed the effects of abortion on women's mental health. First, the APA Task Force on Mental Health and Abortion (2008) systematic review included a very broad range of studies of differing quality and different periods of post-abortion follow-up. A second systematic review (Charles *et al*., 2008) also investigated abortion from a US perspective. Charles and colleagues (2008) graded the included studies according to study quality and looked at longer-term mental health problems, for example those occurring at least 90 days after the abortion. Third, Coleman (2011) conducted a review and meta-analysis of the literature between 1995 and 2009 with the aim of investigating the association between abortion and mental health problems.

The APA review
The APA review was charged with the task of '*collecting, examining, and summarizing the scientific research addressing the mental health factors associated with abortion, including the psychological responses following abortion, and producing a report based upon a review of the most current research.*' (APA, 2008).The report addressed the following questions:

1. Does abortion cause harm to women's mental health?
2. How prevalent are mental health problems among women in the US who have had an abortion?
3. What is the relative risk of mental health problems associated with abortion compared with its alternatives (other courses of action that might be taken by a pregnant woman in similar circumstances)?
4. What predicts individual variation in women's psychological experiences following abortion? (APA, 2008)

The authors reviewed all empirical studies published in the English language after 1989 that compared the mental health of women who had had an induced abortion with women with other pregnancy outcomes (for example, live birth, miscarriage or never pregnant). Studies with no comparison groups were also reviewed, to examine the rates of mental health problems in US samples of women who had had an abortion. The review also evaluated the factors most likely to be associated with poor mental health outcomes following an abortion. Fifty studies comparing mental health outcomes in women who had had an abortion with women with other pregnancy outcomes were included in the review. Furthermore, 23 non-comparative studies that considered only women who had had an abortion were identified.

The APA review concluded that no studies were methodologically rigorous enough to accurately determine prevalence rates of mental health problems following abortion. A number of methodological problems were identified, including with sampling and with the measurement of mental health outcomes. However, the authors did suggest that prevalence rates of mental health problems following abortion were likely to be consistent with prevalence rates of mental health problems within the general population.

The APA review also suggested a number of possible factors that might influence the development of mental health problems following abortion. These included the stigma surrounding abortion, perceived need for secrecy and a lack of social support. However, the most consistently identified factor, and that with the largest impact on post-abortion mental health outcomes was previous mental health problems. The authors suggested that all of the above factors could affect a woman's mental health, whatever the abortion decision.

Finally, the review compared rates of mental health problems in women who had undergone an induced abortion with other pregnancy outcomes, including live birth and women who had never been pregnant. They concluded that the relative risk of developing mental health problems following a single, legal, first-trimester abortion of an unplanned pregnancy for non-therapeutic reasons was no greater than the risk of delivering an unplanned pregnancy.

Among those studies with the strongest methodology, interpersonal concerns, personal characteristics, feelings towards the abortion decision and previous episodes of mental health problems were key factors associated with the development of mental health problems following an abortion.

The APA review has subsequently been updated by Major and colleagues (2009), who identified six additional studies but did not find any evidence to challenge the conclusions of the first review.

The Charles review

The Charles review focused on the longer-term mental health effects of abortion by including only studies with follow-up times of 90 days or more and took a different analytical approach from the APA review by grouping studies according to their methodological quality. From over 700 articles identified in their search, 21 studies with a comparison group were included in the review. Five key study characteristics that underpinned the quality of the evidence were used to rank studies from excellent through to very poor quality. These were:

- appropriateness of comparison groups
- controlling for pre-abortion mental health status
- the use of validated tools to measure mental health
- adequacy of confounder control
- appropriate interpretation of results.

Using these quality criteria, studies were placed in one of five possible study-quality levels (*excellent, very good, fair, poor* and *very poor*), where *excellent* studies satisfied all five quality criteria and *very poor* failed to satisfy at least three criteria while being equivocal on the remaining two. Within the review, four studies were identified as very good quality, eight studies as fair, eight as poor and one as very poor.

The four very good quality studies all showed that abortion had no effect on a woman's mental health in comparison with a no-abortion control group. Of the eight fair studies, the authors reported that three showed neutral findings; that is, similar levels of mental health problems were found in women who had had an abortion and the comparison group. Three studies showed mixed findings and two showed negative findings; that is, increased mental health problems for women who had had an abortion compared with the comparison group. Of the eight poor quality studies identified, one showed neutral findings, four had mixed findings and three had negative findings. Finally, the one very poor quality study suggested that abortion had had a negative impact on a woman's mental health. Overall, the authors concluded that the higher the quality of the study, the greater the likelihood that the study would find no association between abortion and the risk of mental ill health. Unlike the APA review, the Charles review did not assess prevalence rates or the factors associated with poorer mental health outcomes following an abortion.

The Coleman review
In the Coleman review, outcomes for women who had had an abortion were compared with outcomes for women who had not had an abortion (no abortion, pregnancy delivered or unintended pregnancy delivered group). Details of the search strategy and the number of papers retrieved in the search were not provided, nor was it clear why certain papers and outcomes were excluded from the review. In total, the review included 36 measures of effect from 22 papers. To be included in the review, studies needed to assess the impact of abortion compared with a no-abortion group, include a sample size of at least 100 participants, control for third variables, use odds ratios (ORs) and have been published in English-language peer-reviewed journals between 1995 and 2009. Although studies were required to control for third variables, they were not required to control for mental health problems prior to the abortion.

Three analyses were conducted: one that included all 26 effects combined, one that assessed the effects by diagnosis and, an analysis-by-comparison subgroup.
The review reported that abortion was associated with a significant increase in mental health problems and that this effect was consistent across the different diagnostic categories assessed (depression, anxiety, alcohol use, marijuana use and all suicide/self-harm). The final analysis indicated that abortion was associated with significantly greater risk of mental health problems compared with women who delivered a pregnancy, women who had not had an abortion (including women who had never been pregnant) and women who delivered an unintended pregnancy. Using population-attributable risks, the review concluded that 10% of the incidence of mental health problems was attributable to the abortion.

As with Charles, the Coleman review purely focused on the comparative outcomes of women in the abortion and no-abortion groups. Prevalence rates of mental health problems and factors associated with poorer outcomes were not included in the review and meta-analysis.

1.4.2 Limitations of the research included in the previous reviews

Comparators
Comparison groups for mental health and abortion vary depending on the particular question of interest. For a woman with an unwanted pregnancy, the alternative to abortion is limited to continuing the pregnancy to term. A woman faced with this decision and who is concerned about the mental health outcome of each possible choice will be most helped by studies using a comparator that reflects this choice. Therefore, the best available evidence would be a comparison group of women who carry an unwanted

pregnancy to term. However, very few studies made this comparison. Comparators in the individual studies included in the previous reviews were the general population, women who had miscarried, women who had given birth regardless of whether the pregnancy was wanted or unwanted and women who had never had an abortion. Although, some studies did identify women who had an unplanned pregnancy, there is an important distinction between an unplanned and an unwanted pregnancy. This potentially limits the applicability of these results to women faced with a decision regarding an unwanted pregnancy.

Control for co-occurring associated factors and confounding variables
A number of factors such as previous mental health problems, lack of social support and perceived inability to cope have been associated with an increased likelihood of developing mental health problems following abortion. These factors may also be associated with poor mental health outcomes in other contexts (Major *et al.*, 2009). In addition, rates of abortion differ among different sections of the population. For example, rates of abortion in England and Wales peak between 19 to 22 years of age and decline thereafter (Department of Health, 2011); this period is also when a first episode of depression is most likely amongst the general population (National Collaborating Centre for Mental Health [NCCMH], 2010). The abortion rate nearly four times higher in unmarried women in England and Wales (Department of Health, 2011), and Patten (1991) suggested that a risk factor for depression might be the absence of a confiding relationship. However, being unmarried does not necessarily preclude this. Therefore, reliably estimating the risks of mental health problems after abortion is very complex and requires confounding variables to be identified and taken into account. Many of the studies included in the previous reviews did not adequately control for confounding variables, including pre-abortion mental health problems.

Study design and sample
To examine the relationship between abortion and mental health outcomes adequately, the most appropriate study design is a prospective longitudinal study of a large cohort of women drawn from the general population. Ideally, the study would follow up the pregnancy decisions (for example, abortion or going to term) and subsequent mental health outcomes for women with an unwanted pregnancy. Small sample sizes taken from other, less representative populations are likely to be biased. Within the previous reviews, many studies used narrowly defined samples for reasons of expediency and cost, for example women seeking advice from sexual health clinics (Bradshaw & Slade, 2005). In an attempt to use a more representative sample, studies have opted for mail-back questionnaires (Reardon & Ney, 2000). However, as the APA and Charles reviews note, this method can lead to response bias, which reduces the reliability of results.

To overcome problems associated with non-representative and/or small samples, many studies have conducted secondary analyses of large datasets, including nationally representative samples. However, such studies are subject to additional limitations, including an over-representation of participant groups selected for a purpose other than for investigating the effects of abortion, a high chance of reporting bias and retrospective reporting, all of which limit reliability.

Under-reporting of abortion
When assessing the impact of abortion on mental health, it is important to obtain an accurate account of a woman's pregnancy history. Many studies relied on self-report data. However, abortion can be associated with problems of guilt and shame, with the women feeling stigmatised (Boorer & Murty, 2001); therefore, using self-report methods can lead to problems of under-reporting (Major *et al.*, 2009). Under-disclosing is also a risk when interviewing women face to face, and can occur not only via a failure to disclose information on the part of the participant, but by failure to ask relevant

questions. For example, a commonly asked question '*Have you had a previous abortion?*' could introduce errors regarding multiple abortions if an answer of '*yes*' is always coded as a single abortion.

Attrition
It is a common problem in research that people who remain in a study differ systematically from those who drop out. For example, it is possible that those who were most distressed by the experience of abortion withdrew from the study, leaving only those with good responses to be compared against a control group. It is therefore important that researchers take into account differences between completers and non-completers, and control for these differences where possible. Few studies included in the previous reviews tested for attrition bias.

Operationalising the outcome
Outcomes in abortion research varied from general mental health status (Gilchrist *et al.*, 1995) and levels of self-esteem (Russo & Dabul, 1997), to a diagnosis of a specific mental illness (Pedersen, 2007). Studies included in the reviews varied as to whether they used a well-validated tool or method to measure mental health outcomes. Many studies relied on self-report dichotomous measures of alcohol and drug use as opposed to clinical diagnosis of substance misuse or dependence.

Timing of outcome measurement
In many studies, particularly cross-sectional studies, the timing of the mental health measurement subsequent to the abortion was unclear and could vary from a number of days to many years.

Clinical significance of outcome
It is important that the outcome under investigation is clinically relevant to the research question posed (Major *et al.*, 2009). Therefore, when investigating the effect of abortion on mental health, outcomes are required to be clinically relevant.

Statistical and interpretational issues
The APA and Charles reviews made two additional comments that should be considered when investigating the impact of abortion on mental health. First, the authors warned against excessive use of statistical tests, for fear of finding a statistically significant result by chance. Second, they highlighted the problems with assuming that correlation means causation, and the need to always consider the impact of potential confounding variables in any interpretation made.

1.4.3 Limitations in methodology of the previous reviews

In addition to the problems with the evidence highlighted above, the reviews were each subject to a number of methodological limitations.

Generalisability
Despite including studies from outside the US, both the APA and Charles reviews were written from a US perspective. As a result, the findings might not be applicable to the UK population. For example, the APA review cites exposure to anti-abortion picketing as a prominent risk factor for poor outcomes. In the US, an annual pro-life march is held to protest against the legalisation of abortion. No such large-scale event exists in the UK, so women are in the UK are unlikely to encounter picketing and demonstrations outside abortion clinics, thus reducing the applicability of this risk factor to the UK.

Inclusion of low-quality studies
Although the APA review made it clear that research into abortion should be well controlled, the authors did not group studies by study quality, making interpretation of the results difficult. No details of any quality assessment process were included in the Coleman review. The Charles review graded evidence according to study quality based on the key characteristics described above. In particular, grading studies against the characteristic '*the appropriateness of the comparison group*' indicated that the relative risk of mental ill health following abortion depended, in part, on the comparator used. Within the review, differences in the relative risk that were seen between the abortion group and non-appropriate comparator groups disappeared when appropriate comparators such as unwanted or unplanned pregnancies were used.

Follow-up time
Unlike the Charles review, both the APA and Coleman reviews did not restrict follow-up time to greater than 90 days. The period immediately after birth can be a time of great stress, frustration and fatigue (Aston, 2002), and, as such, measurements taken immediately after birth may not provide a reliable measure of a woman's mental health once the initial stress has subsided. Consequently, studies included in the review may be measuring transient psychological changes in the early post- pregnancy period instead of longer-term mental health problems.

Measurement of mental health
In identifying papers that reported prevalence rates and risk factors for mental health problems following an abortion, the APA and Coleman reviews did not ensure that the measures used were validated. Furthermore, within the APA review, the authors did not distinguish between different disorders.

Comparison groups
All of the previous reviews looked at studies that used a 'never pregnant' or 'no abortion' comparison group (Pedersen, 2008; Rees & Sabia, 2007). Although it was useful from a research perspective to compare abortion with outcomes such as miscarriage or not being pregnant, these would not be viable options for a woman facing the decision of whether to have an abortion or not. This issue was summarised effectively by Cameron (2010) who claimed that '*once a woman is in the situation of having an unwanted pregnancy, there is no magical state of "un-pregnancy."*' Furthermore, women in these latter comparison groups may differ in fundamental ways from women who had an abortion.

For example, Russo and colleagues (1992) found that although the characteristics of women seeking an abortion vary between individuals, after controlling for age the abortion rate for low family income groups (under $11,000) was more than three times greater than the rate for women from higher family income groups (over $25,000).

Methodological problems
Two of the previous reviews (APA and Charles) did not conduct any statistical analysis of the data included in the reviews, while Coleman conducted a meta-analysis. A number of methodological problems with the meta-analysis conducted in the Coleman review have been identified, which brings into question both the results and conclusions.

As mentioned above, the comparison group used in each study is of vital importance when interpreting the results. However, errors in the classification of the comparison group are apparent within the Coleman review. In particular, the data included in the unintended pregnancy comparison for FERGUSSON2008 were incorrect. The data included in the Coleman review pertained to a 'no exposure to abortion' group that, although controlling for pregnancy history, included those who had never been pregnant and those who went on to have a delivery – regardless of whether the pregnancy was wanted, unwanted, planned or unplanned. Although an 'unwanted pregnancy delivered to term' group was included in the study, these data were not used within the Coleman review.

Although the Coleman review controlled for multiple outcomes from the same study, this only occurred when the study included multiple disorders under one diagnostic category. For example, if a study had results relating to generalised anxiety disorder (GAD), social anxiety and post-traumatic stress disorder (PTSD), a composite OR was calculated for anxiety disorders. However if a study reported depression, anxiety and alcohol misuse, the ORs included in the review were unadjusted despite the dependence of the results and the large amount of overlap between the different diagnostic categories. Furthermore, many of the studies included in the review used the same data sources. This interdependence between studies has not been adequately taken into account within the analysis.

Finally the statistical method used to calculate the population-attributable risk within the review assumes that outcomes are rare and therefore ORs can be used to estimate relative risks. However the outcomes included in the review are not rare, particularly when assessing lifetime prevalence rates of common mental *health* disorders such as depression. Therefore, the ORs reported are not equivalent to the relative risk.

1.4.4 Summary of key findings from the APA, Charles and Coleman reviews

In summary, the APA, Charles and Coleman reviews came to the following conclusions:

1. There was a large number of studies that examined the relationship between abortion and mental health, but many were of poor or only fair quality and most had significant methodological problems.
2. There were no rigorous studies that reliably established the prevalence of mental health problems following abortion that resulted directly from the effect of the abortion rather than other confounding factors.
3. From the studies considered, the approximate rates of mental health problems following abortion did not appear to be greatly different from rates of mental health problems in the general US population, although there was some uncertainty regarding this finding.

4. Some factors appeared to be associated with poorer mental health outcomes following abortion, including the stigma associated with abortion the need for secrecy regarding the abortion, personal characteristics, interpersonal concerns, level of social support and previous mental health problems. Previous mental health problems were identified as the most important factor associated with poorer mental health outcomes following abortion.
5. Within the Charles review, the higher the quality of the study, the less likely it was for differences to be found in the relative risk for adverse outcomes following abortion when compared with a group of women with an unwanted pregnancy. The converse appeared to be the case for lower quality studies.
6. When only higher quality studies were included in the analysis, the relative risk of mental ill health was no greater following a first-trimester legal abortion, than following delivery at full term of an unplanned pregnancy.
7. A meta-analysis of the studies in the Coleman review suggested that abortion was associated with increased risk of mental health problems across different comparison groups and different diagnostic categories. However, previous mental health problems were not controlled for within the review.

1.5 The Present Review: The Relationship Between Induced Abortion And Mental Health

The present review aimed to identify the prevalence of mental health problems in women who have had an induced abortion, the factors associated with poor mental health following an induced abortion and the risks associated with induced abortion relative to delivery of an unwanted pregnancy. The focus of the review was to consider the question from a woman's point of view; that is, if a woman considering an abortion were to ask what were the risks to her mental health, what answer would be given? The aim was to build upon previous systematic reviews to establish a better understanding of the complex relationship between abortion and mental health.

2 METHODS

The methods used to conduct this review included the following basic steps of a systematic review:

1. Identify significant previous reviews carried out in this specific field.
2. Define the scope and parameters of this review and refine review questions to inform the search strategy.
3. Develop a validated protocol for carrying out the review and apply this to evidence recovered from the search, including:
   - eligibility criteria for inclusion and exclusion of studies
   - assessment of the overall quality and risk of bias in individual studies.
4. Synthesise and analyse the data extracted from the studies to produce summaries of the evidence for each review question.
5. Grade the evidence.
6. Develop evidence statements.
7. Discuss implications for practice.

2.1 The Steering Group

The Steering Group consisted of 19 members, including representatives of the RCPsych, the RCOG, the Royal College of General Practitioners, technical staff from the National Collaborating Centre for Mental Health (NCCMH), and four members from the Department of Health who observed two meetings each and monitored progress.

The Steering Group met formally on six occasions to refine and advise on the review questions, search strategy, data extraction, data analysis and evidence summaries presented by the technical team. The group contributed to the development of evidence statements, consideration of limitations and implications of findings, drafting of the final report and responding to comments received during consultation.

At each meeting, all Steering Group members declared any potential conflicts of interest (see Appendix 1). These included paid employment, financial payments or other benefits from products or services relevant to the review that had been received by members themselves, their family members or employing organisations. Personal non-pecuniary interests were also requested, for example clear opinions held and public statements that have been made about abortion, or holding office in an organisation or group with a direct interest in or publicly held view on abortion.

The Steering Group recognised the important moral and ethical debates surrounding induced abortion, but were clear that the purpose of this review was to evaluate the scientific evidence in order to ascertain what, if any, impact induced abortion may have upon a woman's mental health and not to comment on the ethical issues. It was also considered that the question of mental health impact is important to all clinicians, whether their personal ethical views are in favour of or against abortion, in some or all circumstances.

2.2 Review Questions

Review questions were used to guide the identification and interrogation of the evidence base. The Steering Group identified the following three review questions as important areas for review:

1. **How prevalent are mental health problems in women who have an induced abortion?**
2. **What factors are associated with poor mental health outcomes following an induced abortion?**
3. **Are mental health problems more common in women who have an induced abortion, when compared with women who deliver an unwanted pregnancy?**

The review protocol is provided in Table 1. Data items differed for each of the review questions, therefore they are listed separately for each review (see Section 2.10). All other methods described below were the same for each review question.

The review questions sought to assess mental health problems as measured by validated scales, clinical diagnosis, treatment records, illicit drug use, or suicide and suicide attempts. Because the aim of the review was to assess mental health problems and not transient reactions to a stressful situation or life event, one of the criteria for inclusion in the present review was that mental health outcomes had been measured at least 90 days following an abortion.

2.3 Eligibility Criteria

The review protocol shown in Table 1 details the eligibility criteria for inclusion in the review. Additionally, ideal criteria were identified for the review; however, due to the limitations of the evidence base a more pragmatic approach was adopted. The differences between the ideal and pragmatic approaches adopted in the review are displayed in Table 2.

Table 1: Review protocol for the review of induced abortion and mental health

Electronic databases	CINAHL – 1990 to 2011 (week 27) EMBASE – 1990 to 2011 (week 28) MEDLINE – 1990 to 2011 (week 27) MEDLINE In-process – 1990 to 2011 (21 July) PsycINFO – 1990 to 2011 (week 27)
Date searched	1990 to 2011 (full details of search strategy in Section 2.4)
Population and exposure	Women who have had a legally induced abortion

Outcome	Mental health outcomes were defined as: 1. A mental health disorder as defined by *Diagnostic and Statistical Manual of Mental Disorders* (DSM; APA, 1987 and 1994) or *International Classification of Diseases* (ICD) (World Health Organization, 1992, 2007 and 2010) diagnostic criteria 2. Outcomes confirmed by validated rating scales designed to measure mental health outcomes 3. Accessing mental health treatment 4. Suicide 5. Substance use. For longitudinal studies, measures of mental health had to be assessed at least 90 days after the abortion. Where exact follow-up times were unclear, for example in cross-sectional studies, studies had to provide assurance that post-abortion mental health was being measured.
Additional limits	Studies in English language
Additional limits for Review question 2	Studies assessing factors associated with mental health problems in a subsample of women who had an abortion, for example those attending clinics for mental health treatment, were only included in the review if they included an appropriate comparison group, for example women who are not attending a clinic for mental health treatment.
Additional limits for Review question 3	≥100 participants, comparator group – women who deliver a pregnancy

It is noteworthy that although ideal criteria for each research question can be identified, due to the nature of abortion research no ideal gold standard study exists. First, it would be not be ethical or morally justified to conduct a randomised controlled trial of abortion versus live birth for women with an unwanted pregnancy. Second, as mentioned in Section 1.2, the measurement of pregnancy wantedness is open to many difficulties. For example, a pregnancy that was unwanted may become wanted at a later stage of pregnancy and vice versa. Furthermore, 'unwantedness' is not likely to be an all-or-nothing phenomenon, for instance women who choose abortion and those continuing the pregnancy may not be equal in this regard.

Finally, the decision to have an abortion may also be based on many other factors in addition to the wantedness of the pregnancy, although 'wantedness' is likely to be the 'final common pathway': at the point of agreeing to an abortion, presumably a woman has concluded, no matter how difficult the decision was, that she did not want to continue with the pregnancy. Consequently, the ideal review criteria identified below represents the best available evidence to answer the three research questions; that is, in countries where abortion is legal, comparing the outcomes prospectively with women carrying an unwanted pregnancy to term.

Women with an unwanted pregnancy going on to delivery may have been denied an abortion, although some may have concluded, for religious or ethical reasons or by force of circumstance, that they should go on to delivery with an unwanted pregnancy. Although this may be the best available evidence, the limitations of even these studies, such as the measurement of pregnancy intention, must be considered when interpreting the findings.

Table 2: Comparison of ideal and pragmatic review criteria

Ideal review criteria	Pragmatic approach adopted within the review
Mental health outcomes were measured at least 90 days after the abortion.	Studies employing a cross-sectional design had to provide evidence that post-abortion mental health was being measured and not lifetime prevalence. Longitudinal studies were required to measure outcomes at least 90 days following the abortion and/or delivery.
There was adequate control for previous mental health problems.	Studies identifying prevalence rates of mental health problems following an abortion were not required to control for previous mental health problems, due to the concern that this would result in a very small dataset. Instead, studies that controlled for previous mental health problems were reviewed separately from those that did not consider previous mental health problems.
There was adequate control for confounding factors.	Studies included in the review were not required to control for confounding variables, due to concerns that this would result in a very small dataset. Instead, quality assessment of the individual studies included in each review rated the control of confounding factors as a strength or weakness of the study.
Only abortions for unwanted pregnancies were included, not those carried out for medical reasons.	Studies rarely reported the reasons for the abortion. It was therefore assumed that all abortions were due to unwanted/unplanned pregnancies unless explicitly stated otherwise. Where studies specifically focused on abortions due to fetal abnormality, they were excluded from the review.
Studies were conducted in the UK.	Only one UK-based study was identified in the existing reviews, so studies from all countries where abortion is legal were included.
Where comparisons between abortion and other groups are conducted (Research question 3), an 'unwanted pregnancy delivered to term' group would be used as a comparator.	Comparative studies rarely compare abortion with an 'unwanted pregnancy delivery' group and are even more unlikely to include a group of women who sought but were denied an abortion of an unwanted pregnancy. Therefore, studies that compared abortions with any delivery group were included. Studies that compared abortion with 'unwanted pregnancy delivery' groups were reviewed separately from those which compared abortion with any delivery group. The quality assessment of individual studies identified the comparison group as a strength or weakness of the study accordingly, rather than criteria for inclusion or exclusion.
Comparison studies would employ longitudinal prospective research designs.	Longitudinal retrospective and cross-sectional studies were included in the review, due to the lack of well-controlled longitudinal prospective studies identified in earlier reviews.

2.4 Information Sources

The search strategy was developed in MEDLINE and modified for other databases. The search was limited to English-language reports of human studies. Terms were in part derived from the APA review searches on mental health and abortion, with additional searching being performed for terms on abortion, substance misuse and mental health conditions. Records retrieved from the APA search were excluded from the final dataset, to avoid duplication of effort at the screening stage. (For full details of the search strategy see Appendix 5).

Additional papers were found by searching references of retrieved articles, tables of contents of relevant journals, previous systematic reviews of induced abortion and mental health, and by writing directly to researchers (see Appendix 2) and obtaining references for new or potentially overlooked work from the Steering Group. The eligibility of papers recommended by consultees during the consultation phase was also assessed.

2.5 Study Selection

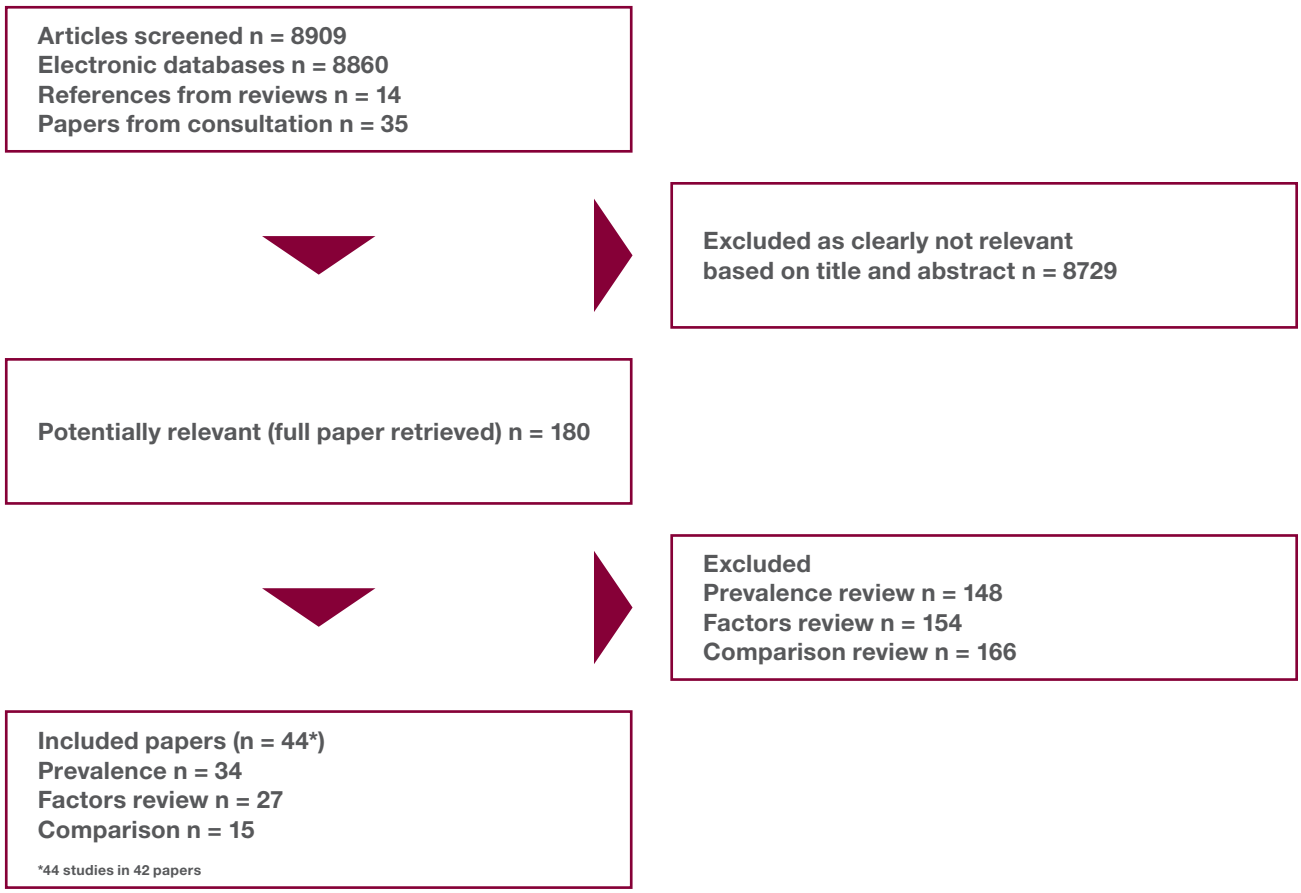
Determining eligibility for inclusion in the systematic review was conducted in a two-stage process. First, all references were screened on the basis of the title and abstract, and all clearly non-relevant references were excluded. Full texts for all the remaining potentially relevant references were obtained and eligibility assessment was determined independently by two reviewers with disagreements resolved by discussion, and consultation with the Steering Group if needed.

Studies that used the same data source and examined similar outcomes were included in the narrative reviews for completeness. Where studies used the same data source, this was clearly reported. For any statistical analysis, to avoid double counting of data, where this overlap occurred and both studies met inclusion criteria, judgement for which study to include was based on a number of factors such as which analysis was the least likely to be associated with potential bias and whether outcomes were reported in a manner comparable with other studies.

2.6 Results Of Literature Search

The systematic search of the literature across all review questions from 1990 to 2011 identified 8,787 references, excluding the initial search results from the APA review. When combined with the 73 references from the APA review this resulted in a set of 8,860 references. Additional hand searching of references from relevant reviews and of papers suggested during the consultation period (Section 2.13) identified an additional 49 papers. Of the papers retrieved in the searches, 180 were seen as potentially relevant. Studies were excluded if they did not meet the inclusion criteria (discussed in Section 2.3). This meant studies that used an inappropriate sample (for example, women who identified themselves as having a negative reaction to abortion without providing a comparison group), did not use a validated measure of mental health or did not contain any useable data, or where no information was presented on whether the mental health problem was present after the abortion (for example, lifetime history of a disorder). Studies were also excluded if they were not written in English, or only abstracts or study proposals were available. Details on the numbers of studies included and excluded are given in the results section for each review question with further information about the reasons for exclusion outlined in Appendix 7 and Appendix 8. A flow diagram of studies included in the review is presented in Figure 1.

Figure 1: Studies considered and included in the review



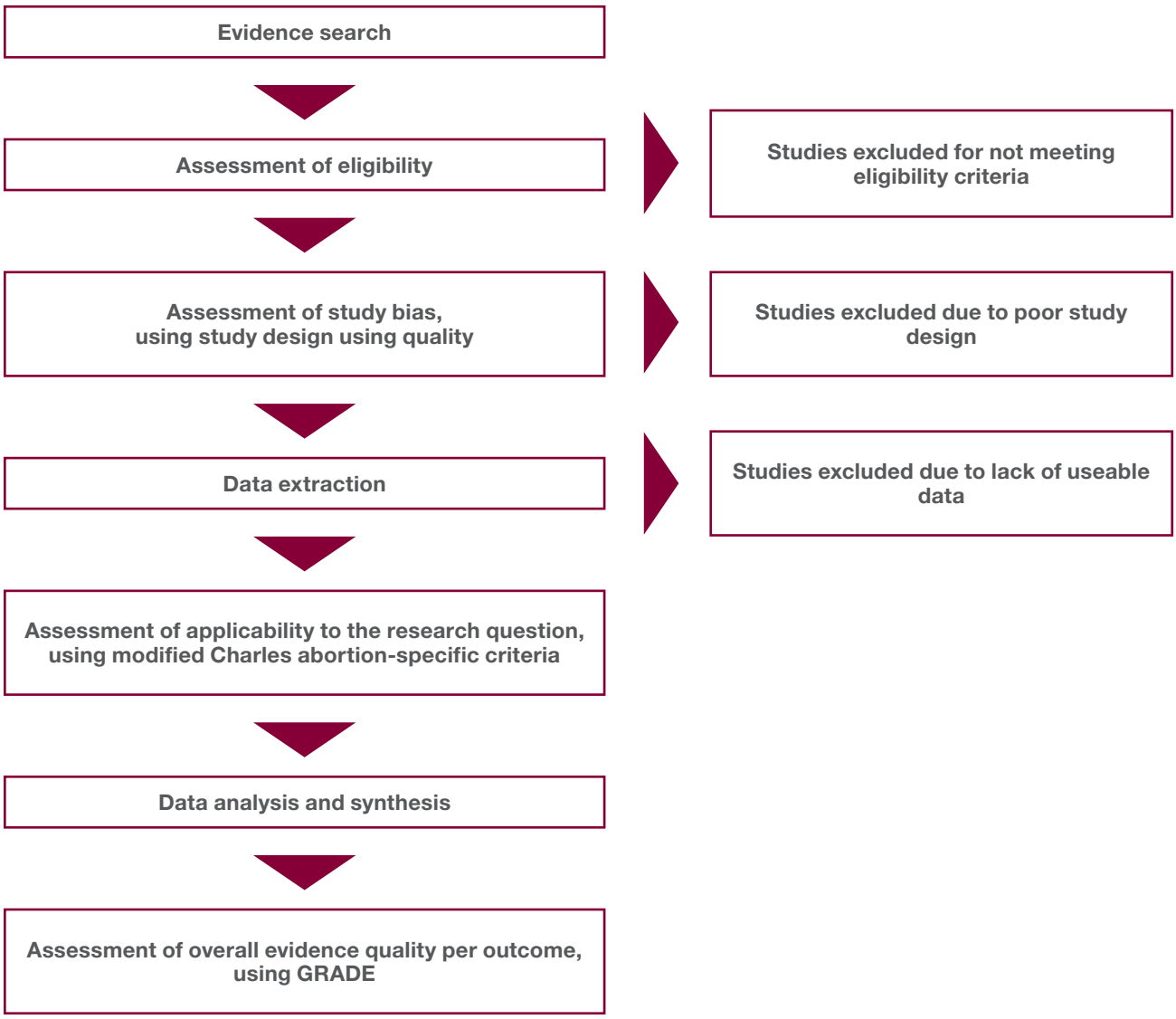
2.7 Quality Assurance

Three approaches to assessing the quality of the research were used throughout the review:

1. Rating the quality of the study design, using study design quality checklists.
2. Rating the applicability of the study to answer the three clinical questions, using a modified version of the Charles abortion-specific quality criteria.
3. Rating the overall quality of the evidence for each outcome, using GRADE (GRADE Working Group, 2004).

An overview of the quality assessment process is presented in Figure 2. Details of the three quality assurance processes are described in Sections 2.8, 2.9 and 2.12.

Figure 2: Quality assessment process



2.8 Risk Of Bias In Individual Studies

All studies that met the eligibility criteria above were assessed for methodological quality using National Institute of Health and Clinical Excellence (NICE) checklists for case control studies (NICE, 2009), Scottish Intercollegiate Guidelines Network (SIGN) for cohort studies or a prognostic study checklist (SCIE, 2004), depending on study design. Example checklists are included in Appendix 6.

The case-control and cohort study checklists include items on selection bias (whether there are systematic differences between groups), attrition bias (systematic differences between comparison groups with respect to loss of participants) and detection bias (bias in how outcomes are ascertained). The prognostic studies checklist includes items on representativeness of sample, validity of outcome measures, accounting for confounding and appropriate statistical analyses.

The assessment of study bias occurred prior to the data extraction phase (see 2.10). Studies excluded due to quality of study design were recorded and listed in the excluded studies table in Appendix 7. The assessment of study quality was independently conducted by two authors with disagreements resolved by discussion.

2.9 Applicability To Research Questions

The rating of applicability of each study to the three research questions was conducted alongside data extraction (described in Section 2.10)

To rate the applicability of each study to the three clinical questions, the abortion-specific quality criteria presented in the Charles review were modified for the purpose of the present review (see Table 3). Studies were given a rating for each question because the quality and applicability of the data varied.

For example, in this review a study designed to assess risk factors of mental health problems following an abortion might be rated as good, but present only unadjusted raw prevalence rates and hence be rated as fair in that regard. The quality criterion was not used to exclude studies at this stage; instead, it was used to provide a rating of the quality of the evidence for each research question. This rating was independently conducted by two authors, with disagreements resolved by discussion with a third author. The level of concordance between raters was 88%.

Table 3: Modified Charles review criteria

Quality level	Appropriate comparison group	Validated mental health tools	Previous mental health problems	Confounder control	Represent-ativeness	Compre-hensive explor-ation
Excellent	+ (good)	+	+	+ (thorough)	+ (good)	+
Very good	+ (good)	+	+	+ (thorough)	+ (good)	-
Good	+	+	+	+ (adequate)	+	-
Fair	+/-	+	+ (weak)	+ (adequate)	+	-
Poor	-	+	+ (weak)	+ (weak)	+	-
Very poor	-	+/-	-	+/-	-	-

Appropriate comparison group
Studies were required to have an appropriate comparison group. Studies rated as very good or excellent in this category were required to compare the outcomes of women who had an abortion with women who delivered an unwanted or unintended pregnancy because this was seen as the best available evidence for the review.

Because studies were not required to compare women who had an abortion with other populations for inclusion in the prevalence or factors associated with mental health reviews, this criterion was only applicable to studies included in the comparative review

Validated mental health tools
To be rated as +, studies had to use a validated scale-based measure, treatment records, suicide or death records, illicit drug use and/or clinical diagnosis.

Control for previous mental health problems
Only studies that adequately controlled for pre-abortion mental health outcomes (through the use of a validated scale, clinical diagnosis or treatment records) were rated as + for this criterion. Studies that used an inappropriate measure of pre-abortion mental health status (for example, non-standardised scale) were rated as + (weak). Studies were also rated as + (weak) if they used an appropriate measure to control for previous mental health problems but reported unadjusted results for a particular analysis.

For example, the majority of studies included in the prevalence review were designed to investigate factors associated with mental health outcomes following an abortion, and not prevalence rates per se. Consequently, many studies controlled for previous mental health problems within the analyses conducted for other outcomes, for example risk factors and so on, but presented raw unadjusted prevalence rates. Adapting the Charles (2008) criterion in this way meant that these studies were not all rated as poor or very poor quality.

Confounder control
Thorough confounder control studies adjusted and controlled for at least five factors associated with mental health problems (in general or following abortion and live birth). Adequate confounder control studies adjusted and controlled for at least three factors associated with mental health problems (in general or following abortion and live birth). A weak rating was given to studies that controlled for less than three factors.

Representativeness
To be rated as + (good) at least 80% of approached participants consented to take part and/or were followed up. Studies rated as + recruited and followed up between 50 and 80%, or recruited and/or followed up <50% but provided statistical analysis comparing participants *with* non-participants. A minus rating (-) included studies in which less than 50% of participants agreed to participate or were followed up and the study failed to assess differences between completers and non-completers.

Comprehensive exploration
A plus rating (+) on this criterion indicated that all quality criteria were thoroughly addressed and that exploration of the research question has an explicit theoretical guiding and an appropriate study design.

2.10 Data Items And Extraction

Outcome data extraction was independently conducted by two authors with disagreements resolved by discussion. The data items extracted for each review are described below.

2.10.1 Prevalence

Proportions or percentages of people with a mental health problem were extracted from each study. A mental health problem was defined as either a diagnosis according to DSM or ICD criteria, or a score greater than or equal to a predefined cut-off on a validated rating scale. Where studies excluded women with previous mental health problems and subsequently reported absolute numbers of new cases of mental health problems and/or cumulative incidence proportions (for example, the proportion of the sample to develop a new mental health problems over a specified time period), these were used to estimate period prevalence rates.

2.10.2 Factors associated with poor mental health

ORs, risk ratios (RRs), regression values and mean differences (with confidence intervals [CIs] or SEs comparing mental health outcomes for women who have had an induced abortion and have or have not been exposed to a particular risk factor were extracted. Raw means and percentages without statistical interpretations were also included for completeness (and converted into ORs where appropriate), although the limitations of this approach were highlighted.

2.10.3 Mental health outcomes for women following abortion compared with those following a delivery

ORs and/or RRs (with CIs or standard errors) comparing rates of mental health outcomes for women who had an induced abortion with women who delivered a pregnancy were extracted. These ORs and/or RRs were required to be adjusted for previous mental health problems.

In addition, mean differences (with CIs or SEs) on continuous outcome measures (for example, rating scales measuring mental health or quality of life) between women who had had an induced abortion and women who delivered an unwanted pregnancy were extracted. These were required to be adjusted for previous mental health problems.

Ratios were recalculated in studies that contained applicable data on mental health outcomes for induced abortion and delivered pregnancy groups, which were also compared with a third comparator not considered appropriate for the review (for example, women who had never been pregnant) and no data were provided for the required comparison (that is, induced abortion versus delivered pregnancy). This was determined by subtracting the coefficient for delivered pregnancy versus third comparator from the coefficient for induced abortion versus third comparator.

2.11 Data Analysis And Synthesis Of Results

For all review questions, data were assessed for suitability for meta-analysis. Due to the large amount of heterogeneity, meta-analysis was only conducted for Review question 3. Heterogeneity was apparent in terms of study design, outcome measurement method, outcomes reported and study population. Furthermore, heterogeneity was assessed by the I² statistic (Higgins & Thompson, 2002) and by visual inspection of forest plots, which confirmed where meta-analysis was not appropriate. In addition to statistical heterogeneity, the data were also assessed for clinical heterogeneity, for instance, even where statistically studies could be combined, meta-analysis would not be conducted if the results would not make any clinical sense or be interpretable.

Meta-analysis

Where possible, meta-analysis was used to synthesise evidence from the comparative studies using Review Manager (Cochrane Collaboration, 2008). The meta-analysis of comparative data was based on log ORs and SEs. Odds are defined as the ratio of the probability that a particular event will occur to the probability that the event will not occur. Odds can be any number between zero and infinity. An OR is the ratio of the odds of the event occurring in each group.

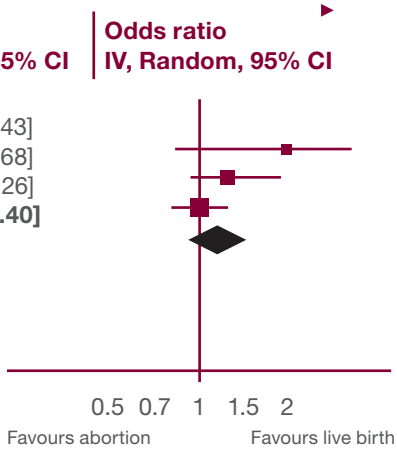
Where studies did not report OR, raw dichotomous data (for example the number of participants in each group with a certain diagnosis) was extracted and ORs and log ORs calculated. Finally, in studies reporting only relative risks (RR) these were converted into ORs if the event was rare because the difference between odds and risks is small with rare events. Data were summarised using the generic inverse variance method within Review Manager. An example forest plot is shown in Figure 3.

Figure 3: Example forest plot

Study or Subgroup	Logs [odds ratio]	SE	Weight	Odds ratio IV, Random, 95% CI	Odds ratio IV, Random, 95% CI
1.10 .1 Unwanted Pregnancy					
STUDY 1	0.5988365	0.45394255	5.7%	1.82 [0.75, 4.43]	
STUDY 2	0.215	0.154	38.2%	1.24 [0.92, 1,68]	
STUDY 3	0	0.11641606	56.1%	1.00 [0.80, 1.26]	
SUBTOTAL {95% CI}			**100%**	**1.12 [0.90, 1.40]**	

HETEROGENITY: $Tau^2 = 0.01$; $Chi^2 = 2.50$, df= 2 (P= 0.29); $I^2 = 20\%$
Test for overall effect: Z = 1.05 (P=0.29)

Test for subgroup differences: Not applicable



Narrative synthesis
Where meta-analysis was not appropriate, narrative synthesis was used to review included studies using an approach adapted from previous guidance on narrative synthesis (Popay *et al.*, 2006). The narrative synthesis approach consisted of a three-stage process:

1. Developing a preliminary synthesis of findings of included studies
This consisted of extracting descriptive and outcome data from all included studies according to the inclusion criteria stated above. Each study was narratively summarised and summary data were entered into tables. These data were then presented at a Steering Group meeting to discuss application of inclusion criteria and the preliminary synthesis.

2. Exploring relationships in the data
Patterns that emerged from the preliminary synthesis across studies were then examined in more detail. In particular, if substantial heterogeneity was identified between studies in terms of direction and size of effect, potential explanations of these differences were examined. Factors considered included: study design, outcome measures, source of funding and between-study differences in composition of participant populations. This exploration of relationships in the data was initially conducted by one author and then discussed in detail at a Steering Group meeting.

3. Assessing the robustness of the synthesis
The robustness of the synthesis was examined in three main ways:
- first, the draft synthesis was presented to the Steering Group on several occasions for discussion and refining of the review
- second, when a draft document was agreed by the Steering Group it was sent out for consultation by national experts in the field of abortion and mental health for further evaluation of the synthesis
- where appropriate, changes were made to the draft to take into account these comments.

2.12 Grading The Evidence

Following data extraction and analysis, the quality of the overall evidence for each outcome was graded using the GRADE approach (GRADE Working Group, 2004). Under the GRADE approach, evidence from each outcome is initially rated as high if from randomised trials or low if from observational studies. Quality may then be 'down-graded' depending on the following factors:

- limitations in study design or execution (risk of bias)
- inconsistency of results (based on between-study heterogeneity)
- indirectness of evidence (that is, how closely the outcome measures, interventions and participants match those of interest)
- imprecision (based on the CI around the effect size)
- publication bias.

For observational studies without important limitations, quality may be 'up-graded' depending on the following factors:

- large magnitude of effect
- all plausible confounding would reduce the demonstrated effect or increase the effect if no effect was observed
- dose–response gradient.

GRADE profiler software was used to grade the evidence and generate evidence profile tables, which include a summary of the findings, number of participants in each group, an estimate of the magnitude of the effect (where possible) and the quality of the evidence for each outcome. An example of a GRADE profile is shown in Table 4.

The overall quality of evidence is a combined grade of the quality of evidence across many outcomes considered critical for a recommendation, defined in the following way:

High = further research is very unlikely to change our confidence in the estimate of the effect
Moderate = further research is likely to have an important impact in the estimate of the effect and may change the estimate
Low = further research is very likely to have an important impact on our confidence in the estimate of the effect and is likely to change the estimate
Very low = any estimate of the effect is very uncertain.

For further information about the process and rationale of producing an evidence profile table, see the GRADE Working Group website (www.gradeworkinggroup.org).

Because the GRADE approach is primarily designed for comparative reviews, it was not appropriate to use this approach for either the prevalence review or the review of factors associated with post-abortion mental health outcomes.

Table 4: Example of a GRADE evidence profile

Quality assessment							Summary of findings				
							No. of participants		Effect		
No. of studies	Design	Limitations	Inconsistency	Indirect-ness	Quality	Other	Inter-vention	Control	Relative (95% CI)	Absolute	Quality
Outcome 1											
6	Randomised trials	No serious limitations	No serious inconsistency	No serious indirectness	Very serious1,2	None	8/191	7/150	RR 0.94 (0.39 to 2.23)	0 fewer per 100 (from 3 fewer to 6 more)	ÅÅOO LOW
Outcome 2											
3	Randomised trials	No serious limitations	No serious inconsistency	No serious indirectness	No serious imprecision	None	120/600	220/450	RR 0.39 (0.23 to 0.65)	30 fewer per 100 (from 17 fewer to 38 fewer)	ÅÅÅÅ HIGH
Outcome 3											
3	Randomised trials	No serious limitations	Serious inconsistency3	No serious indirectness	Very serious1,2	None	83	81	-	MD -3.51 (-11.51 to 4.49)	ÅOOO VERY LOW
Outcome 4											
3	Randomised trials	No serious limitations	No serious inconsistency	No serious indirectness	Serious1	None	88	93	-	SMD -0.26 (-0.50 to -0.03)	ÅÅÅO MOD-ERATE
Outcome 5											
4	Randomised trials	No serious limitations	No serious inconsistency	No serious indirectness	Very serious1,2	None	109	114	-	SMD -0.13 (-0.6 to 0.34)	ÅÅOO LOW

1 Optimal information size not met.
2 The CI includes both (1) no effect and (2) appreciable benefit or appreciable harm.
3 Considerable heterogeneity.

2.13 Consultation

A public consultation was carried out over a 3-month period and comments were sought on:

- overall cohesiveness of the review
- rigour of the methodology
- accuracy of the evidence statements
- relevance of the final conclusions.

Comments were directly sought from Royal College members of the Academy of Medical Royal Colleges and statutory organisations who had an interest in the review. Researchers who had carried out similar reviews were also approached along with patient support organisations. In addition to this targeted approach, the draft report was made available on the websites of the RCPsych and the NCCMH to invite wider comment from the public and other organisations. The RCPsych announced this consultation on its website and via press releases to professional and mainstream audiences to ensure a wide range of responses. All organisations who responded to consultation are listed in Appendix 3.

Consultation yielded a large number of responses, which were helpful in identifying potential methodological inconsistencies, issues of transparency, the need for clarity in some areas of the report and possible overlooked studies. Following consultation, all comments were responded to and relevant changes made to the report. The full set of comments with NCCMH responses is available on the NCCMH website (http://www.nccmh.org.uk).

A large number of consultees listed or alluded to studies that they felt had been overlooked in our review. Consultees were contacted for further details where necessary and all studies were considered against the eligibility criteria for inclusion in the review. All papers suggested by consultees are listed in Appendix 4, with reasons for inclusion or exclusion in Appendix 7.

3 PREVALENCE OF MENTAL HEALTH PROBLEMS IN WOMEN FOLLOWING AN INDUCED ABORTION

3.1 Review Question

How prevalent are mental health problems in women who have an induced abortion?

The aim of this chapter is to identify prevalence rates of mental health problems in women who have had an abortion. Because having a previous mental health problem has been identified as a risk factor for having a mental health problem following an abortion (APA, 2008), studies that account for previous mental health problems in the analysis of prevalence rates are reviewed separately from studies that failed to do so.

3.2 Studies Considered

Thirty-four[1] studies examining the prevalence of mental health problems following an abortion met the eligibility criteria for this review. Twenty-seven studies did not account for previous mental health problems, whereas seven studies did apply some control for pre-abortion mental health problems within the analysis. Ten of the studies included in this review used the same data sources and reported prevalence rates for the same or similar outcomes.

These studies have been included in the narrative review for completeness because in many cases the results differ due to differences in the inclusion or exclusion criteria. One hundred and forty-eight studies were excluded. The most common reason for excluding studies was that outcomes had been measured within 90 days following an abortion. Further details about excluded studies, including reasons for exclusion, can be found in Appendix 7.

3.3 Studies That Did Not Account For Previous Mental Health Problems

3.3.1 Study characteristics[2]

A summary of the study characteristics, including quality assessments (described in Section 2.7), of the 27 included studies are shown in Table 5. Fifteen papers analysed data collected as part of national longitudinal cohort studies from the US, Australia and Norway (COLEMAN2009A, COLEMAN2009B, COUGLE2003, HAMAMA2010, PEDERSEN2007, PEDERSEN2008, REARDON2002B, REES2007, RUSSO2001 SCHMIEGE2005, STEINBERG2008study1, STEINBERG2011Astudy1, STEINBERG2011Astudy2, TAFT2008, WARREN2010); one conducted a retrospective survey across two countries (RUE2004); two conducted an internet survey (COLEMAN2010, COYLE2010); six were prospective cohort studies (BROEN2004, BROEN2005A, BROEN2006, MAJOR2000, RIZZARDO1992, SULIMAN2007); and two were record linkage studies (GISSLER1996, GISSLER2005). Outcomes measured in

[1]STEINBERG2008 contains two studies utilising different data sources – these are termed STEINBERG2008study1 and STEINBERG2008study2 throughout this review. STEINBERG2011A contains two studies utilising the same data – these are termed STEINBERG2011Astudy1 and STEINBERG2011Astudy2 throughout this review.
[2]Here and elsewhere, each study considered for review is referred to by a study ID in capital letters (primary author and date of study publication, except where a study is in press or only submitted for publication, then a date is not used). [3]See Abbreviations for definitions.

the studies varied, as did their method of assessment, with studies utilising clinical diagnosis, treatment claims, self-reported substance use or standardised measures to calculate the prevalence rates reported. Studies also varied in whether they reported point, period or lifetime prevalence rates or incidence.

Table 5: Study characteristics of studies not accounting for previous mental health problems

Study ID and study design	Numbers, participant characteristics and country	Outcome	Measure and mode of administration[3]	Follow-up	Study quality (Charles review rating)
Prospective studies					
BROEN2004 BROEN2005A BROEN2006 Prospective cohort	n = 70 to 80. Women treated in a gynaecology department in a hospital in Drammen, Norway	PTSD Anxiety Depression	Impact of Event Scale (IES) Hospital Anxiety and Depression Scale (HADS) *Self-administered*	6 months 2 years 5 years	Very poor
MAJOR2000 Prospective	n = 386 to 442*. Women undergoing a first-trimester abortion at three sites (two clinics and one clinician's office), US	Depression PTSD	Adapted Diagnostic Interview Schedule Adapted measure of PTSD *Self-report*	2 years	Fair
RIZZARDO1992 Prospective	n = 253 to 164. Women who attended the Obstetrics and Gynaecology Department of the General Hospital in Padua, Italy	Mental health problems	Symptoms Checklist 90 (SCL-90) *Self-report*	3 months	Poor

Study ID and study design	Numbers, participant characteristics and country	Outcome	Measure and mode of administration[3]	Follow-up	Study quality (Charles review rating)
SULIMAN2007 Prospective	n = 155. Women attending a private abortion clinical and state hospital in South Africa	PTSD Depression	Clinician-Administered PTSD scale (CAPS-I) Beck Depression Inventory (BDI) *Clinician administered and self-report*	3 months	Very poor
National longitudinal cohort studies					
HAMAMA2010 Cross-sectional	n = 199. Women who took part in the first prenatal survey in a longitudinal outcomes study, Psychobiology of PTSD and Adverse Outcomes of Childbearing	PTSD Depression PTSD and Depression comorbidity	National Women's Study PTSD Module (NWS-PTSD) Composite International Diagnostic Interview – short form (CIDI-SF) *Interview*	Cross-sectional	Fair
TAFT2008 Retrospective	n = 1,026. Longitudinal cohort study. Random population study. Australia	Depression	Centre for Epidemiologic Studies – Depression scale (CES-D) *Self-administered*	1 year 4 years	Fair
WARREN2010 Retrospective	n = 69. Women who completed the National Longitudinal Study of Adolescent Health, US	Depression	CES-D *Self-administered*	1 year 5 years	Fair
PEDERSEN2007	n = 76 to 125.* Women from the Young in Norway Longitudinal Study	Alcohol problems Illicit drug use	Alcohol Use Disorders Identification Test (AUDIT)	Outcome during previous 12 months	Fair

Study ID and study design	Numbers, participant characteristics and country	Outcome	Measure and mode of administration[3]	Follow-up	Study quality (Charles review rating)
PEDERSEN2008 Retrospective	n = 76 to 125.* Women from the Young in Norway Longitudinal Study	Depression	Kandals and Davies Depressive Mood Inventory *Self-report*	1 to 5 years 7 to 11 years 1 to 11 years	Fair
RUSSO2001 Cross-sectional	n = 324. Women who completed The Health of American Women Survey, US	Suicidal thoughts Anxiety and/or depression	Clinician diagnosis *Self-report*	Cross-sectional	Very poor
STEINBERG2008 study1 Cross-sectional STEINBERG-2008study1 Cross-sectional	n = 1,236. Women who took part in the National Survey of Family Growth. US	Anxiety	Experience of anxiety symptoms (based on DSM-IV criteria for GAD) *Clinical Interview*	Cross-sectional	Fair
National Longitudinal Survey of Youth					
COUGLE2003 Retrospective	n = 304. Women who reported a first pregnancy, US	Depression	CES-D *Interview*	1 to 12 years (all abortion group)	Fair
REARDON2002B Retrospective	n = 293. Women who reported an unintended first pregnancy, US	Depression	CES-D *Interview*	0 to 8 years	Fair
REARDON2004 Retrospective	n = 154 to 213. Women who reported an unintended first pregnancy, US	Alcohol abuse Marijuana use Cocaine use	Drug and alcohol use *Self-report*	0 to 12 years	Fair
SCHMIEGE2005 Retrospective	n = 457. Women who reported an unwanted first pregnancy, US	Depression	CES-D *Interview*	1 to 12 years (post-1979 abortion group), 1 to 22 years (pre-1979 abortion	Fair

Study ID and study design	Numbers, participant characteristics and country	Outcome	Measure and mode of administration[3]	Follow-up	Study quality (Charles review rating)
National Comorbidity Survey					
COLEMAN2009A Cross-sectional	n = 399. Women who completed the National Comorbidity Survey. A nationally representative sample. US	DSM-III-R psychiatric disorders	University of Michigan Composite International Diagnostic Interview (UM-CIDI) *Clinical interview*	Cross-sectional	Fair
STEINBERG2001 Astudy1 Cross-sectional	n = 399 (unweighted). Women who completed the National Comorbidity Survey. A nationally representative sample. US	DSM-III-R psychiatric disorders	UM-CIDI *Clinical interview*	Cross-sectional	Fair
STEINBERG2001 Astudy2 Cross-sectional STEINBER-G2011Astudy2 Cross-sectional	n = 394 (unweighted). Women who completed the National Comorbidity Survey. A nationally representative sample. US	Mood disorders Anxiety disorders Substance misuse	UM-CIDI *Clinical interview*	Cross-sectional	Fair
Fragile Families and Child Wellbeing Study					
COLEMAN2009B Cross-sectional	n = 112. Women who had another pregnancy and aborted the pregnancy. US	Alcohol use	Measure of excessive drinking *Self-report*	0 to 1 year	Very poor
REES2007 Retrospective	n = 99. New mothers who had previously had a live birth recruited into Fragile Families and Child Wellbeing Study. US	Major depression	CIDI-SF *Interview*	0 to 2 years	Fair

Study ID and study design	Numbers, participant characteristics and country	Outcome	Measure and mode of administration[3]	Follow-up	Study quality (Charles review rating)
Retrospective survey					
RUE2004	n = 548. Women surveyed at US and Russian healthcare facilities	PTSD	Institute for Pregnancy Loss Questionnaire *Interview*	Cross-sectional	Fair
Internet survey					
COLEMAN2010 Cross-sectional	n = 374. Women completed surveys on an online website. Worldwide	PTSD	PTSD Checklist – Civilian Version (PCL-C) *Self-administered*	Cross-sectional	Very poor
COYLE2010 Cross-sectional	n = 374. Women completed surveys on an online website. Worldwide	PTSD	PCL-C *Self-administered*	Cross-sectional	Very poor
Record linkage studies					
GISSLER1996 Record data analysis	n = 93,807. Register linkage study using death certificates and abortion register, Finland	Suicide	Death certificate	1 year	Very poor
GISSLER2005 Record data analysis	n = 156,789 Register linkage study using death certificates and abortion register, Finland	Suicide	Death certificate	1 year	Very poor
n = the number of subjects used in the analysis. *Numbers varied across the analysis.					

3.3.2 Findings

Due to the heterogeneity of study design, outcomes and measurement method used in the included studies, meta-analysis of the data was not possible. Therefore, findings from each study were reviewed narratively, with studies using the same data source reviewed together. Table 6 presents the range of prevalence rates identified. Although a proportion of the studies adjusted for previous mental health problems in some of the analyses, the prevalence rates are all unadjusted (REES2007, STEINBERG2008study1), or an inappropriate method of adjusting for previous mental health problems was used, for example, locus of control scales (COLEMAN2009A, COUGLE2003, REARDON2002B, SCHMIEGE2005). Therefore, the prevalence results for mental health problems following abortion presented here potentially include women with a history of mental health problems prior to abortion.

Prospective studies

BROEN2004, BROEN2005A and BROEN2006 utilised a prospective design to follow up 80 women who had undergone an abortion in a Norwegian hospital during a 12-month period. PTSD was measured by the Impact of Event Scale (IES), with both depression and anxiety determined by the Hospital Anxiety and Depression Scale (HADS). As seen in Table 6, at 6 months, 2 years and 5 years following the abortion the percentage of women meeting criteria for PTSD was 25.7%, 18.1% and 20%, respectively.

At 6 months, 2 years and 5 years, 47.3%, 31.9% and 34.3% of women were identified as having anxiety, respectively, whereas 17.6%, 11.1% and 11.4% met the criteria for depression. Although BROEN2004, BROEN2005A and BROEN2006 were three of only five studies in the present review to adopt a prospective design, the sample size was small (n = 80) and included only 46% of women eligible for the study. Furthermore, the lack of control for previous and subsequent pregnancy events in addition to failing to control for other confounding variables when considering the prevalence rates are further limitations with the results. As with many studies included in the review, the percentage of women with multiple disorders (for example, depression and anxiety) was not reported.

MAJOR2000 conducted a prospective study of 442 women who had undergone a first-trimester abortion at one of three sites (two clinics and one clinician's office) within the US. To be included in the sample, the women had to indicate that the abortion was due to an unplanned pregnancy that was not the result of rape. Women were assessed at three time points: 1 hour, 1 month and 2 years following the abortion. Although 882 women initially agreed to take part and completed the 1-hour post-abortion measure, 50 to 57% were lost to follow-up during the 2-year period. As highlighted in Table 6, 20.21% of women had experienced a period of depression and 1.36% PTSD within the 2 years' follow-up period. In addition to the low follow-up rate, the study was also limited by a number of other factors including lack of control for previous mental health problems and other confounding variables.

RIZZARDO1992 recruited a sample of 253 women attending the Obstetrics and Gynaecology Department of the General Hospital in Padua, Italy, for an induced abortion. Although the study failed to control for previous mental health problems, the women were asked to complete the Symptoms Checklist 90 (SCL-90) before the abortion and 3 months after, to assess any changes in their mental state. A total of 164 women completed both the baseline and post-abortion follow-up. 18.9% of the women (n = 31) met the criteria for psychological distress as measured by a score of one or greater on the Global Severity Index (GSI). Measures taken prior to the abortion indicated that 15.2% of the sample met criteria at that time point.

When comparing the pre- and post-abortion measures, RIZZARDO1992 indicated that 4.9% (n = 8) of women moved out of the high distress group following the abortion, 8.5% (n = 14) moved into the high distress group, while the remaining 86.6% (n = 142) remained in the same group. However, one major limitation of the comparisons included in the study is that women were asked to complete the GSI immediately prior to the operation, which may have been a period of heightened stress. Another major limitation of the study was that follow-up data were only available for 164 of 253 women originally recruited within the study (64%), with the differences between completers and non-completers not assessed. Additionally, the study failed to control for confounding factors within the results.

The final prospective study included in the review (SULIMAN2007) recruited consecutive referrals to either a private abortion clinic or an obstetrics/gynaecology department of a local state hospital in Cape Town, South Africa. In total 155 women who had a

surgical termination for an unintended pregnancy were included in the study. Women were assessed using the Clinician-Administered PTSD scale (CAPS-I) and the Beck Depression Inventory (BDI) at four time points: pre-termination, immediately post-to 'termination, and at 1 month and 3 months' follow-up. At 3 months' follow-up, 18.2% of women met criteria for PTSD, with 20% meeting criteria suggestive of clinical depression. However, one of the major limitations of the study was the low follow-up rate, with only 56 out of the original 155 women successfully followed up at 3 months. Due to the lack of analysis comparing women who remained in the study with those who dropped out, the reliability and generalisability of the results is severely limited. In addition to this main limitation, although the study reported the percentages of women to experience rape, domestic violence and/or assault, these potential confounding factors were not controlled for in the analysis of prevalence rates reported in the study.

National survey data

COLEMAN2009A analysed the National Comorbidity Survey, a US survey of the prevalence of mental disorders within a representative sample of non-institutionalised women aged between 14 and 54 years. The analysis included all women for whom information about pregnancy, mental health diagnosis (based on the University of Michigan Composite International Diagnostic Interview [UM-CIDI]) and potential risk factors were available. This identified 399 women of whom 77% reported one abortion and 23% reported multiple abortions.

As shown in Table 6, between 11 and 20% of the sample were diagnosed with some form of anxiety disorder, with the percentage of women varying across the different diagnostic categories, for example panic disorder, agoraphobia, PTSD, and so on. For substance misuse disorders, between 9.52 and 36.84% and 16.97 and 23.31% of women were diagnosed with alcohol or drug misuse disorders/dependence, respectively. Finally, results for mood disorders indicated that between 2.01% (bipolar disorder) and 40.6% (major depression) of women met diagnostic criteria depending on the diagnosis in question.

However, when STEINBERG2011Astudy1 analysed the same data using the same sampling variables and codes, they failed to replicate the COLEMAN2009A results. STEINBERG2011Astudy1 utilised period prevalence data assessing the occurrence of the disorder within the previous month. As demonstrated in Table 6, for anxiety disorders including panic disorder, PTSD and acrophobia, between 1.9 and 6.0% of the sample met diagnostic criteria. For substance misuse disorders, between 0.3 and 5.5% and 0.1 and 2.2% of women were diagnosed with alcohol or drug misuse disorders/ dependence, respectively. Finally, results indicated that between 8.3% (major depression without hierarchy) and 0.6% (bipolar disorder) of women met diagnostic criteria for a mood disorder depending on the diagnosis in question, with 0% meeting criteria for new mania. The differences between the STEINBERG2011Astudy1 and COLEMAN2009A results have been illustrated in Table 7. One suggestion for the difference in results was that the two studies had used different period prevalence, for example, 1 month versus 1 year; however, STEINBERG2011Astudy1 claimed their results replicate previous studies using this dataset (for example, Cairney *et al*., 2006).

To account for the impact of multiple abortions, STEINBERG2011Astudy2 used a subsample of women included in STEINBERG2011Astudy1. After excluding five women from the analysis due to missing data, the sample included 303 who reported one abortion and 91 who reported two or more abortions. Due to the small percentage of women meeting diagnostic criteria for each diagnostic category within the first study, STEINBERG2011Astudy2 collapsed the categories to present prevalence rates for mood disorders, anxiety disorders and substance-use disorders.

As indicated in Table 6, 8.8% with one abortion and 11.9% with multiple abortions met criteria for a mood disorder, 17.1 and 31.0% met criteria for anxiety disorders, and 5.2 and 11.9% met criteria for substance-use disorders, respectively. Additionally, the study addressed differences in the characteristics of women who reported one or multiple abortions. Although not adjusted and controlled for in the analysis of raw prevalence rates, the results of these analyses indicated that women with multiple abortions were more likely to have experienced previous mental health problems and intimate partner violence.

Aside from the observed differences in prevalence rates, one of the main limitations with these studies (as with all the studies reviewed in this Section), was the inadequate control of previous mental health problems. Although some survey data regarding previous conditions was collected, COLEMAN2009A were only able to conclude that 'in most cases, the abortion preceded diagnosis' (page 772), thus raising the possibility that women with pre-existing or previous diagnoses were included in the analysis.

This limitation also applies to STEINBERG2011Astudy1 and STEINBERG2011Astudy2 because they used the same sample as COLEMAN2009A. The studies also failed to control for multiple pregnancy outcomes (that is, two or more different outcomes for a prior pregnancy including birth, abortion or miscarriage) with only STEINBERG2011Astudy2 assessing the impact of multiple abortions. Furthermore, women in these studies represented only 37.6% of the total survey, due to data constraints relating to the availability of outcomes.

The National Longitudinal Survey of Youth, a US sample of civilians aged between 14 and 21 years in 1979, was used in three of the included studies to assess depression (COUGLE2003, REARDON2002B, SCHMIEGE2005) and in one study (REARDON2004) to assess substance misuse. REARDON2004 assessed drug misuse using self-reported use of either marijuana or cocaine within the previous 30 days. Women were included in the sample if they reported an abortion of an unwanted pregnancy; 18.6% (n = 39) and 4.8% (n = 10) out of the 213 individuals included in the study reported marijuana use and cocaine use, respectively. The study also included a measure of alcohol use, where a score of four or greater on the 11-item scale was indicative of alcohol abuse. Data were available for 154 of the 213 individuals included in the study, with 6.5% (n = 10) of this sample reaching criteria for alcohol abuse.

Despite the three studies (COUGLE2003, REARDON2002B, SCHMIEGE2005) using the same survey and measure of depression (Centre for Epidemiologic Studies – Depression scale [CES-D]), results varied due to differences in study quality and the variables used. For instance, SCHMIEGE2005 included abortions occurring before 1979, whereas the other two studies excluded these cases. Studies also varied regarding whether or not they excluded women with subsequent pregnancy events; SCHMIEGE2005 included multiple events, whereas the other two excluded women on this basis. Results for depression ranged from 23.71% as reported in SCHMIEGE2005 to 27.3% as reported in COUGLE2003 and REARDON2002B, who used the same abortion sample, despite differing with regard to their comparison group. In addition to sampling differences in the three depression studies, the four studies were hampered by a lack of adequate confounder control, with studies only controlling for potential confounders in further analyses and not in the prevalence rates reported.

Although a measure of locus of control was used in each study, this was not considered an adequate measure of previous mental health problems within the present review. Furthermore, the length of time between abortion and follow-up measurement varied between 1 and 12 years (in the post-1979 abortion group) and between 1 and 21 years `

(in the all abortion group), a factor very likely to influence prevalence rates. Finally, as with other studies relying on self-report and retrospective measures, the number of abortions reported within the study was lower than the national average, which may be due to a bias in reporting.

STEINBERG2008study1 conducted a secondary analysis of the National Survey of Family Growth, a national probability sample of civilian women aged between 15 and 44 years. Two samples were used in the analysis, one of which only included women with unplanned first pregnancies resulting in abortion (n = 1,167) and a second overlapping sample including women whose first pregnancy event ended in abortion regardless of the pregnancy being planned or not (n = 1,236). Although the study did not include a formal diagnostic measure of anxiety the questions used to measure the experience of anxiety reflected DSM criteria for GAD.

The results indicated that 20.2% (unplanned pregnancies) and 20.0% (all pregnancies) of women experienced anxiety after the abortion. This figure was reduced to 18.8% when considering those who had had one abortion only. It is worth noting the two overlapping samples used in this study suggest that approximately 95% of abortions are for unplanned pregnancies (1,167 of 1,236). However, one of the main limitations of the study is the use of retrospective reporting of both whether or not the pregnancy was planned and post-abortion mental health outcomes. In addition to this limitation, the study failed to adequately control for confounding variables in the analysis of prevalence rates.

RUSSO2001 re-analysed data conducted as part of The Health of American Women Survey, which was a random household survey of 2,500 women aged 18 or over and living in the US. Of the total sample, 13% (n = 324) reported having a previous abortion, which was lower than the 20% reported in US national estimates. Women within the abortion sample were asked about suicidal thoughts within the previous year and whether or not in the previous 5 years they had been told by a clinician that they had either anxiety or depression. Using this criteria, 10.5% (n = 34) reported experiencing suicidal thoughts, whereas 21.3% (n = 69) had been given a diagnosis of either depression and/or anxiety.

In addition to the main limitations such as the lack of control for previous mental health problems, the timing of mental health outcomes relative to the abortion was unclear. Because this was a cross-sectional study, it was possible that the prevalence rates for suicidal thoughts and anxiety and/or depression may include individuals whose mental health outcome preceded the abortion. In any case, it was unclear how long ago an abortion might have occurred. The study was also limited by both the measurement of mental health outcomes and abortion. In both cases, self-reported retrospective data were used, which may have been open to reporter bias. Finally, the rates of mental health problems reported in the sample were unadjusted and did not control for any confounding variables such as previous experience of child abuse, rape and intimate partner violence, all of which are likely to have an impact on mental health outcomes.

Data obtained from the National Longitudinal Study of Adolescent Health were analysed within the WARREN2010 study to assess the impact of abortion on depression and self-esteem. The Add Health study was a nationally representative survey of US adolescents, completed over three waves; wave 1 at baseline, wave 2 at 1-year's follow-up and wave 3 at 5-years follow-up. Women who aborted a pregnancy between wave 1 and 2 were included in the sample. In total, 69 women were included in the analysis, which represented 78% of the eligible sample. Depression was measured at each wave using the CES-D. At 1 year's follow-up, 14.1% of women met criteria for depression, with 16.9% meeting criteria at 5-years' follow-up. Despite measuring

depression at each wave, the prevalence rates reported were all unadjusted and therefore did not control for previous depression or depression at wave 1 (in which 16.1% of the sample met criteria). Additionally, as with the majority of studies included in the review by presenting the unadjusted prevalence rates, the study failed to control for other potentially important confounding factors and relied on self-report data.

TAFT2008 assessed levels of depression in the younger cohort contained in the Australian Longitudinal Study on Women's Health. The women in the study were all aged between 18 and 23 years when first surveyed in 1996. Women were also surveyed in 2000 and at both time points information about pregnancy events was recorded. In their analysis of depression rates, as measured by the CES-D, TAFT2008 separated those who reported a first termination in 1996 and those who reported the first termination in 2000. In total, 36.9% of women scored above cut-offs for depression; 36% met criteria in the sample of women who had their first abortion in 1996; and 38% met criteria in the sample of women who had their first abortion in 2000. However, it was unclear how many women in these groups had had multiple pregnancy outcomes; although TAFT2008 reported that multiple abortion and pregnancy events were rare, they failed to account for this factor in their analysis. Furthermore, the percentage of women who responded to the survey and could be linked at both time points was low, with only 9,333 of the potential 36,000 eligible participants included in the analysis.

PEDERSEN2007 and PEDERSEN2008 looked at alcohol problems and depression within their secondary analysis of the Young in Norway Longitudinal Study. The Young in Norway Longitudinal Study surveyed a representative sample of Norwegian school children aged between 12 and 16 years in 1992, with follow-ups occurring 2, 5 and 11 years later. The sample included in the analysis was a subset of the original sample followed up at all time points. Throughout the survey, women were questioned about their pregnancy history. As shown in Table 6, at up to 11 years following an abortion 20.8% of women met criteria for depression as measured on the Kandel and Davies' Depression Mood Inventory. Further analysis divided the women into two groups: firstly, those who had an abortion 7 to 11 years before the final follow-up and second, those who had an abortion up to 6 years before the final follow-up.

Results indicated that 11% of women in the former group and 26% of women in the latter met criteria for depression at the time of the final follow-up. Unlike PEDERSEN2008, the women included in the PEDERSEN2007 analysis were restricted to those who at the time of the final follow-up had only reported an abortion and had not given birth. Using the Alcohol Use Disorders Identification Test (AUDIT), which estimates alcohol problems in the previous 12 months, at final follow-up results indicated that 30.3.% of the sample met criteria for alcohol problems, while 31.6% reported cannabis use and 17.1% other illegal drug use. One of the main criticisms of the study is that the time between outcome measurement and abortion varied between 1 and 11 years. The study also relied on self-reporting of pregnancy events, with estimates from officially recorded statistics suggesting the rate in the present sample was lower than expected. A proportion of women in the PEDERSEN2008 sample also experienced multiple pregnancy outcomes, which were not accounted for in the analysis.

Unlike other studies included in the review, three studies (COLEMAN2009B, HAMAMA2010, REES2007) specifically assessed abortion within the context of other pregnancy events. HAMAMA2010 assessed the impact of previous abortions on a sample of women expecting their first baby (live birth), whereas REES2007 and COLEMAN2009B looked at the mental health impact of subsequent abortions following a delivery.

HAMAMA2010 used data collected as part of the Psychobiology of PTSD and Adverse Outcomes of Childbearing Study, which assessed PTSD symptoms in women recruited

from three health systems within the US and who were expecting their first baby. The survey included an eligibility assessment to verify if a woman had any early pregnancies which did not result in a live birth. Women who disclosed either an elective or a spontaneous abortion before 20 weeks' gestation were included in the analysis. In total, data were available on mental health outcomes for 199 women who reported a prior elective abortion and a further 22 women who reported both a prior elective and spontaneous abortion. Using the National Women's Study PTSD Module, 12.6% of women who reported a prior abortion met diagnostic criteria for PTSD within the previous month; 15.6% of this sample met diagnostic criteria for depression in the previous year (as measured by the CIDI-SF). Furthermore, 4.5% of the sample was comorbid for both disorders. In the sample of women who reported an elective and a spontaneous abortion, 13.6%, 18.2% and 4.5% met criteria for PTSD, depression or both, respectively. Although the study went on to control for the appraisal of abortion as a traumatic life event, in addition to controlling for other confounding factors such as child and adult sexual abuse, serious illness and religiosity, the prevalence results were all unadjusted for these variables, Additionally, as the women in the sample were all expecting their first child, the results may not be comparable with others included within the review, which tended to focus on first pregnancies and control for future pregnancy events.

REES2007 and COLEMAN2009B looked at the mental health impact of subsequent abortions following a delivery. Both studies analysed data from the Fragile Families and Child Wellbeing Study, which consisted of a representative sample of US women who had recently given birth. Within REES2007, 15 mutually exclusive categories based on the different combinations of outcomes were created for the analysis. The abortion group contained 99 women who had had an abortion but did not have any other pregnancy events between the two follow-up periods. Depression was measured at both follow-up interviews, but not at baseline, meaning any control for previous depression in the analysis was limited. At both follow-up interviews, major depression was measured through the use of a clinical interview (CIDI-SF).

In total, 31.3% met criteria for depression at the second follow-up. Although the study controlled for multiple pregnancy events through the creation of the different categories, the meaning and perception of abortion in this sample may have differed from other studies included in the review, which commonly included only women whose first pregnancy resulted in abortion. This sampling difference makes it harder to compare the results of the present study with others included in the review. Furthermore, the study relied on retrospective self-reporting of pregnancy events and failed to control for the effect of confounder variables on depression outcomes.

The COLEMAN2009B study included 112 women who, following the birth of their first child, had an abortion in the 12 to 18 months' follow-up period. The study included a measure of recent heavy alcohol use, which was defined as drinking five or more alcoholic drinks in one day. Using this measure, 54.5% of the sample reported heavy drinking within the last month. As with REES2007, COLEMAN2009B failed to control for many confounding factors including previous mental health problems and relied on self-reported alcohol. Furthermore, as the study included women who had had an abortion any time within the 12 to 18 months' follow-up period; the measure of alcohol use may have been within 90 days for some individuals included in the sample.

Retrospective survey

To assess the prevalence and risk factors associated with abortion in both America and Russia, RUE2004 recruited women attending one urban hospital in Russia and two outpatient clinics in the US who had previously experienced some form of pregnancy loss. Of these women, 548 reported one or more abortions. PTSD was measured using the Institute for Pregnancy Loss Questionnaire, which includes items reflecting DSM-

IV criteria. 14.3% of the 217 American women and 0.9% of the 331 Russian women included in the sample met criteria for PTSD. One of the problems encountered in the study however was the translation of the questionnaire into Russian, which may further limit the application of the results to the UK context.

Another major limitation of the study was the use of self-reported retrospective data, and lack of control for confounding variables, including multiple pregnancy outcomes, previous mental health problems and whether the pregnancy was wanted or unwanted. Furthermore, as a cross-sectional design was employed, the timing between the measure of PTSD and abortion also varied. Finally, the percentage of people refusing to take part in the study was not reported and there were no data available to compare completers with non-completers.

Internet survey

Two studies (COLEMAN2010, COYLE2010) both utilised data collected as part of an internet survey into the impact of abortion and the adequacy of pre-abortion counselling. Questions included in the survey asked respondents about their abortion history, reasons for abortion, agreement in abortion decision making, opinion regarding the abortion at the time of the procedure, adequacy of pre-abortion counselling, relationship status, mental health history and symptoms related to abortion. In total 374 women from 17 countries were included in the analysis. Using the PTSD Checklist – Civilian Version, COYLE2010 indicated that 54.9% of the women included in the sample met DSM diagnostic criteria for PTSD. Within their analysis, COLEMAN2010 distinguished between women undergoing an early abortion (defined as up to 12 weeks' gestation) or a late abortion (13 to 20 weeks); 52.5% of individuals in the early abortion group compared with 67.4% in the late abortion group met diagnostic criteria for PTSD.

One of the main limitations of these studies was the representativeness of the sample. Because questionnaires were posted on websites, the sample used in the analysis was self-selected, which may have increased the chances of selection bias. It is also noteworthy that women were recruited from a range of countries, including some from Brazil where abortion is illegal. Furthermore, women in other countries may have had an abortion before abortion was legalised. This international sample further limits the generalisability of the results to a UK setting. In addition to this, although variables such as abuse and mental health history were collected as part of the survey, the prevalence rates for PTSD were unadjusted meaning these variables were not controlled for within this analysis. Finally, all variables were based on retrospective self-reporting, with the timing of the abortion unclear in many cases.

Record linkage studies

GISSLER1996 and GISSLER2005 were the only studies to focus on suicide following an abortion. The record linkage studies matched information from the Finland Register of Death Certificates on all deaths of women of childbearing age (15 to 49 years) to the abortion register; GISSLER1996 presented the results between 1987 and 1994, whereas GISSLER2005 extended the study from 1987 until 2000. In total, 50 suicides occurred in the sample of 156,879 women who had an abortion (0.0319% or 31.9 per 100,000 pregnancies). Using the modified Charles review quality criteria, GISSLER1996 and GISSLER2005 were rated as very poor due to the lack of any control for previous mental health problems, a factor associated with higher suicide rates. Furthermore, the study failed to account for confounding factors such as how much the pregnancy was wanted, multiple pregnancy events, type of abortion (elective or medical) or any socioeconomic variables, which may be associated with both abortion and increased suicide risks.

As can be seen in Table 6, the prevalence ranges are wide, reflecting the heterogeneity of the dataset, outcomes and measurement methods used.

Table 6: Prevalence rates for studies, not accounting for previous mental health problems

Study ID	Follow-up	Prevalence rate (%)	CI 95%	Point or period prevalence	Study quality
Depression k = 13					
BROEN2006	2 years 5 years	11.1 11.43	3.85 to 18.37 3.98 to 18.88	Point	Very poor
SULIMAN2007	3 months	20.0	9.52 to 30.48	Point	Very poor
REARDON2002B	1 to 12 years	27.3	22.2 to 32.4	Point	Fair
COUGLE2003	1 to 12 years	27.3	22.2 to 32.4	Point	Fair
MAJOR2000	2 years	20.21	16.2 to 24.22	Point	Fair
COLEMAN2009A Major depression with hierarchy Major depression without hierarchy	Cross-sectional	36.59 40.6	31.86 to 41.32 35.78 to 45.42	Point	Fair
HAMAMA2010 Prior elective abortion Prior elective and spontaneous abortion	Cross-sectional	15.6 18.2	10.56 to 20.64 2.08 to 34.32	Point	Fair
PEDERSEN2008	1 to 6 years 7 to 11 years 1 to 11 years	26.25 11.11 20.8	16.61 to 35.89 1.93 to 20.29 21.6 to 37.6	Point	Fair
REES2007	0 to 2 years	31.3	22.17 to 40.45	Point	Fair
SCHMIEGE2005	1 to 11 years 12 to 22 years 1 to 22 years	23.71 26.22 24.95	18.24 to 29.18 20.47 to 31.97 20.98 to 28.92	Point	Fair
STEINBERG2011 Astudy1 Major depression with hierarchy Major depression without hierarchy	Problems within past month	7.9 8.3	5.25 to 10.55 5.59 to 11.01	Period	Fair
TAFT2008	4+ years Up to 4 years Combined	35.96 37.9 36.89	31.98 to 39.94 33.5 to 42.3 33.99 to 39.89	Point	Fair
WARREN2010	1 year 5 years	14.1 16.9	5.89 to 22.31 8.06 to 25.74	Point	Fair
Anxiety k = 4					
BROEN2006	2 years 5 years	31.94 34.29	21.17 to 42.71 23.17 to 45.41	Point	Very poor
STEINBERG2008 study1 Unplanned first pregnancy	Cross-sectional	20.2	17.92 to 22.52	Point	Fair

Study ID	Follow-up	Prevalence rate (%)	CI 95%	Point or period prevalence	Study quality
STEINBERG2008 study1 All first pregnancies	Cross-sectional	19.98	17.75 to 22.21	Point	Fair
STEINBERG2011 Astudy2 1 abortion 2 or more abortions	Cross-sectional	17.1 31.0	12.86 to 21.34 21.5 to 40.5	Point	Fair
Panic disorder k = 2					
COLEMAN2009A	Cross-sectional	11.03	7.96 to 14.1	Point	Fair
STEINBERG2011 Astudy1	Problems within past month	1.9	0.56 to 3.24	Period	Fair
Panic attacks k = 2					
COLEMAN2009A	Cross-sectional	18.05	14.28 to 21.82	Point	Fair
STEINBERG2011 Astudy1	Problems within past month	3.5	1.7 to 5.3	Period	Fair
Agoraphobia k = 2					
COLEMAN2009A	Cross-sectional	18.05	14.28 to 21.82	Point	Fair
STEINBERG2011 Astudy1	Problems within past month	6.0	3.67 to -8.33	Period	Fair
Agoraphobia without panic disorder k = 2					
COLEMAN2009A	Cross-sectional	14.04	10.63 to 17.45	Point	Fair
STEINBERG2011 Astudy1	Problems within past month	5.1	2.94 to 7.26	Period	Fair
PTSD k = 10					
BROEN2004	6 months 2 years	25.68 18.06	15.73 to 35.63 9.17 to 26.95	Point	Very poor
BROEN2005A	5 years	20.00	10.63 to 29.37	Point	Very poor
COLEMAN2010 Early abortion Late abortion	Cross-sectional	52.5 67.4	46.91 to 58.09 54.66 to 80.14	Point	Very poor
SULIMAN2007	3 months	18.2	8.09 to 28.31	Point	Very poor
COYLE2010	Cross-sectional	54.9	49.86 to 59.94	Point	Very poor
COLEMAN2009A	Cross-sectional	19.8	15.89 to 23.71	Point	Very poor
HAMAMA2010 Prior elective abortion Prior elective and spontaneous abortion	Cross-sectional	12.6 13.6	7.99 to 17.21 -0.72 to 27.92	Point	Fair
MAJOR2000	2 years	1.36	0.28 to 2.44	Point	Fair

Study ID	Follow-up	Prevalence rate (%)	CI 95%	Point or period prevalence	Study quality
RUE2004	Cross-sectional US women Russian women	14.3 0.9	9.64 to 18.96 -0.12 to 1.92	Point	Fair
STEINBERG2011 Astudy1	Problems within past month	4.5	2.47 to 6.53	Period	Fair
Alcohol dependence k = 2					
COLEMAN2009A	Cross-sectional	23.31	19.16 to 27.46	Point	Fair
STEINBERG2011 Astudy1	Problems within past month	5.5	3.26 to 7.74	Period	Fair
Alcohol misuse/problems (with/without drug dependence) k = 5					
COLEMAN2009B Heavy drinking	Cross-sectional	54.5	45.28 to 63.72	Point	Very poor
COLEMAN2009A Alcohol misuse without dependence Alcohol misuse with or without dependence	Cross-sectionala	14.54 36.84	11.08 to 18 32.11 to 41.57	Point	Fair
PEDERSEN2007	Problems within past 12 months at 1 to 7 years' follow-up	30.3	19.93 to 40.59	Period	Fair
REARDON2004	REARDON2004	6.5	2.61 to 10.39	Point	Fair
STEINBERG2011 Astudy1 Alcohol misuse without dependence Alcohol misuse with or without dependence	Problems within past month	0.3 4.0	-0.24 to 0.84 2.08 to 5.92	Period	Fair
Drug dependence k =2					
COLEMAN2009A	Cross-sectional	16.79	13.12 to 20.46	Point	Fair
STEINBERG2011 Astudy1	Problems within past month	2.2	0.76 to 3.64	Period	Fair
Drug misuse (with/without alcohol dependence) k = 4					
PEDERSEN2007 Cannabis use Other illegal drug use	12 months	31.6 17.1	2.6 to 8.2 3.4 to 17.7	Period	Fair
COLEMAN2009A Drug misuse without dependence Drug misuse	Cross-sectional	9.52 23.56	6.64 to 12.4 19.4 to 27.72	Point	Fair

Study ID	Follow-up	Prevalence rate (%)	CI 95%	Point or period prevalence	Study quality
REARDON2004 Cannabis use Cocaine use	0 to 12 years	18.6 4.8	13.37 to 23.83 1.93 to 7.67	Point	Fair
STEINBERG2011 Astudy1 Drug misuse without dependence Drug misuse	Problems within past month	0.1 1.8	-0.21 to 0.41 0.5 to 3.1	Period	Fair
Substance-use disorder k = 1					
STEINBERG2011 Astudy2 1 abortion 2 or more abortions	Cross-sectional	5.2 11.9	2.7 to 7.7 5.25 to 18.55	Point	Fair
Suicide k = 3					
GISSLER1996	1 year	0.03	0.02 to 0.04	Period	Very poor
GISSLER2005	1 year	.0319	0.0317 to 0.0321	Period	Very poor
RUSSO2001 Suicidal thoughts	Cross-sectional	10.5	7.16 to 13.84	Point	Very poor
Mood disorders k = 1					
STEINBERG2011 Astudy2 1 abortion 2 or more abortions	Problems within past month	8.8 11.9	5.61 to 11.99 5.25 to 18.55	Point	Fair
Bipolar disorder k = 1					
COLEMAN2009A Bipolar I disorder New mania	Cross-sectional	5.51 2.01	3.27 to 7.75 0.63 to 3.39	Point	Fair
STEINBERG2011 Astudy1 Bipolar I disorder New mania	Problems within past month	0.6 0	-0.16 to 1.36 0.00 to 0.00	Period	Fair
Psychological distress (GSI >1) k = 1					
RIZZARDO1992	3 months	18.9	12.91 to 24.89	Period	Poor
Depression and/or anxiety k =1					
RUSSO2001	Cross-sectional	21.3	16.84 to 25.76	Point	Very poor
Comorbid depression and anxiety k=1					
HAMAMA2010	Cross-sectional Prior elective abortion Prior elective and spontaneous abortion	4.5 4.5	1.62 to 7.38 -4.16 to 13.16	Point	Fair

Table 7: Differences between STEINBERG2011Astudy1 and COLEMAN2009A

	COLEMAN2009A Abortion	STEINBERG2011Astudy1 Abortion
Unweighted N	399	399
Weighted N	Not reported	350
Diagnosis		
Panic disorder	11.0	1.9
Panic attacks	18.0	3.5
PTSD	19.8	4.5
Agoraphobia with or without panic disorder	18.0	6.0
Agoraphobia without panic disorder	14.0	5.1
Alcohol abuse with or without dependence	36.8	4.0
Alcohol abuse without dependence	14.6	0.3
Alcohol dependence	23.4	5.5
Drug abuse with or without dependence	23.6	1.8
Drug abuse without dependence	9.5	0.1
Drug dependence	16.7	2.2
Bipolar I	5.4	0.6
New mania	1.7	0.0
Major depression without hierarchy	40.7	8.3
Major depression without hierarchy	36.5	7.9

3.3.3 Limitations

As highlighted above, the majority of studies included in the review were subject to multiple limitations. In addition to failing to adequately control for previous mental health problems, other limitations common to many of the studies reviewed included the use of retrospective reporting, failing to account for whether or not the pregnancy was planned and whether the pregnancy was wanted (and thus included abortions due to medical reasons such as fetal abnormality), inadequate confounder control, including taking no account of multiple pregnancy events, and variable measurement of mental health outcome, often including scale-based measures instead of clinical diagnosis.

Although it was not possible to produce a GRADE evidence profile due to the primary aim of the review (prevalence rates as opposed to a comparative review), a number of limitations with the evidence as a whole warrant discussion. One of the main limitations of the dataset related to the degree of clinical and statistical heterogeneity, which meant that meta-analysis of prevalence rates for the different disorders was not possible. The heterogeneity was most notable in the methods used for outcome measurement. For

example, measures of depression varied from scale-based measures such as the HADS to clinical diagnostic interviews. Heterogeneity in sampling and variable selection led to different studies producing a range of prevalence rates, even when using the same data source (COUGLE2003, REARDON2002B, SCHMIEGE2005). SCHMIEGE2005 noted that within the National Longitudinal Survey of Youth database used for the secondary analysis, over 3,000 different variables related to pregnancy outcomes; therefore, even where the studies were using the same survey, included populations and results could differ based on the variables selected.

Another potential reason for the heterogeneity of the prevalence rates reported may result from the follow-up periods used. In many studies, the follow-up time between the abortion and mental health outcome was unclear, with studies including women who had recently had an abortion within the same analysis as those who had had an abortion up to 11 years previously. Within some studies, the follow-up period between an abortion and post-abortion mental health measurement was less than a year, which may mean that mental health problems occurring after a year are missed. In contrast, other studies included much longer follow-up periods; however, the studies failed to control for other life events that might have occurred between the time of the abortion and the follow-up period. Furthermore, both point and period prevalence rates were used throughout the dataset, making comparisons between different studies problematic, even if they did report the same outcome.

Another major limitation with the dataset as a whole was the inadequate control of confounding variables. Many studies failed to control for multiple pregnancy outcomes (that is, a woman having had two or more different outcomes for a prior pregnancy including birth, abortion or miscarriage). While some studies included only women with a first pregnancy event (for example, COUGLE2003, STEINBERG2008study1), others included all abortions during a certain time period (BROEN2004, BROEN2005A, BROEN2006, GISSLER1996, MAJOR2000) and REES2007 included women who had delivered a live birth and subsequently went on to have an abortion. It was unclear whether multiple pregnancy events have an impact on the prevalence of mental health problems. This sampling difference further adds to the difficulties in comparing or meta-analysing prevalence rates between the different studies.

The results of the review are also limited by the study designs, which mainly comprised of secondary data analysis of larger longitudinal cohort studies, many of which were not designed to specifically assess the prevalence of mental health problems following an induced abortion. Only four studies utilised prospective cohort designs (BROEN2004, BROEN2005A, BROEN2006, MAJOR2000) although the small sample size and low opt-in rate of only 46% in BROEN2004 and BROEN2005A, and the 50 to 57%[4] attrition rate in MAJOR2000 make the findings unclear. Furthermore, none of the studies used a UK sample so any generalisations of the results to the UK population should be made with caution

[4] Dropout % varied depending on the outcome reported.

3.4 Studies That Account For Previous Mental Health Problems

3.4.1 Study characteristics

The seven studies presented here all control for previous mental health problems in some form within their analyses of prevalence rates. A summary of the study characteristics, including quality assessment, of the included papers are shown in Table 8. Three of the papers included in the review presented analysis of data collected as part of national longitudinal cohort studies (COUGLE2005, MOTA2010, STEINBERG2008study2), three reported outcomes from a record-based study (COLEMAN2002A, REARDON2002A, REARDON2003A) and one (MUNK-OLSEN2011) used registry data to conduct a population-based cohort study. There was significant variability in the methods of outcome measurement with some studies using clinical diagnosis, while others used standardised scale-based measures and others treatment claims as recorded on regional databases.

Studies also varied in whether they reported point or period prevalence rates. Four of the studies included in the review (COLEMAN2002A, MUNK-OLSEN2011, REARDON2002A, REARDON2003A) excluded participants with previous mental health problems from their analysis. As all cases of mental health problems were new, these studies reported incidence rates instead of prevalence. In that case, where the studies reported absolute numbers or cumulative incidence rates (for example, the total proportion of the sample to experience a new mental health problem within a given time period), these were used to estimate period prevalence rates (for example, the total number of people to experience a mental health problem within a given time period) because all cases of the mental health problem could be classed as new cases.

For these studies, data pertaining to inpatient and outpatient treatment were the only data included in the review of prevalence. Although these studies compared the differences in types of disorders requiring inpatient or outpatient treatment, for example, admitted for depression, it was not possible to use these data to estimate prevalence as the studies only recorded the first contact with mental health services. For example, an individual receiving treatment for depression at the beginning of the study would be removed from the rest of the study period; thus if the same individual went on to experience anxiety within the study, this would not be recorded.

Table 8: Study characteristics of studies accounting for previous mental health problems

Study ID and study design	**Numbers, participant characteristics and country**	**Outcome**	**Measure and mode of administration**	**Follow-up**	**Study quality** (Charles review rating)
National survey data					
COUGLE2005 Cross-sectional	n = 1033. National Survey of Family Growth, US	Anxiety	Interview based on DSM-IV criteria for GAD *Interview*	Cross-sectional	Fair
MOTA2010 Cross-sectional	n = 452. Women who completed the National Comorbidity Survey Replication, US	DSM-IV psychiatric disorders	CIDI *Interview*	Cross-sectional	Fair
STEINBERG2008 study2 Cross-sectional	n = 273. Identified from the National Comorbidity Survey, US	DSM-III-R anxiety disorders	UM-CIDI *Interview*	Cross-sectional	Very good
Prospective cohort					
MUNK-OLSEN2011 Prospective cohort study	n = 84620. Women with a first ever abortion identified from national records. Denmark	First psychiatric contact	Danish records of either inpatient or outpatient psychiatric contact	9 months pre-abortion 1 year post-abortion	9 months pre-abortion 1 year post-abortion
Californian Medical and Deaths Records study					
COLEMAN2002A Retrospective	n = 14297. Women who claimed from state-funded medical insurance programme in California, US	Outpatient treatment for ICD-9 mental illness	Insurance claims for psychiatric outpatient treatment	1 year 2 years 3 years 4 years	Poor
REARDON2003A Retrospective	n = 15299. Women who claimed from state-funded medical insurance programme in California, US	Psychiatric admission for ICD-9 mental illness	Insurance claims for psychiatric inpatient admission	1 year 2 years 3 years 4 years	Poor

Study ID and study design	Numbers, participant characteristics and country	Outcome	Measure and mode of administration	Follow-up	Study quality (Charles review rating)
REARDON2002A Retrospective	n = 17472. Women who claimed from state-funded medical insurance programme in California, US	Suicide	Death certificate	0 to 8 years	Poor
n = the number of subjects used in the analysis.					

3.4.2 Findings

Due to differences in outcome measurement, follow-up times and whether point or period prevalence was reported, meta-analysis of prevalence rates for each outcome was not possible. As above, a narrative approach has been adopted for the present review, with prevalence rates for each disorder reported in Table 9.

Like STEINBERG2008study1 (discussed in Section 3.3.2), COUGLE2005 also analysed data from the fifth cycle of the National Survey of Family Growth. In order to determine the effect of abortion on mental health problems, variables relating to pregnancy outcome, whether or not the pregnancy was planned, and anxiety, were extracted from the survey. The final sample used in the analysis included women who had reported that their first pregnancy event was unplanned and resulted in abortion. Because the outcome of interest was anxiety, women who reported a period of anxiety either before or during their first pregnancy were excluded. This resulted in a total of 1,033 included in the analysis.

Where women indicated that they had experienced either anxiety or worry on the initial items, follow-up questions related to the DSM-IV classification of GAD were used. In total, 13.75% of women included in the study met the criteria for GAD. One of the main limitations of the study was that the time period between the abortion and mental health outcomes was unclear. Furthermore, the reports of anxiety both prior to (used as the basis for exclusion) and following the pregnancy event, were based upon retrospective self-reporting. The study also failed to control for other confounding factors within the analysis of prevalence rates. For example, although an attempt was made to control for previous pregnancies by excluding women who reported that the abortion occurred after a previous pregnancy, there was no control for multiple pregnancies in the follow-up period.

Unlike COLEMAN2009A (discussed in Section 3.3.2) who also utilised the National Comorbidity Survey, STEINBERG2008study2 only included women whose first pregnancy event ended in abortion, resulting in a sample of 273. STEINBERG2008study2 used data on the first and most recent onset of each disorder (as classified by the UM-CIDI) to determine the percentage of women with post-abortion anxiety. Controlling for previous anxiety disorders in this way reduced the prevalence rates reported in the study. For instance COLEMAN2009A reported that 19.8% of women met criteria for PTSD whereas in STEINBERG2008study2 this figure was 10.26%, with rates for GAD and social anxiety at 6.2% and 12.09%, respectively.

To control for multiple abortions, STEINBERG2008study2 reported the percentage of women meeting criteria for the different disorders categorised by the number of abortions. For women with only one abortion, the rates for GAD, social anxiety and PTSD were 6.5%, 11.0% and 9.2%, respectively, with higher prevalence rates reported for women experiencing two or more abortions. Despite controlling for these factors, one of the main limitations of the study was that the time period between the abortion and subsequent assessment of anxiety varied from a few months to 20 years. The study also relied upon retrospective reporting and failed to distinguish between elective and therapeutic abortions.

MOTA2010 analysed data from the National Comorbidity Survey Replication study, which surveyed women aged 18 years and over between 2001 and 2003. The sample used in the present study included women with a history of abortion (n = 452). Lifetime mental health disorders were diagnosed through the use of a structured clinical interview, the Composite International Diagnostic Interview (CIDI). To control for previous mental health problems, the analysis distinguished between women whose age of onset of mental health problems preceded their first abortion and women whose age of onset was after their first abortion. As shown in Table 9, prevalence rates varied from disorder to disorder with 18.14%, 9.29% and 2.88% experiencing major depression, GAD and social phobia, respectively. Results for drug and alcohol misuse ranged from 4.65 to 10.62% depending on the diagnostic category. Finally, 10.62% and 3.54% of women reported suicidal ideation and attempts, respectively. The prevalence rates reported are limited by a number of factors including the retrospective reporting of abortion and mental health outcomes.

This included retrospective reporting of when the first period of mental health problems was experienced, which was used as the basis for controlling for previous conditions. Crucially, distinctions between pre- and post-abortion disorders were diagnosis specific; therefore, women who reported depression prior to the abortion would still be included in the post-abortion anxiety prevalence rates and vice versa. Furthermore, by using lifetime measures of abortion and mental health history, follow-up times between events were unclear, especially as the study failed to control for confounding variables including multiple pregnancy outcomes.

COLEMAN2002A, REARDON2002A and REARDON2003A used data from a US state-funded medical insurance programme to identify a sample of women whose first pregnancy ended in abortion during a specific time period. To control for previous mental health problems, women who claimed for psychiatric inpatient treatment (COLEMAN2002A) or inpatient and/or outpatient treatment (REARDON2002A, REARDON2003A) in the 12 to 18 months prior to the abortion were excluded. While COLEMAN2002A and REARDON2003A assessed outpatient and inpatient treatment, respectively, REARDON2002A used data from death certificates to assess suicide rates subsequent to the abortion. As shown in Table 9, the overall period prevalence rates of women who had received inpatient treatment was 0.3%, 0.56%, 0.84% and 1.18% up to 1, 2, 3 and 4 years, respectively.

Rates for outpatient treatment on the other hand were 4.7%, 7.85%, 10.98% and 14.49% up to each time point, and at up to 8 years following the abortion 11 women or 0.063% had died by suicide. As with other studies utilising the same data source, the three studies varied in their inclusion criteria regarding previous mental health problems. COLEMAN2002A only excluded women with a history of inpatient admission, whereas the other two studies excluded women with a history of both inpatient and outpatient treatment (REARDON2002A, REARDON2003A).

One of the main limitations of the study was the use of treatment records to estimate mental health problems because women with mental health problems who did not claim for treatment would not be included in the rates reported. Furthermore, although each study excluded women with a history of pregnancy events prior to abortion, women were not excluded if they experienced subsequent pregnancy events resulting in abortion, miscarriage or birth, which could all have an affect on mental health outcomes.

Unlike the record linkage studies above, MUNK-OLSEN2011 used linkage data to conduct a national prospective cohort study. Using data from the Danish Civil Registration System to establish the potential sample, the authors linked abortion records from the Danish National Register of Patients to the Danish Psychiatric Central Register, which includes records of all inpatient and outpatient psychiatric contact. Women were included in the sample if they had undergone a first abortion between 1995 and 2007, and had no history of mental health problems (defined as no recorded inpatient treatment) between birth and 9 months before their first abortion. In total 84,620 women were included in the sample and individually followed up to a maximum of 12 months after the abortion or until psychiatric contact, emigration or death occurred. Unlike other studies included in the review, MUNK-OLSEN2011 assessed psychiatric contact in the 9 months leading up to the abortion as well as 1 year following the abortion. Although the study assessed incidence rates, raw numbers of women receiving psychiatric treatment in a given time period were reported and were used to estimate period prevalence rates. However it was not possible to estimate prevalence rates accurately for each of the different diagnostic categories because women were excluded from the analysis after their first contact. For example, someone with a first contact for depression may have gone on to have contact for psychosis but would not be included in the psychosis analysis.

In total, 1% of the sample had psychiatric contact in the 9 months leading up to the abortion compared with 1.5% in the 12 months' follow-up period. Although the study was of higher quality than others included in the review because it did not rely on retrospective reporting, had a low attrition rate and included a large national sample, a number of limitations warrant discussion. In particular, using psychiatric contact as a measure of mental health outcome may underestimate the rates reported as women may have experienced mental health problems without coming into contact with services. Furthermore, the study failed to control for confounding variables and did not distinguish between elective abortions and abortions conducted due to medical reasons, such as fetal abnormality.

Table 9: Prevalence rates for each outcome from studies accounting for previous mental health problems

Outcome	Study Ids	Follow-up	Percentage	CI 95%	Study quality
GAD k = 2					
GAD	MOTA2010	Cross-sectional	9.29	6.61 to 11.97	Fair
GAD	STEINBERG2008 study2	n/a	6.23	3.36 to 91	Very good
Social phobia k = 1					
Social phobia	MOTA2010	Cross-sectional	2.88	1.34 to 4.42	Fair
Anxiety k = 2					
Anxiety states	COLEMAN2002A	1 to 4 years	2.48	2.23 to 2.73	Poor
Anxiety	COUGLE2005	n/a	13.75	11.65 to 15.85	Fair
Social anxiety k = 1					
Social anxiety	STEINBERG2008 study2	n/a	12.09	8.22 to 15.96	Very good
Depression-related disorders k = 1					
Major depression	MOTA2010	Cross-sectional	18.14	14.59 to 21.69	14.59 to 21.69
Suicide k = 2					
Suicide	REARDON2002A	Up to 8 years	0.06	0.02 to 0.1	Poor
Suicidal ideation	MOTA2010	Cross-sectional	10.62	7.78 to 13.46	Fair
Suicide attempt	MOTA2010	Cross-sectional	3.54	1.84 to 5.24	Fair
Psychiatric admissions k = 1					
Psychiatric admission	REARDON2003A	Up to 1 year Up to 2 years Up to 3 years Up to 4 years	0.3 0.56 0.84 1.18	0.21 to 0.39 0.44 to 0.68 0.7 to 0.98 1.01 to 1.35	Poor
Alcohol misuse k = 1					
Alcohol misuse	MOTA2010	Cross-sectional	10.62	7.78 to 13.46	Fair
Alcohol dependence k = 1					
Alcohol dependence	MOTA2010	Cross-sectional	4.65	2.71 to 6.59	Fair
Alcohol dependence	MOTA2010	Cross-sectional	7.96	5.46 to 10.46	Fair
Drug dependence k = 1					
Drug dependence	MOTA2010	Cross-sectional	4.65	2.71 to 6.9	Fair
PTSD k = 1					
PTSD	STEINBERG2008 study2	n/a	10.26	6.66 to 13.86	Very good
Outpatient treatment k = 1					
Outpatient psychiatric treatment	COLEMAN2002A	Up to1 year Up to 2 years Up to 3 years Up to 4 years	4.7 7.85 10.98 14.49	4.35 to 5.05 7.41 to 8.29 10.47 to 11.49 13.91 to 15.07	Poor

Outcome	Study Ids	Follow-up	Percentage	CI 95%	Study quality
Psychiatric treatment k = 1					
First contact with psychiatric services	MUNK-OLSEN2011	9 months before 0 to 12 months Total time period	1.03 1.52 2.53	0.96 to 1.1 1.44 to 1.6 2.42 to 2.64	Good

3.4.3 Limitations

Although these studies in general were of better quality than the studies that did not control for previous mental health problems, they still have a number of limitations. In particular, the studies included in this review failed to control for other confounding factors (including multiple pregnancy outcomes both before and during the follow-up periods), they relied on retrospective reporting of pregnancy and mental health outcomes, and they failed to distinguish between elective and therapeutic abortions.

The methods of identifying and controlling for previous mental health problems were both varied and limited. REARDON2003A, COLEMAN2002A and REARDON2002A all excluded women who had made a claim for psychiatric treatment within the last 6 to 12 months prior to the survey. However, there was no certainty that all women experiencing mental health problems would have claimed for treatment. Moreover, the exclusion time period of only 1 year prior to the abortion would lead to women with older claims dating back beyond 1 year still being included in the study. On the other hand MOTA2010 excluded women whose age at onset of a mental health problem was less than the age at which they had the abortion. However, the age of onset of mental health problems was assessed retrospectively and was therefore subject to the possibility of recall bias.

As with the review in Section 3.3, heterogeneity in the outcomes investigated and in the measurement of disorders meant that meta-analysis was not possible. Very few studies looked at the same outcomes. For example, while REARDON2003A and COLEMAN2002A focused on inpatient and outpatient psychiatric treatment, respectively, MUNK-OLSEN2011 did not distinguish between the two, making comparisons across these studies difficult. Even where studies reported prevalence rates for the same diagnostic category, the methods of outcome measurement varied with some studies using standardised measures while others used clinical interviews. Furthermore, the difference in follow-up times, which ranged from 90 days to 20 years, and the use of point and period prevalence rates further complicates any comparisons made and the conclusions drawn.

These limitations aside, it was also unclear how generalisable the findings would be to a UK population given that three of the six included studies (COLEMAN2002A, REARDON2002A, REARDON2003A) all used the same data source, which focused on US women of low income, and none were conducted in the UK.

3.5 Comparison Of Studies That Accounted For Previous Mental Health Problems And Studies That Did Not Account For Previous Mental Health Problems

It was possible to compare prevalence rates from studies that did not account for previous mental health problems with those that did account for previous mental health problems as described in Sections 3.3 and 3.4, respectively.

A higher rate of mental health problems was reported in studies that did not control for previous mental health problems compared with studies that did account for previous mental health problems (see Table 10 for a comparison). This was true even where studies used the same data source. For example, COLEMAN2009A and STEINBERG2008study2 both analysed data from the National Comorbidity Survey. However, only STEINBERG2008study2 adequately controlled for previous mental health problems and reported lower rates of the same disorders when compared with COLEMAN2009A. A similar pattern of results was also apparent for COUGLE2005 (controlled for previous anxiety), which reported lower prevalence rates of anxiety, compared with STEINBERG2008study1, which did not control for previous anxiety despite using the same data source. These findings suggest that a history of mental health problems prior to an abortion will have an effect on the rates of mental health problems following an abortion.

However, it must also be noted that differences in the results may also be attributable to other variations within the studies, including sample and variable selection, heterogeneity in outcomes reported and differences in the measurement methods used. Studies differ greatly from one another, making a direct comparison between studies that did and did not control for previous mental health outcomes problematic. Furthermore, comparisons of rates of mental health problems between studies that did and did not account for previous mental health problems are limited to five outcomes. There was no information on to whether this observed difference in rates applies to other mental health outcomes.

Table 10: Comparison of prevalence rates between studies that account for previous mental health problems and studies that did not account for previous mental health problems

Outcome	Prevalence rate (%) in studies that accounted for previous mental health problems	Prevalence rate in (%) studies that did not account for previous mental health problems
Depression/related disorder	18.14	7.9 to 40.6
Anxiety/related disorder	2.48 to 13.75	17.1 to 34.29
PTSD	10.26	0.9 to 67.4
Suicide	0.06 to 10.62	0.03 to 10.5
Outpatient treatment	4.7 to 14.49	-
Psychiatric admissions	0.3 to 1.18	-
Alcohol/drug-related disorder	4.65 to 10.62	0.1 to 54.5
Psychiatric treatment	1.03 to 2.53	-
Panic disorder/attacks	-	1.9 to 18.05
Agoraphobia with/without panic disorder	-	5.1 to 18.05

Outcome	Prevalence rate (%) in studies that accounted for previous mental health problems	Prevalence rate in (%) studies that did not account for previous mental health problems
Bipolar disorder	-	0.00 to 5.51
Mood disorders	-	8.8 to 11.9
Psychological distress	-	18.9
Comorbid depression and anxiety	-	4.5
Depression and/or anxiety	-	21.3

3.6 Evidence Statements

1. The studies included in the review have a number of significant limitations, such as retrospective study designs and secondary data analysis of population studies, varied measurement of mental health outcomes both prior to and following the abortion, small sample sizes, and lack of adequate control for confounding variables, including whether or not the pregnancy was planned and multiple pregnancy events both before and after abortion. The high degree of heterogeneity in prevalence rates reported and the differences in outcome measurement make it difficult to form confident conclusions or generalisations from these results.
2. The single largest confounding variable in these studies appeared to be the prevalence of mental health problems prior to the unwanted pregnancy; controlling for previous mental health problems has had an impact on the prevalence rates of mental health problems following an abortion. Specifically, studies that controlled for previous mental health problems reported lower rates of mental health problems following an abortion when compared with studies that did not adequately control for previous mental health problems, which reported substantially higher rates.
3. The samples used in STEINBERG2008study1 suggest that in countries where abortion is legal, the majority of abortions (up to 95% as reported in the study) are for unplanned pregnancies with only a small proportion occurring due to therapeutic reasons such as fetal abnormality.

4 FACTORS ASSOCIATED WITH MENTAL HEALTH PROBLEMS FOLLOWING AN INDUCED ABORTION

4.1 Review Question

What factors are associated with poor mental health outcomes following an induced abortion?

This chapter identifies factors that are associated with poor mental health following an induced abortion.

4.2 Studies Considered

Twenty-seven studies were included in the review of factors associated with mental health outcomes following an induced abortion. Of the 27 included studies, 14 were designed with the specific aim of testing for predictors of mental health outcomes (BROEN2005B, BROEN2006, COLEMAN2010, CONGLETON1993, COYLE2010, FERGUSSON2009, MAJOR2000, MUNK-OLSEN2011, PEDERSEN2007, PEDERSEN2008, QUINTON2001, REARDON2002A, RUSSO1997, SÖDERBERG1998). The remaining 13 studies (COLEMAN2002A, COUGLE2005, GILCHRIST1995, GISSLER2005, REARDON2002B, REARDON2003A, REES2007, RIZZARDO1992, RUE2004, SCHMIEGE2005, STEINBERG2008study1, STEINBERG2008study2, STEINBERG2011Astudy2) were primarily concerned with comparing outcomes in abortion and non-abortion groups, rather than directly assessing the factors that can lead to poor outcomes following an abortion.

Because the review question focused on the factors associated with mental health problems following an abortion, studies that included a subgroup of women receiving treatment for mental health problems or with self-identified distress following an abortion were included in the review if an adequate comparison group of women without post-abortion mental health problems or distress was included. Two of the included studies (CONGLETON1993, SÖDERBERG1998) meet this criterion.

In total, 154 studies were excluded from the review. The most common reason for exclusion was lack of useable data. Many studies assessed the impact of different factors such as violence, abuse and partner support on mental health outcomes regardless of pregnancy resolution (for example, live birth, abortion or miscarriage). In these cases, where studies did not provide data assessing the impact of the factor on the mental health outcomes for women who had an abortion, they did not meet criteria for the review. Studies that used the same data source within their analysis (MAJOR2000, QUINTON2001, REARDON2002B, RUSSO1997, SCHMIEGE2005) and examined the same factors associated with mental health outcomes were included in the narrative review for completeness, because in many cases results varied due to differences in the inclusion/exclusion criteria and statistical comparisons conducted. Further details about excluded studies including reasons for exclusion can be found in Appendix 7.

4.3 Factors Associated With Poor Mental Health Following An Abortion

4.3.1 Study characteristics

The studies in this section identified factors associated with poor mental health following an abortion. Studies varied as to whether they were specifically designed to determine the effect of factors on subsequent mental health outcomes or if this was a secondary outcome. Details of the included studies can be seen in Table 11.

The 27 studies included in the review analysed data drawn from 16 separate data sources. Seven studies, reporting on four different data sources (BROEN2005B, BROEN2006, GILCHRIST1995, MAJOR2000, MUNK-OLSEN2011, QUINTON2001, RIZZARDO1992), utilised prospective cohort designs to follow-up women either requesting or obtaining an abortion during a set time period. Thirteen studies analysed retrospective or cross-sectional data collected as part of national longitudinal cohort studies or surveys. Within these 11 studies, six different data sources were used, including the National Longitudinal Survey of Youth (REARDON2002B, RUSSO1997, SCHMIEGE2005), the National Survey of Family Growth (COUGLE2005, STEINBERG2008study1), the Fragile Families and Child Wellbeing Study (REES2007), the National Comorbidity Survey (STEINBERG2008study2, STEINBERG2011Astudy2), the Young in Norway Longitudinal Study (PEDERSEN2007, PEDERSEN2008) and the Christchurch Health and Developmental Study (FERGUSSON2009).

Five studies utilised a retrospective design but did not use national survey data. These included a retrospective internet survey (COLEMAN2010, COYLE2010), a retrospective study of Russian and American women (RUE2004) and two retrospective studies comparing women who reported either negative feelings of distress following an abortion (CONGELTON) or serious emotional distress (SÖDERBERG1998) with a control group who did not experience distress. The final four studies utilised data obtained from medical and death records linking pregnancy outcomes to subsequent treatment claims (COLEMAN2002A, REARDON2002A, REARDON2003A) and suicides (COLEMAN2002A, REARDON2002A, REARDON2003A, GISSLER2005).

Across the studies a range of post-abortion mental health outcomes were assessed including depression (BROEN2006, MAJOR2000, PEDERSEN2008, QUINTON2001, REARDON2002B, REES2007, SCHMIEGE2005), anxiety (BROEN2006, COUGLE2005, STEINBERG2008study1, STEINBERG2008study2), psychiatric treatment (CONGLETON1993, COLEMAN2002A, REARDON2003A), PTSD (BROEN2005B, COLEMAN2010, CONGLETON1993, COYLE2010, MAJOR2000, RUE2004), alcohol and drug misuse (PEDERSEN2007), psychological symptoms (RIZZARDO1992), serious emotional distress (SÖDERBERG1998), psychosis (GILCHRIST1995), self-harm (GILCHRIST1995), non-psychotic illness (GILCHRIST1995), suicide (GISSLER2005, REARDON2002A), any DSM psychiatric disorder (FERGUSSON2009, GILCHRIST1995), general mental health symptoms (CONGLETON1993) and self-esteem (RUSSO1997).

In addition to the variation in study design and mental health outcomes reported, studies differed in the factors assessed. The following factors were included in the review: a history of mental illness (BROEN2006, GILCHRIST1995, MAJOR2000, RIZZARDO1992), low self-esteem (RUSSO1997), age (COLEMAN2002A, COUGLE2005, GISSLER2005, MAJOR2000, PEDERSEN2008, QUINTON2001, REARDON2003A), ethnicity (COUGLE2005, MAJOR2000, MUNK-OLSEN2011, RUSSO1997, SCMIEGE2005, SÖDERBERG1998), education (BROEN2006, RUSSO1997, SÖDERBERG1998), other pregnancy events including multiple abortions or births, or timing of the abortion (BROEN2006, COLEMAN2010, MAJOR2000, MUNK-OLSEN2011, PEDERSEN2007, REARDON2002A, REES2007, RIZZARDO1992,

RUSSO1997, SÖDERBERG1998, STEINBERG2008study1, STEINBERG2008study2), employment (BROEN2006, RUSSO1997, SÖDERBERG1998), marital and/or relationship status (BROEN2006, COUGLE2005, MAJOR2000, REARDON2002B, RIZZARDO1992, RUSSO1997, SCMIEGE2005, SÖDERBERG1998), religion (MAJOR2000, RUSSO1997, SCHMIEGE2005, SÖDERBERG1998), negative reactions to abortion (BROEN2006, CONGLETON1993, FERGUSSON2009), perceived level of support including the adequacy of pre-abortion counselling and partner support (COYLE2010, RIZZARDO1992, SÖDERBERG1998), negative attitudes towards abortion (BROEN2006, SÖDERBERG1998), reasons for abortion (BROEN2005B), medical complications following the abortion (MAJOR2000) and stressful life events (BROEN2006).

Table 11: Study characteristics: risk and predictive factors associated with mental health problems following an abortion

Study ID and study design	Numbers, participant characteristics and country	Outcome, measure and mode of administration	Factors and measures	Follow-up	Study quality (Charles review rating)
Young in Norway Longitudinal Study					
PEDERSEN2008 PEDERSEN2007 Retrospective	n = 76 to 125. Women from the Young in Norway Longitudinal Study	Alcohol use (intoxication episodes, Rutgers Alcohol Problem Index, AUDIT) Cannabis use or substance use (self-report) *Self-administered*	Age at time of pregnancy Other pregnancy events	11 years	Fair Fair
National Comorbidity Survey					
STEINBERG2011 Astudy2 Cross-sectional	n = 394 (unweighted). Women who completed the National Comorbidity Survey. A nationally representative sample, US	Mood disorders Anxiety disorders Substance misuse (UM-CIDI) *Interview*	Multiple pregnancy events	Cross-sectional	Good
STEINBERG2008 study2 Cross-sectional	n = 273. Identified from the National Comorbidity Survey. All first pregnancies ending in an abortion, US	DSM-III-R anxiety disorders (UM-CIDI) *Interview*	Multiple pregnancy events	Cross-sectional	Very good

Study ID and study design	Numbers, participant characteristics and country	Outcome, measure and mode of administration	Factors and measures	Follow-up	Study quality (Charles review rating)
National Survey of Family Growth					
COUGLE2005 Cross-sectional	n = 1,033. Women whose first pregnancy was unplanned and ended in abortion, and who did not report a period of pre-pregnancy anxiety. US	Experience of anxiety (interview based on DSM-IV GAD criteria) *Interview*	Marital status Ethnicity Age	Cross-sectional	Fair
STEINBERG 2008study1 Cross-sectional	n = 1,167. Women who took part in National Survey of Family Growth. US	Experience of anxiety (based on DSM-IV GAD criteria) *Interview*	Multiple pregnancy events	Cross-sectional	Very good
National Longitudinal Survey of Youth					
REARDON2002B Retrospective	n = 293. Non-institutionalised women with a history of at least one abortion. US	Depression based on the CES-D *Self-administered*	Marital status	Up to 12 years	Fair
RUSSO1997 Retrospective	n = 721. Non-institutionalised women with a history of at least one abortion. US	Well-being (10-item Rosenberg Self-Esteem Scale) *Self-administered*	Ethnicity Religion Previous self-esteem Education Marital status Multiple pregnancy outcomes	8 years	Fair
SCHMIEGE2005 Retrospective	n = 479. Non-institutionalised US women with a history of at least one abortion	Depression based on the CES-D *Self-administered*	Marital status Ethnicity Religion	Up to 22 years	Fair
Fragile Families and Child Wellbeing Study					
REES2007 Retrospective	n = 99. New mothers who had previously had a live birth recruited into the Fragile Families and Child Wellbeing Study. US	Major depression (CIDI-SF) *Interview* *Wellbeing Study*	Multiple pregnancy events	0 to 2 years	Fair

Study ID and study design	Numbers, participant characteristics and country	Outcome, measure and mode of administration	Factors and measures	Follow-up	Study quality (Charles review rating)
Christchurch Health and Developmental Study					
FERGUSSON 2009 Retrospective (with some prospective data)	n = 104. Women followed from birth to 30 years old reporting an abortion. New Zealand	DSM-IV diagnosis (questionnaires based on the CIDI Assessment of Diagnosis Interview Schedule for Children (DISC) at age 16 only) *Self-administered*	Negative reaction to abortion	Follow-ups occurred at age 15 to 18, 18 to 21, 21 to 25, 25 to 30 years	Good
Internet surveys					
COLEMAN2010 Cross-sectional	n = 374. Women completed surveys on an online website. Worldwide	DSM-IV criteria for PTSD *Self-administered*	Timing of abortion (late versus early)	Various	Various
COYLE2010 Cross-sectional	n = 374. Women completed surveys on an online website. Worldwide	DSM-IV criteria for PTSD *Self-administered*	Negative attitudes to abortion Negative reactions to abortion	Various	Very poor
Retrospective studies					
SÖDERBERG 1998 Retrospective	n = 854. Women who underwent legal abortion in 1989 in Malmö. Sweden	Serious emotional distress *Interview*	Relationship status Education Employment Social support Pre-abortion support Quality of the relationship with partner Religion Negative attitudes towards abortion Ethnic origin Timing of pregnancy	Various	Very poor

Study ID and study design	Numbers, participant characteristics and country	Outcome, measure and mode of administration	Factors and measures	Follow-up	Study quality (Charles review rating)
CONGLETON 1993 Retrospective	n = 25 women with self-identified distress following an abortion and n = 25 women who reported neutral feeling or feeling of relief following abortion. US	Impact of Life Events (PTSD) GSI Counselling *Self-administered*	Negative reactions to abortion	Various	Very poor
RUE2004 Retrospective	n = 331 American and n = 217 Russian women who had had an abortion	PTSD *Self-report*	Age Marital status Number of children Employment Education Religion Pregnancy length Partner support Pre-abortion counselling Reasons for abortion Attitude to abortion Medical complications	Various	Fair
Prospective studies					
BROEN2005B BROEN2006 Prospective	n = 70 to 80. Women treated in a gynaecology department. Norway	PTSD (IES) Anxiety and depression (HADS) *Self-administered*	Age Reasons for abortion Negative attitudes to abortions Doubt (negative reaction) Previous mental health problems Life events Education Multiple pregnancy events Marital status Employment	6 months to 5 years	Very poor

Study ID and study design	Numbers, participant characteristics and country	Outcome, measure and mode of administration	Factors and measures	Follow-up	Study quality (Charles review rating)
RIZZARDO1992 Prospective	n = 253 to164. Women who attended the Obstetrics and Gynecology Department of the General Hospital in Padua. Italy	Psychological distress (SCL-90) *Self-report*	Marital/ relationship status Previous mental health problems Partner support Multiple pregnancy events Multiple abortions	3 months	Poor
GILCHRIST1995 Prospective	n = 6,410. Women requesting an abortion were recruited from general practitioner (GP) surgeries. UK	Any psychiatric illness Psychotic illness Non-psychotic illness Deliberate self-harm *GP rated*	Psychiatric history	Every 6 months from 1976 to 1987	Good
MUNK-OLSEN2011 Prospective	n = 84,620. Women with no history of a mental disorder (previous inpatient psychiatric contact) prior to first childbirth or abortion in the first trimester. Denmark	Psychiatric inpatient and outpatient contact (Danish Psychiatric Central Register)	Age Prior child birth	Up to 12 years	Good
Buffalo prospective study					
QUINTON2001 Prospective	n = 436. Minors and adults from one of three abortion clinics in Buffalo, New York. US	Depression (depression subscale of the Brief Symptom Inventory) *Self-administered*	Age	2 years	Poor

Study ID and study design	Numbers, participant characteristics and country	Outcome, measure and mode of administration	Factors and measures	Follow-up	Study quality (Charles review rating)
MAJOR2000 Prospective	n = 386. Women obtaining an abortion from one of three sites (2 clinics and 1 clinician's office) in Buffalo, New York, for an unplanned pregnancy, not as a result of rape. US	Depression (Brief Symptom Inventory and a questionnaire version of the Diagnostic Interview Schedule) *Self-administered*	Previous mental health problems Age Ethnicity Religiosity Multiple pregnancy events Medical complications	2 years	Fair
Record linkage studies					
GISSLER200	n = 156,789. Register linkage study using death certificates and abortion register. Finland	Suicide (record data)	Age	Up to 14 years	Very poor
Californian medical records – linkage study					
REARDON2002A Retrospective	n = 17,472. Californian women who claimed for an abortion. US	Suicide (record data)	Multiple pregnancy events	0 to 8 years	Poor
REARDON2003A Retrospective	n = 15,299. Californian women who claimed from state-funded medical insurance programme. US	Claims for psychiatric admission for ICD-9 disorder	Age at time of pregnancy	90 days to 4 years	Poor
COLEMAN2002A Retrospective	n = 14,297. Californian women who claimed from state-funded medical insurance programme. US	Claims for psychiatric outpatient treatment	Age at time of pregnancy	90 days to 4 years	Poor
n = the number of subjects used in the analysis					

4.3.2 Findings

Due to the heterogeneity of study design, outcome and measurement methods used in the included studies, meta-analysis of the data was not possible in this part of the review. Meta-analysis of similar outcomes where they did exist was also not possible due to the selective reporting of data, with the majority of studies only reporting a particular factor when a significant result was obtained and many studies only reporting approximate p-values. Therefore, findings for each risk factor have been reviewed narratively, with studies using the same data source reviewed together to highlight any differences in findings. Summary findings for each of the factors are shown in Table 12.

History of mental illness

Five prospective studies (using four data sources) assessed the impact of previous mental health problems on post-abortion mental health outcomes (BROEN2005B, BROEN2006, GILCHRIST1995, MAJOR2000, RIZZARDO1992). Four of the studies directly aimed to determine the effects of previous mental health problems (BROEN2005B, BROEN2006, MAJOR2000, RIZZARDO1992). GILCHRIST1995, on the other hand, indirectly evaluated the impact of previous mental health problems, comparing the mental health outcomes for women who either had or had not requested a termination for an unplanned pregnancy.

BROEN2006 set out to determine the effect of previous mental illness on measures of depression and anxiety following a pregnancy termination (either miscarriage or abortion), whereas BROEN2005B assessed the impact of previous mental health problems on symptoms of PTSD. The authors conducted multivariate analyses to identify risk factors for mental health problems (using logistic regression for categorical variables and linear regression for continuous variables) following a pregnancy termination, with separate results reported for the miscarriage and abortion groups within BROEN2006. The results of the analyses indicated that a history of poor psychiatric health prior to the abortion was associated with higher depression scores ($p < 0.001$) at 6 months, and higher depression and anxiety scores ($p < 0.001$ and $p < 0.05$, respectively), as measured by the HADS, at 5 years.

However, no indication was given of the precision or magnitude of these differences. With reference to PTSD, the regression analysis indicated that previous mental health problems were associated with intrusion at 6 months and 2 years after the abortion ($\beta = .23$, $p < 0.1$ and $\beta = .38$, $p < 0.001$, respectively) but not with symptoms of avoidance. However, no data were provided for total PTSD symptoms and there was no information given regarding whether or not it was related to reaching criteria for PTSD 'caseness'.

MAJOR2000 conducted a longitudinal study to investigate the effect of induced abortion on levels of depression, self-esteem and abortion-specific PTSD in women attending three sites (two abortion clinics and one clinician's office) in the US. Using multiple regression, their model included (and controlled for) a number of potential factors including age, history of depression, prior births, ethnicity, religious affiliation, marital status, number of prior abortions and physical complications post-abortion. In agreement with BROEN2006, the results of the multiple regression analyses indicated that a history of depression was associated with poorer post-abortion outcomes for all measures of depression and PTSD.

Specifically, a history of depression was the only significant predictor included in the model for both post-abortion depression (as measured by the Diagnostic Interview Schedule) and PTSD ($\beta = 0.87$, $SE = 0.30$, $p < 0.01$ and $\beta = 2.26$, $SE = 0.75$, $p < 0.05$, respectively). Furthermore, a history of depression was also significantly associated with a continuous measure of depression: the Brief Symptom Inventory Depression Interview

score (β = 0.49, SE = 0.11, p <0.001) and with post-abortion negative emotions (β = 0.54, SE = 0.13, p <0.001).

Within their prospective study, RIZZARDO1992 used the GSI of the SCL-90 to assess psychological distress before and after the abortion. Their regression analysis indicated that individuals with a history of emotional problems scored higher on all scales of the SCL-90, including the GSI (p <0.0001). Furthermore, this effect was evident both before and after the abortion.

GILCHRIST1995 investigated mental health outcomes in a UK prospective cohort study of women with an unplanned pregnancy over a period of up to 11 years. Groups were stratified according to their psychiatric histories, namely previous psychosis, previous non-psychotic illness, previous deliberate self-harm without another psychiatric illness or no previous psychiatric illness. Incidence rates of first psychiatric illnesses were reported for all women included in the study and stratified by psychiatric history. For all pregnancy outcomes, a history of psychotic illness was associated with an increased risk of post-pregnancy psychiatric illnesses. Specifically for women who had had an abortion, incidence rates (per 1000 woman-years) for all psychiatric illnesses for each group are shown in Table 12 (GILCHRIST1995).

Table 12: Incidence rates for all psychiatric illnesses in women who have had an abortion

Psychiatric illness	Incidence rates (per 1000 woman-years)
Previous psychosis	116.9
Previous non-psychotic illness	108.8
Previous deliberate self-harm	66.5
No psychiatric history	63.5

The authors also report incidence rates (per 1000 woman-years) for psychotic episodes, non-psychotic episodes and deliberate self-harm across the four groups for previous psychosis, previous non-psychotic illness, previous deliberate self-harm and no psychiatric history (Table 13).

Table 13: Incidence rates for episodes of psychiatric illnesses in women who have had an abortion

Groups	Incidence rates (per 1000 woman-years)		
	Psychotic episodes	Non-psychotic episodes	Deliberate self-harm episodes
Previous psychosis	28.2	115.9	18.2
Previous non-psychotic illness	4.9	107.0	7.1
Previous deliberate self-harm	0	63.3	8.4
No psychiatric history	1.1	61.8	3.0

Despite the consistency of findings, one of the main limitations of the study was the lack of analysis to ascertain whether the differences in incidence rates between women with differing psychiatric histories were statistically significant.

History of low self-esteem

Rather than looking at mental illness as a risk factor, RUSSO1997 assessed the impact of prior self-esteem on measures of post-abortion self-esteem in women included in the National Longitudinal Survey of Youth. When focusing on women who reported an abortion, results of multiple regression analyses revealed that only previous levels of self-esteem were significant predictors of post-abortion self-esteem. Despite reporting the significance of the findings, exact results of the regression in terms of the resulting β coefficients were not reported.

Demographic factors

The association between a number of demographic factors and post-abortion mental health has been investigated within various studies utilising a range of designs. In particular, studies have assessed the impact of age, ethnicity, education, marital/ relationship status, religion, income and employment.

Age

Ten studies (BROEN2005B, COLEMAN2002A, COUGLE2005, GISSLER2005, MAJOR2000, MUNK-OLSEN2011, PEDERSEN2008, QUINTON2001, REARDON2003A, RUE2004) assessed the impact of age at the time of the abortion on different measures of post-abortion mental health. Of these, only MAJOR2000 and QUINTON2001 (who used the same sample of women recruited from three abortion clinics in the US), BROEN2005B and RUE2004 specifically aimed to assess the impact of age and provided some statistical analysis of the impact of age. Within their analyses, the findings for the impact of age at the time of abortion were mixed. MAJOR2000 found that at 2 years' follow-up, age was a significant predictor of negative emotions post-abortion ($\beta = -0.05$, SE = 0.01, $p < 0.001$), with younger women reporting more negative attitudes. However, MAJOR2000 failed to find any impact of age on either scale-based or interview measures of depression ($\beta = -0.02$, SE = 0.01, $p > 0.05$ and $\beta = -0.01$, SE = 0.03, $p > 0.05$, respectively), or on PTSD ($\beta = -0.05$, SE = 0.11, $p > 0.05$). Unlike MAJOR2000, who grouped their participants according to five age categories when comparing minors (17 years old and younger) with adults (over 17 years old), QUINTON2001 found no effect of age on negative emotions at 2 years' follow-up ($F = 0.00$; 95% CI, 1.0 to 5.0, $p > 0.05$).

Furthermore, by grouping the women in this way QUINTON2001 also failed to show any effect of age on measures of post-abortion depression at 2 years' follow-up ($F = 0.23$; 95% CI, 0.0 to 4.0, $p > 0.05$). Findings were also mixed within the other two studies, with RUE2004 reporting that age was a significant predictor of PTSD within Russian women ($p = 0.01$), but not American. Finally, BROEN2005B found no relationship between age and measures of PTSD symptoms in their prospective study. However as they only presented results for significant factors, no further details were provided.

Findings from studies that were not specifically designed to assess the impact of age, and hence did not provide any statistical comparisons between age groups, also produced mixed findings. In their cross-sectional analysis of survey data, COUGLE2005 reported that women who had an abortion under the age of 20 years had slightly higher rates of anxiety symptoms (14.1%) than women over the age of 20 (12.8%). Converting this raw data into ORs indicated that there was no significant difference between age groups (OR = 1.15; 95% CI, 0.79 to 1.65, $p > 0.05$). However, caution must be exercised when considering this result because raw unadjusted data were used to produce these estimates. In contrast, when analysing retrospective data, PEDERSEN2008 reported that 21% of women aged 21 to 26 years experienced depression up to 11 years' post-abortion, compared with only 5% of women aged 15 to 20 years. ORs for the data indicated that this difference between the two age groups was significant (OR = 0.35; 95% CI, 0.12 to 1.01, $p = 0.05$). Analysis of medical records data also

produced unclear findings. REARDON2003A reported that up to 4 years after pregnancy, the rate of first-time psychiatric admissions per 10,000 increased as age at the time of the abortion increased. Rates of inpatient admissions ranged from 915.4 in every 10,000 at age 13 to 19 years, to 1,065.2 in every 10,000 at age 25 to 29 years and to 1,117.1 in every 10,000 at age 35 to 49 years.

Similarly, using the same dataset, COLEMAN2002A found that incidence rates of psychiatric outpatient treatment per 10,000 were greatest for women aged between 35 and 49 years at the time of the abortion (2,237.6) and lowest for women aged between 13 and 19 years (1,044.7). GISSLER2005 assessed suicide rates per 100,000 pregnancies for three different age groups (15 to 24, 25 to 34 and 35 to 49 years). Although the suicides rates increased with age (28.1, 33.1 and 37.7, respectively) no statistical analysis was conducted to compare these rates.

MUNK-OLSEN2011 reported, as an additional analysis, that age, in general, did not significantly affect the rate of psychiatric contact following an abortion. However, it was not possible to ascertain whether there were any differences between specific age groups because no further statistical comparisons were conducted. It was also unclear whether the factor being assessed within this and the majority of the studies was age at the time of the abortion or the present age of the women being interviewed.

Ethnicity

In total, five studies assessed the impact of ethnicity or immigrant status on post-abortion mental health outcomes. Of these five studies, three (MAJOR2000, RUSSO1997, SÖDERBERG1998) were designed to assess ethnicity, whereas the others (COUGLE2005, SCHMIEGE2005) provided raw percentages of women with post-abortion mental health outcomes grouped by ethnicity. In general, the findings for ethnicity were mixed, with studies varying as to whether ethnicity was a significant factor or not. Even within studies, ethnicity was associated with some outcomes but not others, such that belonging to a particular ethnic group was associated with an increased rate of one mental health diagnosis (for example, depression) but had no impact on a different diagnosis.

One prospective study found a mixed association between ethnicity and post-abortion well-being. MAJOR2000 indicated that ethnicity had an impact on post-abortion self-esteem at 2 years, with African–American women reporting higher self-esteem than other ethnic groups ($\beta = 0.25$, SE = 0.13, $p < 0.05$). Furthermore, ethnicity was linked to depression (as measured on the Brief Symptom Inventory Depression Interview), with Hispanic women scoring significantly higher at 2 years' follow-up ($\beta = 0.95$, SE = 0.32, $p < 0.01$). In contrast, however, results for depression (as measured on the Diagnostic Interview Schedule) and PTSD indicated that ethnicity did not have an effect on outcomes as reported at 2 years' follow-up.

Using data from the National Longitudinal Survey of Youth, both RUSSO1997 and SCHMIEGE2005 assessed the effect of ethnicity on post-abortion well-being. RUSSO1997 reported that when controlling for education, net family income and total number of children there was no evidence that ethnicity (in this case black versus white) had an impact on post-abortion self-esteem. Specifically, in their analysis, black women showed no evidence of better well-being following an abortion compared with white women ($F [2; 4,861] 0.27$, $p > 0.05$). Likewise, using the same dataset, SCHMIEGE2005 reported that 19.9% of white women compared with 32.5% of black women reported post-abortion depression. When converting these raw percentages into ORs, as with RUSSO1997, these results were not significant (OR = 1.54; 95% CI, 0.86 to 2.65, $p > 0.05$). In both cases, there was no control for previous mental health problems.

SÖDERBERG1998 assessed the factors associated with serious emotional distress following an abortion using a retrospective case-control approach. Within the analysis, individuals who were under 25 years old were analysed separately from those aged 25 and above. Their analysis indicated that women who experienced serious emotional distress did not differ in terms of immigration status (native Swedes or immigrants) when compared with a control group of women who did not experience serious emotional distress (OR = 1.2; 95% CI, 0.5 to 3.0, p >0.05 in the under-25 age group and OR = 1.1; 95% CI, 0.6 to 2.1, p >0.05 in the above-25 group).

Although not providing any statistical comparison of different ethnic groups, COUGLE2005 in part substantiated the findings of MAJOR2000 by indicating that ethnicity was associated with differing risks of post-abortion anxiety. COUGLE2005 reported that fewer black women developed post-pregnancy anxiety (6.0%) compared with white women (16.3%), Hispanic women (14.9%) and women of other ethnic backgrounds (24.2%). When converting the raw percentages into ORs, black women had significantly lower rates of anxiety when compared with white women (OR = 0.33; 95% CI, 0.19 to 0.57, p <0.001) and all other ethnic groups (OR = 0.31; 95% CI, 0.16 to 0.61, p <0.001). However it must be noted that as all studies assessing the impact of ethnicity have been conducted in the US the results may not be generalisable to the UK context.

Education

Five studies assessed the impact of education on an abortion-only group. Within their multiple regression analyses, both BROEN2006 and SÖDERBERG1998 found that level of education was inversely related to mean depression score at 5 years' post-abortion (p <0.05) and serious emotional distress in the under-25 group (p <0.05). That is, a lower level of education was significantly associated with higher depression scores and serious emotional distress. However, education was not associated with either anxiety or depression at 2 years' or anxiety at 5 years' post-abortion (BROEN2006), emotional distress in the 25 and over age group (SÖDERBERG1998), nor was it associated with measures of PTSD (BROEN2005B, RUE2004). Furthermore, a multiple regression conducted by RUSSO1997 found that education did not have an impact on levels of post-abortion self-esteem when focusing purely on women who reported an abortion. However, no further details about the results were reported.

Marital /relationship status

A number of studies assessed the impact of marital or relationship status on post-abortion mental health. BROEN2005B, BROEN2006, MAJOR2000, RIZZARDO1992, RUE2004 and RUSSO1997 all included marital status in their regression analyses of factors predicting post-abortion mental health. In all studies, marital status was not a significant predictor of any post-abortion outcomes. Specifically, both MAJOR2000 and RUSSO1997 failed to find an effect of marital status on self-esteem, with MAJOR2000, BROEN2005B and BROEN2006 also indicating that marital status was not associated with any measure of depression (BROEN2006, MAJOR2000), anxiety (BROEN2006) or PTSD (BROEN2005B, MAJOR2000, RUE2004), while RIZZARDO1992 indicated that marital status was not significantly related to general psychological symptoms, nor was having a good partner relationship.

In contrast, within their Chi-squared analysis, SÖDERBERG1998 indicated that having a transient relationship with the father was associated with serious emotional distress, but only within the above-25 age group (OR = 0.7; 95% CI, 0.3 to 1.8, p >0.05 in the under-25 age group and OR = 0.2; 95% CI, 0.1 to 0.5, p <0.001 in the above-25 age group).

Despite both using the National Longitudinal Survey of Youth, SCHMIEGE2005 and COUGLE2005 produced contrasting results when assessing the impact of marital status. SCHMIEGE2005 indicated that more unmarried white women exceeded the cut-off score for depression on the CES-D than married white women (30 and 16%, respectively). The same was true for black women (38 and 24% of unmarried and married women, respectively). However, only the difference between white women was statistically significant (OR = 0.46; 95% CI, 0.25 to 0.86, $p < 0.05$ and OR = 0.52; 95% CI, 0.19 to 1.39, $p > 0.05$, respectively). When considering all women included in their sample (regardless of ethnicity), REARDON2002B also failed to find a significant association between marital status and post-abortion depression, with 26.2% of married women and 28.7% of unmarried women meeting CES-D criteria (OR = 0.88; 95% CI, 0.53 to 1.48, $p > 0.05$). Although using the same data source, it must be noted that SCHMIEGE2005 additionally included women who had had an abortion pre-1979 in their analysis, whereas REARDON2002B restricted their sample to women with post-1979 abortions.

Finally, COUGLE2005, when analysing data from the National Comorbidity Survey, failed to find any association between marital status at time of first pregnancy and post-abortion anxiety, with 17.2% of married women and 13.5% of unmarried women meeting criteria (OR = 1.33; 95% CI, 0.66 to 2.69, $p > 0.05$). In all three studies, only raw percentages were provided. These were converted into ORs for the purpose of the present review.

Religion

Six studies (BROEN2005B, MAJOR2000, RUE2004, RUSSO1997, SCHMIEGE2005, SÖDERBERG1998), two of which used data from the same data source (RUSSO1997, SCHMIEGE2005), investigated the effect of religion on different measures of post-abortion mental health and produced mixed findings. When directly assessing the impact of having a religious affiliation for all women included in the analysis (for example, those with and without a history of abortion), RUSSO1997 found no relationship between religion and self-esteem ($F [5; 4,150] = 0.59$, $p > 0.05$). Furthermore, when assessing this relationship specifically in women with a history of abortion, having a religious affiliation was not predictive of post-abortion self-esteem. Using the same data source, SCHMIEGE2005 focused on Catholics. As with RUSSO1997, there was no association between having a Catholic religious affiliation and measures of post-abortion depression, with 21% of Catholic women compared with 27% of non-Catholic women meeting criteria (OR = 1.01; 95% CI, 0.64 to 1.59, $p > 0.05$).

In agreement with this finding, both BROEN2005B and MAJOR2000 entered religious affiliation into a regression model and found no relationship with any measure of post-abortion depression (MAJOR2000), self-esteem (MAJOR2000) or PTSD (BROEN2005B, MAJOR2000). Mixed findings were also apparent within the RUE2004 study, which found that religiosity was associated with PTSD within the Russian sample ($p = 0.0019$), but not within the US sample. In contrast, SÖDERBERG1998 indicated that being actively religious was associated with serious emotional distress ($p < 0.001$).

Income

Only RUSSO1997 investigated the effects of income on measures of self-esteem within an abortion specific group. After controlling for other contextual variables, income was not significantly associated with outcome. However, it was unclear from this retrospective study whether income was measured at the time of the abortion or at the time of follow-up.

Employment
The final demographic factor to be investigated in a number of studies was employment status. BROEN2006, RUE2004, RUSSO1997 and SÖDERBERG1998 failed to find any significant effect of employment on post-abortion depression and anxiety, PTSD, self-esteem or serious emotional distress. However, BROEN2004 indicated that vocational activity was associated with intrusion scores, with women working at home or in temporary employment scoring higher on this measure at 2 years' follow-up. However, vocational activity was not associated with any other symptom of PTSD at both 6 months' and 2 years' follow-up. As with income, it was unclear whether this relates to employment at the time of abortion or at the time of follow-up.

Reason for abortion
BROEN2005B aimed to investigate whether certain reasons for abortion were associated with post-abortion mental health within their prospective study. The authors conducted a multiple regression analysis, which included a number of reasons for abortion that were correlated with measures of PTSD symptoms. Of all the reasons entered into the analysis, only 'pressure from male partner' was significantly associated with both measures of intrusion and avoidance at 6 months' and 2 years' follow-up (intrusion: $\beta = 0.27$, $p < 0.05$ and $\beta = 0.32$, $p < 0.01$; avoidance $\beta = 0.34$, $p < 0.01$ and $\beta = 0.24$, $p < 0.05$, respectively). Pressure from friends was associated with higher intrusion and avoidance scores at 6 months ($\beta = 0.25$, $p < 0.05$; $\beta = 0.31$, $p < 0.01$) but not at 2 years. Likewise, for both the Russian and American women included in the RUE2004 retrospective survey, pressure from others was not significantly associated with total PTSD scores.

Social, partner and professional support
Four studies assessed the impact of level of social support (SÖDERBERG1998), partner support (RIZZARDO1992, SÖDERBERG1998), having a confidante (RIZZARDO1992), the partner's level of agreement with the abortion decision (COYLE2010), the quality of the relationship with the partner and/or father (SÖDERBERG1998), and the adequacy of pre-abortion counselling (COYLE2010).

Using a retrospective internet survey, COYLE2010 assessed the relationship between PTSD symptoms and agreement between partners regarding the abortion. Within their analysis they controlled for a number of factors such as race, education, previous abuse and mental health counselling prior to the abortion. Although the effect of disagreement between partners was attenuated by controlling for these factors, it was still linked to a significant increase in PTSD scores ($\beta = 0.64$, $SE = 0.32$, $p < 0.05$). Likewise, women who perceived their pre-abortion counselling to be inadequate also scored significantly higher on measures of PTSD, despite controlling for a number of factors ($\beta = 1.34$, $SE = 0.57$ $p < 0.05$). Similar findings were also obtained by SÖDERBERG1998 whose analysis demonstrated that for both age groups (under 25 and above 25) poor social support from family and friends was associated with serious emotional distress ($p < 0.001$). Mixed findings across age groups were obtained for support from the attending gynaecologist and for the quality of the relationship with the partner. Poor gynaecologist support was significantly associated with serious emotional distress in younger women (OR = 3.9; 95% CI, 1.3 to 11.9, $p < 0.001$) but not in those aged 25 and over (OR = 0.6; 95% CI, 0.2 to 1.8, $p > 0.05$). Conversely, a poor relationship with a partner was significantly related to emotional distress in older women (OR = 2.0; 95% CI, 1.03 to 3.9, $p < 0.001$), but not in those under 25 (OR = 1.1; 95% CI, 0.5 to 2.5, $p > 0.05$).

In contrast, RIZZARDO1992 found no significant relationship between partner support and measures of psychological distress at 3 months' post-abortion. However, their prospective study did indicate that having a confidante was significantly associated

with improvements in psychological symptoms when comparing pre- and post-abortion measures (p = 0.049). Similarly, the partner's supportiveness of the decision to abort was not significantly associated with measures of PTSD within both samples included in RUE2004. As with COYLE2010, RUE2004 did demonstrate that a lack of pre-abortion counselling was associated with increased PTSD symptoms, however, this was only significant for the Russian women included in the study (p = 0.031).

Negative attitudes and reactions to abortion

One prospective study (BROEN2006), one study utilising both prospective and retrospective reporting (FERGUSSON2009) and three retrospective studies (CONGELTON, RUE2004, SÖDERBERG1998) investigated the effects of negative attitudes towards abortion in general (risk factor) and/or the effects of negative emotional reactions to the abortion (predictive factor) on post-abortion mental health. The studies considered feelings such as relief, distress, emptiness, grief, anger, guilt, loss and doubt that were experienced by women when asked about their abortion.

RUE2004 specifically assessed the impact of whether or not the women believed it was their right to have an abortion. Within the American sample, where women felt it was not their right to have an abortion, this was significantly associated with higher rates of PTSD. However, this relationship was not apparent within the Russian sample. Furthermore, believing abortion to be morally wrong was not significantly associated with PTSD in either sample. SÖDERBERG1998 retrospectively assessed negative attitudes towards abortion within their case-control study. Negative attitudes towards abortion were significantly associated with serious emotional distress in both the under-25 age group (OR = 18.2; 95% CI, 3.8 to 88.1, p <0.001) and the over-25 age group (OR = 7.9; 95% CI, 3.4 to 18.1, p <0.001).

Similarly, BROEN2006 found that women reporting negative attitudes towards abortion at the time of the procedure had significantly more anxiety at 6 months' (p <0.01), 2 years' (p <0.05) and 5 years' (p <0.05) follow-up (based on the HADS) compared with those with no negative attitudes towards the abortion. However, negative attitudes were not significantly related to depression at any time point. In contrast, negative reactions to the abortion (such as doubt at the time) were associated with increased depression at 2 years' (p <0.05), but not at 5 years' follow-up. At both time points, doubt was not a significant predictor of anxiety. In all cases, no indication was given about the precision of these results.

Similarly, FERGUSSON2009 examined the association between emotional reactions to abortion and post-abortion mental health outcomes in a longitudinal cohort study, utilising both prospective and retrospective reporting. Retrospective reporting of reactions to abortion was used as a predictor of subsequent mental health problems across a range of diagnostic categories. In general, the study demonstrated a linear relationship between increased distress (as measured by an increased number of negative emotions following an abortion) and higher incidence rates of post-abortion mental health problems.

Specifically, when compared with women who did not report any negative reactions to their abortion, the incidence rate ratios (IRR) indicated a 23% and 51% increase in the rate of developing a mental health problem for women reporting one to three and four to six negative emotions, respectively (IRR = 1.23; 95% CI, 1.00 to 1.51 and IRR = 1.51; 95% CI, 1.01 to 2.27) Although not providing any statistical comparisons, this increase in rates was more pronounced for depression, anxiety and suicidal ideation in comparison with drug and alcohol dependence. In contrast, there was no relationship between positive emotions and post-abortion mental health problems.

CONGEL2009 conducted a retrospective cohort study to compare the mental health outcomes and characteristics of self-identified distressed and non-distressed women following an abortion. To be included in the study, women indicated that their response to the abortion was one of distress. Scores on the IES (a measure of PTSD) at the time of maximum distress following the abortion and at the present time were compared for the distressed and non-distressed groups. Data were also provided on current global symptoms (as measured by the GSI) and whether or not the women had counselling following the abortion. Analysis conducted for the purpose of this review indicated that those women who reported negative feelings of distress following the abortion scored higher on a measure of PTSD at both the present time and at the most distressing time (standardised mean difference [SMD] = 0.63; 95% CI, 0.02 to 1.23 and SMD = 1.26; 95% CI, 0.61 to 1.91, respectively) and were more likely to seek counselling for the abortion (64% compared with 0%, respectively).

Results also indicated that distressed women scored significantly higher on the GSI (SMD = 0.78; 95% CI, 0.16 to 1.39), however, the authors noted that the mean group scores did not indicate psychological distress in either group. Despite assessing differences in the characteristics of women who self-identified as distressed compared with those who did not experience this negative reaction, the authors did not control for these differences within their analysis of mental health outcomes. Furthermore, the study relied on self-reported retrospective data about their feelings at the time of the abortion and included a self-selected small sample of women, which might have affected the generalisability of the results.

Life events

The impact of life events (such as experiencing serious illness, an accident, a break-up with a partner or a death of immediate family or friends) following an abortion were investigated prospectively by BROEN2006. Their results indicated that if women experienced an increased number of life events during the year of follow-up (1 to 2 years after the abortion), this was associated with increased HADS anxiety scores ($p < 0.001$) as measured at 2 years' follow-up. Furthermore, if women experienced at least three life events in the year of the assessment (4 to 5 years after the abortion) this was also associated with higher level of anxiety as measured at 5 years' follow-up. However, life events were not significantly associated with depression at either time point.

Other pregnancy-related factors

A number of studies either directly or indirectly tested the effect of other pregnancy factors on post-abortion mental health outcomes. Studies included in this section assessed history of multiple abortions, abortion and subsequent pregnancies, previous abortion and/or births, or abortion and delivery regardless of timing of each pregnancy event. Four studies also assessed the impact of the timing of the abortion.

Multiple abortions

Both STEINBERG2008study1 and STEINBERG2008study2 assessed the impact of multiple abortions on measures of post-abortion anxiety, whereas in STEINBERG2011Astudy2 the relationship between multiple abortions and mood disorders, anxiety disorders and substance-use disorders were assessed. Two overlapping samples of women were used in STEINBERG2008study1, one that included all women with a first pregnancy regardless of whether or not the pregnancy was planned and a second sample that only included women with an unplanned first pregnancy. In both cases, women who reported one abortion were compared with those reporting two or more abortions.

Despite the difference in anxiety rates not being significant when assessing the impact of multiple abortions alone without controlling for any confounding factors (unplanned pregnancy OR = 1.22; 95% CI, 0.92 to 1.62, p = 0.16 and all pregnancies OR = 1.24; 95% CI, 0.96 to 1.59, p = 0.10), when covariates were controlled for including pre-pregnancy anxiety, sociodemographics and the experience of rape, there was a positive association between the number of abortions and post-abortion anxiety (unplanned pregnancy OR = 1.40; 95% CI, 1.00 to 1.95, p = 0.05 and all pregnancies OR = 1.34; 95% CI, 1.00 to 1.80, p = 0.05).

Mixed findings were also reported in both STEINBERG2011Astudy2 and STEINBERG2008study2, which utilised data from the National Comorbidity Survey. STEINBERG2011Astudy2 demonstrated that multiple abortions were only significantly associated with increased rates of anxiety disorders and not mood disorders or substance-use disorders when no risk factors were controlled for (mood disorders OR = 1.4, 95% CI, 0.5 to 3.9, p >0.05; anxiety disorders OR = 2.1, 95% CI, 1.2 to 3.6, p <0.05 and substance-use disorders OR = 2.5, 95% CI, 1.0 to 6.26, p <0.1). When prior risk factors such as previous mental health problems and violence were accounted for, the difference in anxiety disorders was no longer significant, although there was now a significant difference in substance-use disorders (mood disorders OR = 0.9; 95% CI, 0.3 to 2.7, p >0.05; anxiety disorders OR = 1.4; 95% CI, 0.7 to 2.7, p >0.05 and substance-use disorders OR = 2.8; 95% CI, 1.0 to 7.8, p <0.05). Finally, when all risk factors were taken into account, none of the differences in mental health rates in women who had one abortion or multiple abortions remained significant (mood disorders OR = 0.8; 95% CI, 0.3 to 2.7, p >0.05; anxiety disorders OR = 1.5; 95% CI, 0.8 to 2.9, p >0.05 and substance-use disorders OR = 3.0; 95% CI, 0.9 to 9.7, p >0.05).

Unlike the 2011 study, STEINBERG2008study2 assessed a range of anxiety disorders in a sample of women who had not previously experienced anxiety. Results indicated that multiple abortions were associated with increased social anxiety (OR = 2.20; 95% CI, 1.24 to 3.88, p <0.01), but were not statistically significant for PTSD (OR = 2.84; 95% CI, 0.93 to 11.90, p = 0.07) or GAD (exact OR not reported). However, within this analysis, there was no control for covariates including demographics, experience of rape or number of births, and the CIs were wide. When controlling for these covariates, the positive association between social anxiety and multiple abortions was no longer significant (OR = 1.96; 95% CI, 0.83 to 4.62, p = 0.12).

History of abortion and/or pregnancy

Three prospective cohort studies assessed the impact of a history of abortion and/or pregnancy, and produced mixed findings. BROEN2005B and BROEN2006 included the number of previous abortions, number of children and whether the women was pregnant between 'time 2' (6 months) and 'time 4' (5 years) in their regression analyses. For both anxiety and depression none of the variables was found to be a significant predictor at any time point. However, BROEN2005B reported that having one child was associated with higher rates of avoidance at 2 years (β = 0.25, p <0.05) but not at 6 months, and was not related to intrusion at any time point. Similarly, MAJOR2000 collected information on both prior births and abortions within their prospective cohort study. Although prior births were associated with a decreased rating of post-abortion relief, decision satisfaction and benefit appraisal, neither prior births nor prior abortions were significantly associated with increased levels of depression or PTSD at 2 years' follow-up. Finally, neither a history of previous abortions nor pregnancy was related to scores on the GSI measure of psychological distress within the RIZZARDO1992 sample.

Although the adjusted ORs reported in the study did not directly compare women who had an abortion with women who had a history of delivery and abortion, PEDERSEN2007

reported the percentages of women with self-reported alcohol problems or illegal substance misuse in each group. These data were used to calculate the ORs within this review. The findings indicated that women who reported both a delivery and an abortion had significantly lower rates of alcohol problems, illegal substance misuse and use of cannabis compared with women who only reported a history of abortion (OR = 0.38; 95% CI, 0.15 to 0.98, OR = 0.21; 95% CI, 0.04 to 0.96 and OR = 0.19; 95% CI, 0.06 to 0.60, respectively). One of the main limitations of these findings was that it was not possible to distinguish the relative timings of events, for example whether the abortion preceded the delivery or vice versa. Furthermore, because raw percentages have been used to estimate the ORs, the findings did not control for any confounding variables, including previous substance misuse problems and multiple abortions, which may have an impact on results.

REARDON2002A assessed the suicide rates associated with a number of multiple pregnancy outcomes. Using medical records, women were categorised into the following groups: abortion only, abortion followed by delivery or delivery followed by abortion. Suicide rates ranged from 16.3 to 62.8 per 100,000 across the three groups; however, none of the pair-wise comparisons indicated a significant difference in rates between groups.

REES2007 analysed data from the Fragile Families and Child Wellbeing Study to assess the impact of multiple pregnancy outcomes on depression. All of the women included in the study had previously given birth. REES2007 further distinguished between women who went on to have subsequent pregnancy outcomes, including abortion, birth or miscarriage: 31.6% of women who reported having an abortion only compared with 37.8% women who reported having an abortion followed by a delivery met criteria for depression, a difference that was not significant (OR = 0.75; 95% CI, 0.36 to 1.57, p >0.05). Information was also available for women who had had an abortion and miscarriage or a miscarriage and birth, however, the numbers included in each group were too low to allow for any further analysis (n <5). Given that all women included in the study had previously given birth, it was also unclear how generalisable these findings were to the other studies included in the review. One more retrospective study assessed the impact of the number of children and abortions at any time point. RUSSO1997 reported that neither the number of children nor the number of abortions was associated with changes in or lower post-abortion self-esteem.

History of child birth and/or number of children

Two studies specifically assessed the impact of previous childbirth on post-abortion mental health. MUNK-OLSEN2011 reported that parity status (prior history of childbirth) was not significantly associated with an increased risk of a psychiatric contact following an abortion. The only data provided were p-values (p = 0.09). RUE2004, in contrast, produced mixed findings. Within their retrospective survey, having more children was associated with significant increases in PTSD within the Russian women (p = 0.031), even when factors such as sexual abuse, physical abuse and rape were controlled for. However, this relationship was not apparent within the American sample included in the study, where number of children was not significantly associated with PTSD.

Timing of the abortion

Four studies (BROEN2005B, COLEMAN2010, RUE2004, SÖDERBERG1998) assessed the timing of pregnancy on measures of PTSD and serious emotional distress. In their prospective cohort study, BROEN2005B indicated that symptoms of PTSD were not related to length of pregnancy or previous abortions. In contrast, in an internet survey conducted by COLEMAN2010, women who had had a late abortion (13 to 30 weeks) were

significantly more likely to have met DSM-IV criteria for PTSD compared with those who had had an early abortion (up to 12 weeks: OR = 2.04; 95% CI, 1.09 to 3.83, p = 0.03), a finding partially substantiated by SÖDERBERG1998, who indicated that a second-trimester abortion was associated with serious emotional distress within the under-25 age group (p <0.001) but not in the 25 and over age group (OR = 4.1; 95% CI, 0.5 to 31, 0.8, p >0.05) partly due to the small sample size and wide CIs. Finally, RUE2004 indicated that a later abortion was significantly associated with PTSD scores within the Russian (p = 0.001) but not American sample included in the study.

Medical complications following abortion

Only two studies (MAJOR2000, RUE2004) assessed the impact of medical complications on post-abortion mental health. In MAJOR2000, the findings suggested that for all measures of post-abortion well-being (self-esteem, depression and PTSD), medical complications following the abortion were not associated with differences in outcome. In contrast, RUE2004 indicated that experiencing health complications was significantly associated with post-abortion PTSD within the Russian sample (p <0.01). However, it was unclear whether these health complications were related to the abortion procedure or to general health complications. Furthermore, this relationship was not apparent in the American sample.

A summary of all factors considered is shown in Table 14.

Table 14: Summary of factors associated with post-abortion mental health outcome

Factor	Mental health outcome	Positive	Negative	Neutral	No statistical comparison
Previous mental health problems	Depression	3	-	-	-
	Anxiety	1	-	1	-
	PTSD	1	-	1	-
	Psychological symptoms	1	-	-	-
	Total*	**6**	**0**	**2**	**0**
Previous self-esteem	Self-esteem	-	1	-	-
	Total	**0**	**1**	**0**	**0**
Age	Depression*	1	-	2	-
	PTSD	-	-	1	-
	Anxiety	-	-	1	-
	Psychiatric treatment	-	-	-	-
	Suicide	-	-	-	1
	Total	**1**	**0**	**6**	**1**
Ethnicity	Self-esteem	-	-	1	1a
	Depression*	-	-	2	1 b
	PTSD	-	-	1	-
	Anxiety	-	-	-	1 c

Factor	Mental health outcome	Positive	Negative	Neutral	No statistical comparison
	Serious emotional distress	-	-	1	-
	Total	**0**	**0**	**5**	**3**
Education	Depression*	-	1	1	-
	Anxiety	-	-	1	-
	Self-esteem	-	-	1	-
	PTSD	-	-	2	
	Serious emotional distress	-	-	1	-
	Total*	**0**	**1**	**6**	**0**
Marital/ relationship status	Depression	-	-	2	1 d
	Anxiety	-	-	1	-
	PTSD	-	-	2	
	Serious emotional distress	-	-	1	-
	Psychological symptoms	-	-	1	-
	Total*	**0**	**0**	**7**	**1**
Religion	Self-esteem	-	-	2	-
	Depression	-	-	2	-
	PTSD	-	-	3	-
	Serious emotional distress	-	1	-	-
	Total *	**0**	**1**	**7**	**0**
Income	Self-esteem	-	-	1	-
	Total	**0**	**0**	**1**	**0**
Employment	Self-esteem	-	-	2	-
	Depression	-	-	1	-
	PTSD	-	-	3	-
	Serious emotional distress	-	-	1	-
	Total*	**0**	**0**	**7**	**0**
Reasons for abortion					
Pres from partn	PTSD	1	-	-	-
	Total	**1**	**0**	**0**	**0**
Pressure m friends	PTSD	-	-	1	-
	Total	**0**	**0**	**1**	**0**

Factor	Mental health outcome	Positive	Negative	Neutral	No statistical comparison
Negative attitudes to abortion	Depression	-	-	1	-
	PTSD	1	-	1	-
	Anxiety	1	-	-	-
	Serious emotional distress	1	-	-	-
	Total	**3**		**2**	
Pre-abortion support					
Social and partner support	PTSD	-	-	1	-
	Serious emotional distress	-	1	-	-
	Psychological symptoms	-	-	1	-
	Total	**0**	**1**	**2**	**0**
Professional support or counselling	PTSD	-	1	1	-
	Serious emotional distress	-	-	1	-
	Total	0	1	2	0
Partner agreement	PTSD	1	-	-	-
	Total	**1**	**-**	**-**	**-**
Negative reactions to abortion	Depression	-	-	1	-
	Anxiety	-	-	1	-
	General symptoms / mental health problems	1	-	-	-
	PTSD	2	-	-	-
	Counselling	1	-	-	-
	Total*	**4**	**0**	**2**	**0**
Life events	Anxiety	1	-	-	-
	Depression	-	-	1	-
	Total*	**1**	**0**	**1**	**0**
Other pregnancy outcomes					
Multiple abortions	Anxiety	1	-	2	-
	PTSD	-	-	2	-
	GAD	-	-	1	-
	Social anxiety	-	-	1	-
	Depression	-	-	2	-

Factor	Mental health outcome	Positive	Negative	Neutral	No statistical comparison
	PTSD	-	-	1	-
	Substance-use disorder	-	-	1	-
	Psychological symptoms	-	-	1	-
	Total*	**1**	**0**	**11**	**0**
Number of children	Depression	-	-	3	-
	Anxiety	-	-	1	-
	PTSD	1	-	2	-
	Alcohol use	-	-	-	1 e
	Cannabis use	-	-	-	1 e
	Illicit drug use	-	-	-	1 e
	Psychiatric contact	-	-	1	-
	Total*	**2**	**0**	**7**	**3**
Previous pregnancies	Psychological symptoms	-	-	1	-
	Total	**0**	**0**	**1**	**0**
Pregnancy length	PTSD	1	-	2	-
	Serious emotional distress	-	-	1	-
	Total*	**1**	**0**	**3**	**0**
Medical complications	Depression	-	-	1	-
	PTSD	-	-	2	-
	Self-esteem	-	-	1	-
	Total*	**0**	**0**	**4**	**0**

Key: positive relationship indicates that increasing the factor increases the risk of mental health problems, in the case of ethnicity a positive relationship indicates that a certain ethnicity is associated with an increased risk; negative relationship indicates that reducing the factor increases the risk of mental health problems; neutral indicates that the factor has no statistically significant effect on mental health or produced mixed findings; no statistical comparison indicates that a statistical comparison was not possible with the data reported.
* Includes studies/ findings using the same data source/study.
a African–American women had significantly higher self-esteem than women of other ethnicities.
b Hispanic women had significantly higher depression scores than women of other ethnicities.
c Black women had significantly lower levels of anxiety than women of other ethnicities.
d Unmarried white women had higher rates of depression compared with married white women.
e Women who had an abortion and delivery reported lower rates than women who reported only an abortion.

4.3.3 Limitations

A number of limitations that restrict the generalisability of these findings warrant discussion. Many of the studies included in the review were not specifically designed to assess factors predictive of post-abortion mental health. Instead, studies compared women with a history of abortion with women with a history of either a delivery or no abortion. In these cases, only limited information regarding the relationship between a particular factor and mental health outcomes for women who had had an abortion was available.

Additionally, a number of studies (COLEMAN2002A, COLEMAN2009B, COUGLE2005, GILCHRIST1995, PEDERSON2007, PEDERSON2008, REARDON2002B, REARDON2003A, REES2007, SCHMIEGE2005) only reported raw data (for example, percentages) when assessing the impact of a factor, without reporting any useable statistical analysis (for example, ORs or regression coefficients). Throughout the review, where possible, raw percentages have been used to calculate ORs. However, these ORs are reported without controlling for confounding variables. Therefore results from these studies need to be treated with caution.

One of the most common limitations across the individual studies was a lack of adequate control for potential confounding variables, with a proportion of the included studies only assessing the impact of one or two factors. Although a number of studies employed logistic regression models to control for potential confounders, in total, only 11 studies adequately controlled for other factors in addition to previous mental health problems (BROEN2006, COYLE2010, FERGUSSON2009, GILCHRIST1995, MAJOR2000, PEDERSEN2007, RUE2004, RUSSO1997, STEINBERG2008study1, STEINBERG2008study2, STEINBERG2011Astudy2). Even where studies did attempt to control for previous mental health problems, this control was often inadequate, such as including a limited time frame for detecting mental health problems (for example, 1 year before the abortion), assessing mental health outcomes at times of heightened stress (such as immediately before the procedure) and using medical records that rely on individuals seeking treatment.

The STEINBERG studies demonstrated that controlling for risk factors, such as previous violence and abuse, reduces the significance of the reported associations, whereas COYLE2010 found that controlling for risk factors attenuated the findings, which, nevertheless, remained significant. Furthermore, control for previous and subsequent pregnancy events was very limited and differed greatly across studies. The lack of confounder control was particularly pronounced for studies that did not statistically assess the relationship between a specified factor and post-abortion mental health. Where studies did not control for potential confounding variables, the impact of any one factor was impossible to determine with confidence.

Only seven of the studies included in the review adopted a prospective design (BROEN2005B, BROEN2006, GILCHRIST1995, MAJOR2000, MUNK-OLSEN2011, QUINTON2001, RIZZARDO1992). Instead, many studies used retrospective and self-report measures to assess reactions to, and mental health outcomes following, an abortion. Not only is self-report data open to social desirability bias, the accuracy of recalled data is also limited. Where studies did utilise a prospective design, attrition data was limited, with only MAJOR2000 and QUINTON2001 providing statistical analysis comparing women who did not remain in the study with those who were followed up at all time points.

In addition to the limitations of the individual studies discussed above, there are also a number of limitations of the dataset as a whole. One of the main limitations relates to the high degree of heterogeneity, which meant that meta-analysis was not possible. Heterogeneity in sampling and variable selection led to different studies producing mixed findings for the same factor, even when using the same data source. For instance, MAJOR2000 and QUINTON2001 both utilised the same prospective data source yet produced contrasting results on the impact of age on post-abortion mental health. In this case, MAJOR2000 divided the sample into five age groups, whereas QUINTON2001 only divided women into adults and minors (aged <18). Heterogeneity was also apparent in the methods used to measure pre- and post-abortion mental health. For example, FERGUSSON2009 and MAJOR2000 relied on modifications of validated scales, but with no standardised algorithm for determining clinical diagnosis, whereas other studies (COLEMAN2002A, REARDON2002A, REARDON2003A) used medical claim databases or clinical diagnosis (GILCHRIST1995) to assess mental health.

Another source of heterogeneity is the variation in follow-up times, with the time between abortion and mental health outcome often unclear, particularly in studies utilising a cross-sectional design. Within these studies, women who had recently experienced an abortion were included in the analysis alongside women who had experienced an abortion up to 20 years previously. In many of the studies it was also hard to ascertain the exact timing of the factor in relation to the abortion, particularly where mental health outcomes, abortion status and factors such as demographics or pregnancy history were all measured retrospectively or cross-sectionally. Moreover, the precise significance of depression or other mental health problems several years post-abortion was unclear, particularly where long periods of time had elapsed.

The heterogeneity inherent in the data and the selective reporting of data meant that meta-analysis was not appropriate. For example, even where multiple studies assessed the same factors and mental health outcomes, meta-analysis was not appropriate because studies frequently reported data for only the significant findings. Factors that were not significant were only reported in the text, without the appropriate data required for meta-analysis.

Cultural, social and clinical practices vary both geographically and historically. Only one study was conducted within the UK, and was conducted over 15 years ago. Studies included in the review were often conducted within the US and many included small or unrepresentative samples, thus limiting the generalisability of the results.

Finally, it is important to note that the list of potential risk factors reviewed here is not exhaustive. A number of other factors such as exposure to violence (COLEMAN2009B, RUSSO2001, TAFT2008), child abuse (RUSSO2001, STEINBERG2011A, STEINBERG2011B), housing conditions (BROEN2005B) and coping mechanisms (QUINTON2001) may be associated with variations in post-abortion mental health. Furthermore, factors associated with a particular mental health outcome, for example depression, may not necessarily be associated with an alternative outcome such as psychosis.

4.3.4 Factors associated with mental health problems following birth or pregnancy

In 2007, NICE published a clinical guideline on antenatal and postnatal mental health (NCCMH, 2007). The guideline conducted a systematic review of the best available evidence (large-scale prospective studies and existing systematic reviews) that assessed the mental health outcomes for women following a birth. The following factors were identified as important risk factors for developing a range of mental health problems following a live birth including depression, puerperal psychosis, anxiety disorders and eating disorders:

- a history of mental health problems both before and during the pregnancy
- low social support
- exposure to recent life events
- low self-esteem
- childcare difficulties
- relationship status
- 'neuroticism'
- birth complications
- marital discord
- obstetric factors
- socioeconomic status
- age at time of pregnancy
- a family history of depression.

4.4 Evidence Statements

1. The evidence base reviewed above is restricted by a number of limitations including heterogeneity in the factors assessed and the outcomes reported, inconsistent reporting of non-significant factors and variations in follow-up times.
2. When considering prospective studies, the only consistent factor to be associated with poor post-abortion mental health was pre-abortion mental health problems.
3. The most reliable predictor of post-abortion mental health problems regardless of study type was having a history of mental health problems prior to the abortion. A history of mental health problems was associated with a range of post-abortion mental health conditions, irrespective of outcome measure or method of reporting used.
4. A range of other factors have more inconsistent results, although there was some limited evidence that life events, negative attitudes towards abortion, pressure from a partner to have an abortion and negative reactions to the abortion including grief or doubt, may have a negative impact on mental health.
5. The lack of UK-based studies further reduces the generalisability of the data.
6. It is likely that a range of factors may be associated with variations in mental health outcomes following an abortion and that those reviewed here did not constitute an exhaustive list.
7. There was an overlap in the risk factors associated with mental health problems following an abortion and those factors associated with mental health problems following a live birth.

5 MENTAL HEALTH OUTCOMES FOR WOMEN FOLLOWING ABORTION COMPARED WITH FOLLOWING A DELIVERY

5.1 Review Question

Are mental health problems more common in women who have an induced abortion when compared with women who deliver an unwanted pregnancy?

This chapter assesses the mental health outcomes of women who have had an abortion compared with women who delivered a live birth. As discussed in Section 2.3, no ideal comparison group exists; therefore, women who delivered an unwanted or unplanned pregnancy were considered the best alternative. Studies that did not account for whether the pregnancy was planned or wanted are reviewed first (Section 5.3), and then studies that did account for pregnancy intention are reviewed second (Section 5.4).

5.2 Studies Considered

Fifteen[5] studies that compared mental health outcomes for women who have an abortion with those who deliver a live birth met the eligibility criteria for the review. Of the 15 included studies, 12 compared women who had an abortion with those who delivered, without accounting for whether the pregnancy was wanted or planned; three considered unplanned pregnancies; and one considered unwanted pregnancies. Two studies that used the same data source within their analysis (COUGLE2005, STEINBERG2008study1) and examined the same mental health outcomes were included in the narrative review for completeness. In addition, 166 studies were excluded from the review. The most common reason for exclusion was that the outcomes were measured less than 90 days after an abortion or there was an inadequate comparison group. Further details about the excluded studies, with reasons for exclusion, can be found in Appendix 7.

5.3 Abortion Versus Delivery: Studies That Did Not Account For Whether The Pregnancy Was Planned Or Wanted

5.3.1 Study characteristics

The studies in this section compare mental health outcomes for women who had an abortion with those who had a delivery, without accounting for whether the pregnancy was wanted or planned. Details of the included studies can be seen in Table 15. The 12 studies included in this review analysed data drawn from seven separate data sources. One study (MUNK-OLSEN2011) utilised a prospective cohort design to follow-up women who either had a first abortion or gave birth to a first pregnancy during a set time period. Five studies analysed retrospective or cross-sectional data collected as part of four national longitudinal cohort surveys: the National Survey of Family Growth (STEINBERG2008study1); the National Comorbidity Survey (STEINBERG2008study2, STEINBERG2011Astudy2, STEINBERG2011B); the National Longitudinal Study of Adolescent Health (WARREN2010); and the Young in Norway Longitudinal Study (PEDERSEN2007, PEDERSEN2008). One study, which analysed data obtained from the Christchurch Health and Developmental Study (FERGUSSON2006), utilised both

[5]Includes one paper that presents [illegible]studies; these' to 'reports two studies, one of which includes two samples. These that did not control for pregnancy intention (included in the first review in this chapter) and one that did control for pregnancy intention (included in the second review of this chapter), and STEINBERG2008study2. The studies varied as to the data sources and populations used within the analyses.

prospective and retrospective reporting within their analysis. The final three studies included in the review utilised data obtained from Californian medical and death records, linking pregnancy outcomes to subsequent treatment claims and suicides (COLEMAN2002A, REARDON2002A, REARDON2003A).

Across the studies a range of post-abortion mental health outcomes were assessed including depression (COLEMAN2002A, PEDERSEN2008, REARDON2003A, STEINBERG2011Astudy2, STEINBERG2011B, WARREN2010), anxiety (COLEMAN2002A, STEINBERG2008study1, STEINBERG2008study2, STEINBERG2011Astudy2), psychiatric treatment (COLEMAN2002A, MUNK-OLSEN2011, REARDON2003A), PTSD (STEINBERG2008study2), GAD (STEINBERG2008study2), alcohol and drug misuse (COLEMAN2002A, PEDERSEN2007, STEINBERG2011Astudy2), suicide and/or suicidal ideation (REARDON2002A, STEINBERG2011B), bipolar disorder (COLEMAN2002A, REARDON2003A), schizophrenia and related disorders (COLEMAN2002A, REARDON2003A), non-organic psychoses (COLEMAN2002A, REARDON2003A) and any DSM psychiatric disorder (FERGUSSON2006). The measurement methods used to assess mental health outcomes also differed across studies, with methods varying from clinical diagnosis to medical treatment records.

In addition to the variation in outcomes measures, studies also differed in the ways in which they controlled for previous mental health problems. Three studies (COLEMAN2002A, MUNK-OLSEN2011, REARDON2003A) excluded those with a history of mental health problems from the analysis. In contrast, nine studies (FERGUSSON2006, PEDERSEN2007, PEDERSEN2008, REARDON2002A, STEINBERG2008study1, STEINBERG2008study2, STEINBERG2011Astudy2, STEINBERG2011B, WARREN2010) presented both unadjusted and adjusted ORs that controlled for previous mental health problems in addition to other confounding factors such as demographic information, number of pregnancies and a history of rape.

Table 15: Summary characteristics of studies that did not control for whether the pregnancy was wanted or planned

Study ID and study design	**Numbers, participant, characteristics and country**	**Comparison**	**Outcome, measure and mode of administration**	**Follow up**	**Study quality** (Charles review rating)
National longitudinal cohort studies					
WARREN2010 Retrospective	n = 69. Women reporting an abortion who completed the National Longitudinal Study of Adolescent Health n = 220. Women reporting a pregnancy ending in a live birth. US	Abortion versus delivery	Depression CES-D *Self-administration*	1 – 5 years	Good

Study ID and study design	Numbers, participant, characteristics and country	Comparison	Outcome, measure and mode of administration	Follow up	Study quality (Charles review rating)
FERGUSSON 2006[6] Retrospective (with some prospective data)	n = 51. Women from the Christchurch Health and Developmental Study. Longitudinal cohort study of children who had an abortion. New Zealand n = 84. Women reporting a pregnancy ending in a live birth	Abortion versus delivery	Any mental health problems Questionnaire based on CIDI and Assessment of Diagnosis Interview Schedule for Children (DISC at age 16 only) *Interview*	5-year lagged model	Good
Young in Norway Longitudinal Survey					
PEDERSEN2008 Retrospective PEDERSEN2007 Retrospective	n = 76 to 125. Women from the Young in Norway Longitudinal cohort study reporting an abortion n = 183. Women who had a live birth	Abortion versus delivery	Depression, Kandals and Davies Depressive Mood Inventory Substance abuse *Self-report*	Up to 11 years Up to 11 years	Good Good
National Survey of Family Growth					
STEINBERG 2008study1 Cross-sectional	n = 1,236. Women who took part in the National Survey of Family Growth and reported a first pregnancy ending in induced abortion. US n = 5,458. Women reporting a first pregnancy ending in a live birth. US	All first pregnancies: abortion versus delivery	Experience of anxiety symptoms reflective of DSM-IV criteria for GAD *Interview*	Cross-sectional	Very good

[6] Includes data obtained from personal correspondence with the authors.

Study ID and study design	Numbers, participant, characteristics and country	Comparison	Outcome, measure and mode of administration	Follow up	Study quality (Charles review rating)
National Comorbidity Survey					
STEINBERG 2008study2 Cross-sectional	n = 273. Women who completed National Comorbidity Survey and reported a first pregnancy ending in abortion. US n = 1,549. Women reporting a first pregnancy ending in a live birth	All first pregnancies: abortion versus delivery	GAD Social phobia Anxiety UM-CIDI *Interview*	Cross-sectional	Good
STEINBERG 2011Astudy2 Cross-sectional	n = 303. (Unweighted). Women who completed the National Comorbidity Survey and reported a first pregnancy ending in abortion. US n = 91. (Unweighted). Women reporting multiple abortions n = 1,671. (Unweighted). Women reporting a first pregnancy ending in a live birth	All first pregnancies: abortion versus delivery	Anxiety disorders Mood disorders Substance-use disorders UM-CIDI *Interview*	Cross-sectional	Good
STEINBERG 2011B Cross-sectional	n = 218. Women completing the National Comorbidity Survey and reported a first pregnancy ending in abortion. n = 1,547. Women reporting a first pregnancy ending in a delivery	All first pregnancies: abortion versus delivery	Depression Suicidal ideation UM-CIDI *Interview*	Cross-sectional	Good

Study ID and study design	Numbers, participant, characteristics and country	Comparison	Outcome, measure and mode of administration	Follow up	Study quality (Charles review rating)
Prospective cohort studies					
MUNK-OLSEN2011 Prospective cohort study	n = 84,620. Women with a first abortion identified from national records. Denmark n = 280,930. Women who gave birth to their first live-born child	First abortion versus first delivery	Psychiatric treatment *Medical records*	Up to 1 year	Good
Californian medical and death records – linkage study					
REARDON 2002A Retrospective	n = 17,472. Women who claimed from California state funded medical insurance programme for an abortion. US n = 41,956. Women who claimed for a delivery	First pregnancy: abortion versus delivery	Suicide *Death certificate*	Up to 8 years	Poor
REARDON 2003A Retrospective	n = 15,299. Women who claimed from California state funded medical insurance programme for an abortion. US n = 41,442. Women who claimed for a delivery	First pregnancy: abortion versus delivery	Psychiatric admission Depression Bipolar disorder Schizophrenia Non-organic psychoses *Psychiatric inpatient treatment claims*	90 days to 4 years	Poor

Study ID and study design	Numbers, participant, characteristics and country	Comparison	Outcome, measure and mode of administration	Follow up	Study quality (Charles review rating)
COLEMAN 2002A Retrospective	n = 14,297. Women who claimed from California state funded medical insurance programme for an abortion. US n = 40,122. Women who claimed for a delivery	Abortion versus delivery	Outpatient treatment Depression Anxiety Bipolar disorder Schizophrenia Non-organic psychoses Alcohol and drug abuse *Psychiatric outpatient treatment claims*	90 days to 4 years	Poor
n = the number of subjects used in the analysis.					

5.3.2 Findings

Due to the heterogeneity of study design, outcomes and measurement methods used in the included studies, meta-analysis of the outcome data was not considered appropriate. Therefore, the findings have been grouped by outcome and synthesised narratively, with studies using the same data source reviewed together. Results from all studies are detailed in Table 16 (page 101) with a GRADE evidence profile shown in Table 17 (page 104).

Psychiatric treatment

Three studies (COLEMAN2002A, MUNK-OLSEN2011, REARDON2003A) assessed psychiatric treatment following a pregnancy event. Two of the studies (COLEMAN2002A, REARDON2003A) used the same data source, namely a retrospective analysis of Californian medical and death records, whereas MUNK-OLSEN2011 conducted a prospective population-based cohort study of Danish women. Studies in this section assessed outpatient treatment (COLEMAN2002A), inpatient treatment (REARDON2003A) or any psychiatric treatment (MUNK-OLSEN2011).

COLEMAN2002A reported that, in general, women who had an abortion were significantly more likely to receive outpatient psychiatric treatment up to 4 years following the pregnancy event than women following a live birth (OR = 1.17; 95% CI, 1.10 to 1.25, p <0.0001). When analysing the data by individual years, the results indicated that women who had an abortion were more likely to claim for outpatient psychiatric treatment up to 90 days, 180 days and 1 year following the pregnancy event (OR = 1.63; 95% CI, 1.40 to 1.91, p <0.0001; OR = 1.42; 95% CI, 1.25 to 1.60, p <0.0001 and OR = 1.30; 95% CI, 1.18 to 1.44, p <0.0001, respectively).

When assessing the claims made in the second, third and fourth years following the pregnancy event, women who had an abortion were significantly more likely to receive outpatient treatment in the second year (OR = 1.16; 95% CI, 1.03 to 1.30, p = 0.018)

with no significant increase in the third or fourth years (OR = 1.10; 95% CI, 0.97 to 1.23, p >0.05 and OR = 1.05; 95% CI, 0.93 to 1.18, p >0.05, respectively). Despite the consistency of these findings, the ORs indicate a small effect size and rates of contact overall were low.

REARDON2003A indicated that women who had an abortion were significantly more likely to claim for inpatient psychiatric treatment compared with women who delivered at up to 90 days, 180 days and 1 year following the pregnancy event (OR = 2.6; 95% CI, 1.6 to 5.3, p <0.01; OR = 2.2; 95% CI, 1.3 to 3.7, p <0.01 and OR = 1.9; 95% CI, 1.3 to 2.8, p <0.01, respectively). Similarly, women in the abortion group were more likely to receive inpatient psychiatric treatments during the 2nd year (OR = 2.1; 95% CI, 1.3 to 3.2, p <0.01), 3rd year (OR = 1.6; 95% CI, 1.1 to 2.3, p <0.05) and the 4th year (OR = 1.5; 95% CI, 1.1 to 2.1, p <0.05) following the pregnancy event than those who delivered the pregnancy.

In their prospective study, MUNK-OLSEN2011 assessed the rates of any psychiatric treatment 9 months before and 1 year after the resolution of a pregnancy, in a population-based cohort of Danish women with no previous history of mental health problems (defined as no history of inpatient treatment). First, psychiatric incidence rates were calculated for the 9-month period prior to the pregnancy event (either birth or abortion) and in the year following pregnancy. When using the raw data reported in the paper to calculate ORs for the purpose of this review, the results indicated that women in the abortion group were statistically significantly more likely to seek psychiatric treatment during the 1 year's follow-up period when compared with those who delivered a pregnancy (OR = 2.25; 95% CI, 2.09 to 2.41, p <0.001).

However, there was also an increase in psychiatric contact for women in the abortion group in the 9-month period prior to the pregnancy event (OR = 3.68; 95% CI, 3.34 to 4.05, p <0.001). Furthermore, rates of psychiatric contact in the abortion group did not increase following the abortion relative to the rate of psychiatric contact prior to the abortion. In contrast, the rate of psychiatric contact within the delivery group significantly increased following birth compared with the 9 months prior to the birth. The authors suggested that the difference in psychiatric incidence rates indicates that women who have an abortion may constitute a population with higher psychiatric morbidity and that this propensity pre-dates the abortion. Furthermore, the authors noted that having an unwanted pregnancy might be the cause of distress itself, whatever the pregnancy outcome.

Any mental health diagnosis

Using prospective data collected as part of a longitudinal survey, FERGUSSON2006 assessed whether women who had had an abortion by the age of 21 were more likely to report a higher number of mental health problems in the subsequent 5 years compared with women who had given birth by the age of 21. For the purposes of the review, incidence rate ratios for the number of mental health problems were converted into ORs to produce a dichotomous measure of any disorder. Findings indicated that there was no statistically significant difference between women who had an abortion and women who did not have an abortion in their odds of having a diagnosis of a mental health problem (OR = 1.82; 95% CI, 0.74 to 4.35, p >0.05).

Depression

Five studies (COLEMAN2002A, PEDERSEN2008, REARDON2003A, STEINBERG2011B, WARREN2010) compared the rates of depression in women who had an abortion with those who delivered a pregnancy, while STEINBERG2011Astudy2 assessed any mood disorder.

With regard to STEINBERG2011B, their re-analysis of national survey data compared the rates of depression in women who aborted their first pregnancy with those who delivered. The results indicated that women in the abortion group were no more likely to meet the criteria for depression compared with those who delivered their first pregnancy. Crucially, the study demonstrated the effect of controlling for different variables on the effect sizes observed; that is, controlling for variables such as experience of violence and economic factors attenuated the effect size observed when only pre-pregnancy mental health was controlled for (all factors controlled for: OR = 0.87; 95% CI, 0.54 to 1.37, p >0.05; only pre-pregnancy mental health controlled for: OR = 1.18; 95% CI, 0.81 to 1.71, p >0.05).

When adjusting for confounders such as race, previous mental health problems and prior measures of self-esteem, WARREN2010 found no difference in the rates of depression as measured by the CES-D within their secondary analysis of the National Longitudinal Survey of Adolescent Health. Adjusted ORs between the abortion and delivery groups were not statistically significant at either the 1 year or 5 years' follow-up time points (OR = 0.75; 95% CI, 0.27 to 2.09, p >0.05 and OR = 0.69; 95% CI, 0.24 to 2.01, p >0.05, respectively).

Although PEDERSEN2008 did not provide any statistical comparison between the abortion and delivery group, both groups were compared with a third comparator (for example, never pregnant) within the analysis. ORs were calculated in the present review (see Section 2.7.3 for details of the method) in order to compare women who had an abortion to those who gave birth. For those aged 15 to 20 years at the time of the pregnancy event, there was no evidence to suggest that women who had an abortion were more or less likely to have depression than those who gave birth (OR = 0.53; 95% CI, 0.14 to 1.95, p >0.05). However, for women who were aged 21 to 26 years at the time of the pregnancy event, those who had an abortion were more likely to experience depression at follow-up compared with women giving birth OR = 2.90; 95% CI, 1.31 to 6.40, p <0.01).

Two studies utilised data from Californian medical records to ascertain inpatient (REARDON2003A) or outpatient (COLEMAN2002A) treatment rates for different categories of depressive disorder over the 4-year study period. REARDON2003A indicated that women who had an abortion were not significantly more likely to claim for inpatient treatment for depression (OR = 1.5; 95% CI, 0.6 to 3.8, p >0.05) or neurotic disorders (OR = 1.7; 95% CI, 0.8 to 3.6, p >0.05) compared with women in the delivery group. In contrast, women in the abortion group were significantly more likely to make a treatment claim for both single and recurrent episodes of depressive psychosis (OR = 1.9; 95%CI, 1.3 to 2.9, p <0.01 and OR = 2.1; 95% CI, 1.3 to 3.5, p <0.01, respectively). COLEMAN2002A found no statistically significant difference in the rates of both single and recurrent episodes of depressive psychosis (OR 1.08; 95% CI, 0.82 to 1.41, p >0.05 and OR = 1.00; 95% CI, 0.70 to 1.43, p >0.05, respectively) or depression (OR = 1.06; 95% CI, 0.85 to 1.34, p >0.05). However, women in the abortion group were significantly more likely to claim for outpatient treatment of neurotic depression (OR = 1.40; 95% CI, 1.18 to 1.67, p <0.01).

Finally, STEINBERG2011Astudy2 compared the rates of mood disorders in women who aborted compared with those who delivered a first pregnancy. Within their analysis, women who had one abortion were analysed separately from those who had multiple abortions. In both cases, there were no significant differences in the rates of mood disorders between the abortion and no abortion group (one abortion: OR = 0.8; 95% 0.3 to 2.7, p >0.05; multiple abortions: OR = 1.2; 95% CI, 0.4 to 2.7, p >0.05). However, one limitation of this study was that it failed to control for other pregnancy outcomes including miscarriage.

Anxiety disorders

After controlling for a number of covariates including previous mental health problems, experience of rape and age at first pregnancy, STEINBERG2008 study1 indicated that women who had an abortion, regardless of the number of abortions were no more likely to experience anxiety compared with those who gave birth (OR = 1.23; 95% CI, 0.96 to 1.56, p = 0.1). However, contrasting results were reported in a further analysis, which assessed the impact of multiple abortions on mental health outcomes (for example, 1 versus 0, 2 versus 0). When compared with women who had given birth to a first pregnancy, those who reported two or more abortions were significantly more likely to experience anxiety (OR = 1.68; 95% CI, 1.22 to 2.31, p = 0.002). Similarly, those women who had one abortion were also more likely to experience anxiety at the time of the survey (OR = 1.25; 95% CI, 1.00 to 1.56, p = 0.05). In all cases, the ORs reported were consistent with a small effect.

STEINBERG2008study2 (also cross-sectional) compared the rates of social anxiety and GAD in women who had an abortion with women who gave birth to their first pregnancy. The analysis indicated that having an abortion was not associated with increased odds of having either diagnosis (social anxiety: OR = 0.87; 95% CI, 0.52 to 1.47, p = 0.60; GAD: OR = 0.84; 95% CI, 0.45 to 1.88, p = 0.58). However, despite controlling for previous mental health problems, this analysis did not control for any additional covariates. Further analysis of the social anxiety data by number of abortions (for example, 2 versus 0 and 1 versus 0), which controlled for a number of covariates including experience of violence and age at first pregnancy, indicated that abortion was not associated with a statistically significant increased rate of social anxiety (2 versus 0 abortions: OR = 1.65; 95% CI, 0.76 to 3.57, p = 0.20; 1 versus 0 abortions: OR = 0.84; 95% CI, 0.44 to 1.63, p = 0.60). This finding was further confirmed by STEINBERG2011Astudy2 who used the same sample. Instead of presenting the results by disorder, the study compared rates of any anxiety disorder by abortion status. When controlling for confounding variables, such as violence and poverty, there was no significant different in the rates of anxiety disorder between those reporting one abortion (OR = 1.0; 95% CI, 0.7 to 1.6, p >0.05) or multiple abortions (OR = 1.5; 95% CI, 0.8 to 2.8, p >0.05) when compared with those who did not abort the pregnancy.

COLEMAN2002A assessed rates of outpatient treatment claims for anxiety states. The results indicated that when age and number of pregnancies were controlled for there was no significant difference in the outpatient treatment rates for women who had abortion compared with women who delivered a pregnancy (OR = 1.14; 95% CI, 1.00 to 1.30, p = 0.058). However as COLEMAN2002A mentioned, the rate was approaching significance with a lower CI of 1.0.

PTSD

As with the findings for social anxiety and GAD reported above, STEINBERG2008study2 found no clear evidence that the odds of having PTSD were greater in women who aborted their first pregnancy compared with those who gave birth (OR = 1.35; 95% CI, 0.67 to 2.73, p = 0.43). When controlling for additional covariates women who had either one or multiple abortions were no more likely to experience PTSD at the time of follow-up than those women who delivered their first pregnancy (1 versus 0 abortions: OR = 0.98; 95% CI, 0.54 to 1.78, p = 0.94; 2 versus 0 abortions: OR = 1.29; 95% CI, 0.43 to 3.84. p = 0.64).

Suicide

REARDON2002A used medical records and death certificates to compare the rates of suicide between women with only one known pregnancy who either delivered or aborted the pregnancy. After adjusting for age and previous psychiatric history, the results indicated that women who had an abortion were at a significantly increased risk of suicide compared with those who had delivered a pregnancy (RR = 3.12; 95% CI, 1.25 to 7.78, p <0.001). In this case, however, the control for previous psychiatric history was limited, with only those who had made a treatment claim in the year prior to the pregnancy event excluded from the analysis. Therefore, women who did not claim for psychiatric treatment, or who claimed before that 1-year period, would still be included in the study.

In contrast, abortion was not associated with increased rates of suicidal ideation within the STEINBERG2011B study. When compared with those who delivered their first pregnancy, women who reported an abortion were significantly more likely to experience suicidal ideation, when only previous mental health problems were controlled for (OR = 1.86; 95% CI, 1.29 to 2.70, p <0.001). However, when additional factors including exposure to violence were taken into account, the difference between the groups was no longer significant (OR = 1.19; 95% CI, 0.70 to 2.02, p >0.05); again this highlights the importance of controlling for confounders.

Substance-use disorders

STEINBERG2011Astudy2 compared the rates of substance-use disorders between women reporting either multiple or one abortion to those who did not have an abortion. When controlling for pre-pregnancy mental health and additional confounders such as experience of violence and abuse, there was no significant difference between those reporting one abortion and no abortions (OR = 1.2; 95% CI, 0.6 to 2.5, p >0.05). The analyses did indicate that women who reported multiple abortions were statistically significantly more likely to experience substance-use disorders compared with those who did not have an abortion (OR = 3.7; 95% CI, 1.2 to 11.7, p <0.05). One caveat with this study was that the sample contained those who experienced either a miscarriage and/or stillbirth. However, there were no significant differences between the percentages of women reporting these events across the abortion and delivery groups.

As with PEDERSEN2008, PEDERSEN2007 did not provide any statistical comparison between the abortion and delivery group but instead compared both groups to a third 'never pregnant' group. ORs calculated for this review indicated that alcohol problems, cannabis use and illegal drug misuse were statistically significantly more likely in the abortion group compared with women who gave birth (OR = 20.0; 95% CI, 7.89 to 50.68, p <0.001; OR = 11.33; 95% CI, 3.55 to 36.20, p <0.001 and OR = 7.83; 95% CI, 1.68 to 36.61, p <0.001, respectively). In all cases, the ORs were consistent with very large effects. However, the presence of very large CIs introduces significant doubt about the reliability of these findings.

Finally, COLEMAN2002A assessed outpatient treatment claims for drug and alcohol abuse. After controlling for a number of factors including age and number of pregnancies, there was no statistically significant difference in the treatment claims between women who had an abortion and those who delivered a pregnancy (OR = 1.16; 95% CI, 1.00 to 1.36, p =0.56), although the difference was approaching significance.

Bipolar disorder

Both REARDON2003A and COLEMAN2002A used Californian medical records to assess the rates of inpatient and outpatient treatment for bipolar disorder. In both cases the results were significant, with COLEMAN2002A indicating that women who had had an abortion were more likely to make a claim for outpatient treatment compared with women who had delivered a pregnancy (OR = 1.95; 95% CI, 1.21 to 3.16, p = 0.006), while REARDON2003A reported the same results for inpatient treatment (OR = 3.0; 95% CI, 2.5 to 6.0, p <0.01).

Schizophrenia and related disorders

Only two studies assessed the rates of schizophrenia and related disorders. Although REARDON2003A found no significant differences in the inpatient treatment claims (OR = 1.2; 95% CI, 0.7 -1.9, p >0.05), women in the abortion group were statistically more likely to claim outpatient treatment for schizophrenia compared with women who delivered a pregnancy (OR = 1.97; 95% CI, 1.32 to 2.96, p = 0.02).

Non-organic psychoses

Finally, both COLEMAN2002A and REARDON2003A assessed the outpatient and inpatient treatment claims for episodes of non-organic psychoses. In both cases the differences between the rates of treatment in the abortion group compared with the delivery group were not significant (outpatient OR = 1.33; 95% CI, 0.88 to 2.02, p <0.05; inpatient OR = 1.2; 95% CI, 0.7 to 1.9, p >0.05).

Table 16: Summary of findings by outcome

Mental health outcome	Study ID	Follow-up/age at time of abortion	Results OR/RR (CI 95%), p-value
Psychiatric inpatient claims	REARDON2003A	Up to 90 days Up to 180 days Up to 1 year 2nd year 3rd year 4th year	OR = 2.6 (1.3 to 5.3) p <0.01 OR = 2.2 (1.3 to 3.7) p <0.01 OR = 1.9 (1.3 to 2.8) p <0.01 OR = 2.1 (1.3 to 3.2) p <0.01 OR = 1.6 (1.1 to 2.3) p <0.05 OR = 1.5 (1.1 to 2.1) p <0.05
Psychiatric outpatient claims	COLEMAN2002A	Up to 90 days Up to 180 days Up to 1 year Up to 4 years 2nd year 3rd year 4th year	OR = 1.63 (1.40 to 1.91) p <0.0001 OR = 1.42 (1.25 to 1.60) p <0.0001 OR = 1.30 (1.18 to 1.44) p <0.0001 OR = 1.17 (1.10 to 1.25) p <0.0001 OR = 1.16 (1.03 to 1.30) p = 0.018 OR = 1.10 (0.97 to 1.23) p >0.05 OR = 1.05 (0.93 to 1.18) p >0.05

Mental health outcome	Study ID	Follow-up/age at time of abortion	Results OR/RR (CI 95%), p-value
Any psychiatric treatment	MUNK-OLSEN2011	9 months prior to pregnancy event 1 year's follow-up	OR = 3.68 (3.34 to 4.05) p <0.001 OR = 2.25 (2.09 to 2.41) p <0.001
Any mental health problem	FERGUSSON2006	5-year lagged model	OR = 1.82 (0.74 to 4.35) p >0.05)
Depressive disorders			
Depression	PEDERSEN2008	15 to 20 years 21 to 26 years	OR = 0.52 (0.14 to1.91) p >0.05 OR = 2.90 (1.31 to 6.40) p <0.01
Depression	STEINBERG2011B only controlled for pre-pregnancy mental health All factors controlled for	Cross-sectional	OR = 1.18 (0.81 to 1.71) p >0.05 OR = 0.81 (0.54 to 1.37) p >0.05
Depression	WARREN2010	1 year 5 years	OR = 0.75 (0.27 to 2.09) p >0.05 OR = 0.69 (0.24 to 2.01) p >0.05
Depression (outpatient)	COLEMAN2002A	4 years	OR = 1.06 (0.85 to 1.34), p >0.05
Depression (inpatient)	REARDON2003A	4 years	OR = 1.5 (0.6 to 3.8) p >0.05
Neurotic depression (outpatient)	COLEMAN2002A	4 years	OR = 1.40 (1.18 to 1.67) p <0.0001
Neurotic disorders (inpatient)	REARDON2003A	4 years	OR = 1.7 (0.8 to 3.6) p >0.05
Anxiety disorders			
Anxiety disorders	STEINBERG2011A study2 1 abortion Multiple abortions	Cross-sectional	 OR = 1.0 (0.7 to 1.6) p >0.05 OR = 1.5 (0.8 to 2.8) p >0.05
Anxiety states (outpatient)	COLEMAN2002A	4th year	OR = 1.14 (1.00 to 1.30) p = 0.058
Anxiety	STEINBERG2008 study1 2 versus 0 abortion 1 versus 0 abortion	Cross-sectional	OR = 1.23 (0.96 to 1.56) p >0.05 OR = 1.68 (1.22 to 2.31) p = 0.002 OR = 1.29 (1.00 to 1.56) p = 0.05
GAD	STEINBERG2008 study2	Cross-sectional	OR = 0.84 (0.45 to 1.88) p = 0.58

Mental health outcome	Study ID	Follow-up/age at time of abortion	Results OR/RR (CI 95%), p-value
Social anxiety	STEINBERG2008 study2 2 versus 0 abortion 1 versus 0 abortion	Cross-sectional	 OR = 0.87 (0.52 to 1.47) p = 0.60 OR = 1.65 (0.76 to 3.57) p = 0.20 OR = 0.84 (0.44 to1.63) p = 0.60
PTSD	STEINBERG2011A study2 2 versus 0 abortion 1 versus 0 abortion	Cross-sectional	 OR = 1.33 (0.67 to 2.73) p = 0.43 OR = 1.29 (0.43 to 3.84) p = 0.64 OR = 0.98 (0.54 to 1.78) p = 0.94
Psychotic disorders			
Depressive psychosis, single episode (outpatient)	COLEMAN2002A	4th year	OR = 1.08 (0.82 to 1.41) p >0.05
Depressive psychosis, single episode (inpatient)	REARDON2003A	4th year	OR = 1.9 (1.3 to 2.9) p <0.01
Depressive psychosis, recurrent episode (outpatient)	COLEMAN2002A	4th year	OR = 1.00 (0.70 to 1.43) p >0.05
Depressive psychosis, recurrent episode (inpatient)	REARDON2003A	4th year	OR = 2.1 (1.3 to 3.5) p <0.01
Schizophrenic disorders (outpatient)	COLEMAN2002A	4th year	OR = 1.97 (1.32 to 2.96) p = 0.002
Schizophrenic disorders (inpatient)	REARDON2003A	4th year	OR = 1.2 (0.7 to 1.9) p >0.05
Non-organic psychoses (outpatient)	COLEMAN2002A	4th year	OR = 1.33 (0.88 to 2.02) p = 0.18
Non-organic psychoses (outpatient)	REARDON2003A	4th year	OR = 1.2 (0.6 to 2.3) p >0.05

Mental health outcome	Study ID	Follow-up/age at time of abortion	Results OR/RR (CI 95%), p-value
Mood disorders			
Mood disorder	STEINBERG2011A study2 1 abortion Multiple abortions	Cross-sectional	 OR = 0.8 (0.3 to 2.7) p >0.05 OR = 1.2 (0.4 to 2.7) p >0.05
Bipolar disorder	COLEMAN2002A	4th year	OR = 1.95 (1.21 to 3.16) p = 0.006
Bipolar disorder	REARDON2003A	4th year	OR = 3.0 (1.5 to 6.0) p <0.01
Suicide			
Suicide	REARDON2002A	Up to 8 years	RR 3.12 (1.25 to 7.78) p <0.001)
Suicidal ideation	STEINBERG2011B Only controlled for pre-pregnancy mental health All factors controlled for	Cross-sectional	OR = 1.86 (1.29 to 2.70) p <0.001 OR = 1.19 (0.70 to 2.02) p >0.05
Substance-use disorders			
Substance-use disorders	STEINBERG2011A study2 1 abortion Multiple abortions	Cross-sectional	 OR = 1.2 (0.6 to 2.5) p >0.05 OR = 3.7 (1.2 to 11.7) p<0.05
Drug and alcohol abuse	COLEMAN2002A	4th year	OR = 1.16 (1.00 to 1.36) p = 0.056
Alcohol problems	PEDERSEN2007	Up to 11 years	OR = 20.00 (7.89 to 50.68) p <0.001
Cannabis use	PEDERSEN2007	Up to 11 years	OR = 11.33 (3.55 to 36.20) p <0.001
Illicit drug use	PEDERSEN2007	Up to 11 years	OR = 7.83 (1.68 to 36.61) p <0.001
*Additional data provided by authors			

Table 17: GRADE summary of evidence profile for the mental health outcomes of abortion compared with delivery of pregnancies (regardless of whether or not the pregnancy was planned)

Outcomes	Relative effect (95% CI)	No. of participants (studies)	Quality of the evidence (GRADE)
Any psychiatric treatment Treatment records Follow-up: mean 1 year	OR 2.25 (2.09 to 2.41)	363,892 (1 study)	⨁⊖⊖⊖ Very low[1]

Outcomes	Relative effect (95% CI)	No. of participants (studies)	Quality of the evidence (GRADE)
Psychiatric outpatient treatment Medical treatment record Follow-up: mean 4 years	OR 1.17 (1.1 to 1.25)	54,419 (1 study)	⨁⊖⊖⊖ Very low[1]
Inpatient psychiatric treatment Medical records Follow-up: 90 days to 4 years	OR ranged from 1.5 to 2.6	56,741 (1 study)	⨁⊖⊖⊖ Very low[1,3]
Any mental health diagnosis Clinical interview Follow-up: mean 5 years	OR 1.81 (0.74 to 4.35)	135 (1 study)	⨁⊖⊖⊖ Very low[1,4]
Depression Various Follow-up: mean 11 years	OR ranged from 0.52 to 2.9	61,224 (6 studies)	⨁⊖⊖⊖ Very low*
Depression psychosis (single episode) Medical records Follow-up: 4 years	OR ranged from 1.08 to 1.9	56,741 (2 studies[5])	⨁⊖⊖⊖ Very low*
Depression psychosis (recurrent) Medical treatment claims Follow-up: 4 years	OR ranged from 1 to 2.1	56,741 (2 studies[5])	⨁⊖⊖⊖ Very low*
Neurotic depression (inpatient/outpatient treatment) Medical records Follow-up: 4 years	OR ranged from 1.4 to 1.7	56,741 (2 studies[5])	⨁⊖⊖⊖ Very low*
Anxiety Clinical interview	OR ranged from 0.84 to 1.5	65,007 (2 studies)	⨁⊖⊖⊖ Very low*
PTSD Clinical diagnosis	OR 1.33 (0.67 to 2.73)	1,822 (1 study)	⨁⊖⊖⊖ Very low[1,4,6]
Suicide Medical records and death certificates	RR 3.12 (1.25 to 7.78)	59,428 (1 study)	⨁⊖⊖⊖ Very low[1]
Suicidal ideation Follow-up: mean 8 years	OR 1.19 (0.17 to 2.02)	1,792 (1 study)	⨁⊖⊖⊖ Very low[1,4]
Alcohol problems and drug use Follow-up: mean 11 years	OR ranged from 7.83 to 20	259 (1 study)	⨁⊖⊖⊖ Very low*
Drug or alcohol abuse Medical records[7] Follow-up: 4 years	OR 1.16 (1 to 1.36)	54,419 (1 study)	⨁⊖⊖⊖ Very low[1,4,8]

Outcomes	Relative effect (95% CI)	No. of participants (studies)	Quality of the evidence (GRADE)
Bipolar disorder (inpatient/outpatient treatment) Medical records Follow-up: 4 years	OR ranged from 1.95 to 3	56,741 (2 studies[5])	⨁⊖⊖⊖ Very low*
Schizophrenia and related disorders (inpatient/outpatient treatment) Medical records Follow-up: 4 years	OR ranged from 1.2 to 1.97	56,741 (2 studies[5])	⨁⊖⊖⊖ Very low*
Non-organic psychoses (inpatient/outpatient treatment) Medical records Follow-up: 4 years	OR ranged from 1.2 to 1.33	56,741 (2 studies[5])	⨁⊖⊖⊖ Very low*
GRADE Working Group grades of evidence **High quality**: further research is very unlikely to change our confidence in the estimate of effect. **Moderate quality:** further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate. **Low quality**: further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate. **Very low quality**: we are very uncertain about the estimate.			
* See full profile for rationale. [1] Comparison group did not control for pregnancy intention. [2] 4 years' follow-up. [3] Adjusted ORs not presented for the total 4 years' follow-up period (data reported for first year only). [4] CI includes both appreciable benefit and appreciable harm. [5] Studies used data from the same source. [6] Cross-sectional design using retrospective reporting. [7] Controlling for a number of factors including age and number of pregnancies. [8] CI includes both no effect and appreciable harm.			

5.3.3 Limitations

In addition to the main limitation of these studies (that is, that they did not control for whether the pregnancy was wanted or planned), the studies were also limited by a number of other factors. The GRADE evidence summary in Table 17 shows that in general, the evidence available from this section of the review ranged from low to very low, with problems in areas such as imprecision and study design. In particular, many of the studies produced imprecise effect estimates, with CIs compatible with increased and decreased rates of mental health problems.

Studies varied in the outcomes they assessed with very few studies assessing the same diagnosis. Studies also varied in the methods of outcome measurement, which ranged from treatment records to clinical diagnosis, through to scale-based measures. Due to this clinical heterogeneity, meta-analysis of the data was not appropriate. Three of the included studies (COLEMAN2002A, MUNK-OLSEN2011, REARDON2003A) used psychiatric treatment records as their measure of mental health outcome. One

of the main limitations of this method of outcome evaluation was that women who experienced mental health problems may not have sought psychiatric treatment. Furthermore, as incidence rates were provided, for example first psychiatric contact, it was not possible to truly ascertain the difference in risk for different diagnoses as women who experienced depression may also go on to experience, for example, anxiety.

Another major limitation of the dataset as a whole was the inadequate control of confounding variables. In particular, many of the studies included in the review failed to control for multiple pregnancy outcomes, with only REARDON2002A limiting their analysis to women with one known pregnancy and FERGUSSON2006 controlling for multiple pregnancies in their analysis. Other studies included in the review only partly controlled for multiple pregnancy events with COLEMAN2002A, MUNK-OLSEN2011 and REARDON2003A limiting their sample to women who had delivered their first pregnancy and had no subsequent abortions but with no such criteria applied to the abortion group. Similarly STEINBERG2008study1 and STEINBERG2008study2 included women with a first pregnancy event during a set time period. However, women could go on to have multiple pregnancy outcomes, with only multiple abortions assessed in the analysis, whereas STEINBERG2011B included individuals who had experienced a miscarriage or stillbirth within their samples. Control for other potential confounding factors, such as experience of violence, age of pregnancy and socioeconomic status, varied across studies, with few studies apart from FERGUSSON2006, STEINBERG2008study1, STEINBERG2008study2, STEINBERG2011Astudy2 and STEINBERG2011B controlling for a large number of confounding variables. The importance of controlling for additional confounders was highlighted by STEINBERG2011Astudy2 and STEINBERG2011B, where controlling for factors such as violence, abuse, economic factors and background variables in addition to pre-pregnancy mental health had an impact on all of the results.

Studies were also limited in the methods used for controlling for previous mental health problems with COLEMAN2002A, REARDON2003A, REARDON2002A and MUNK-OLSEN2011 all relying on medical treatment records, whereas other studies (FERGUSSON2006, PEDERSEN2007, PEDERSEN2008, STEINBERG2008study1, STEINBERG2008study2) relied on retrospective and/or self-reported measures of previous mental health problems. Additionally, the measurement of previous mental health problems was limited to only 1 year before the abortion in a number of the studies (COLEMAN2002A, REARDON2003A, REARDON2002A).

Studies also have specific limitations associated with their design. Only one study included in the review adopted a prospective design (MUNK-OLSEN2011), with FERGUSSON2006 relying on both retrospective and prospective data. Instead, many studies used retrospective and self-report measures of mental health outcomes following an abortion. Follow-up periods included in the studies also varied, particularly in cross-sectional studies (STEINBERG2008study1, STEINBERG2008study2), where the time between abortion and follow-up could range from 6 months to 20 years.

5.4 Abortion Versus Delivery Of An Unwanted Or Unplanned Pregnancy

Studies included in this section of the review made some attempt to control for pregnancy intention. Due to a paucity of data, studies that compared women who had an abortion with those who delivered an unwanted pregnancy were reviewed alongside studies that included a comparison group of women who delivered an unplanned pregnancy. However, it must be noted that there are differences between an unwanted and an unplanned pregnancy, as discussed in Section 2.3.

5.4.1 Study characteristics

The four studies presented in this section compare mental health outcomes for women who had an abortion with those who delivered an unwanted (FERGUSSON2008) or unplanned pregnancy (COUGLE2005, GILCHRIST1995, STEINBERG2008study1). Details of the included studies, including quality assessment scores, are shown in Table 18. The four studies included in the review analysed data drawn from three separate data sources. One study (GILCHRIST1995) utilised a prospective cohort design to follow up women either requesting or not requesting an abortion for an unplanned pregnancy. Two studies analysed cross-sectional data collected as part of the National Survey of Family Growth (COUGLE2005, STEINBERG2008study1). The final study (FERGUSSON2008), which analysed data obtained from the Christchurch Health and Developmental Study, utilised both prospective and retrospective reporting within their analysis.

Across the studies, a range of post-abortion mental health outcomes were assessed, including depression (FERGUSSON2008), anxiety, (COUGLE2005, FERGUSSON2008, STEINBERG2008study1), psychosis (GILCHRIST1995), non-psychotic illness (GILCHRIST1995), self-harm (GILCHRIST1995), alcohol and drug misuse (FERGUSSON2008), suicidal ideation (FERGUSSON2008), or any psychiatric disorder (GILCHRIST1995, FERGUSSON2008). Methods used to measure mental health outcomes in the studies included the use of medical treatment records (GILCHRIST1995) and diagnostic interviews (COUGLE2005, FERGUSSON2008, STEINBERG2008study1).

In addition to the variation in outcomes, studies also differed in their control of previous mental health problems. Two studies (COUGLE2005, GILCHRIST1995) excluded those with a history of mental health problems, whereas STEINBERG2008study1B and FERGUSSON2008 adjusted for previous mental health outcomes within their analyses.

Table 18: Study characteristics: studies considering unwanted or unplanned pregnancies

Study ID and study design	**Numbers, participant characteristics and country**	**Comparison**	**Outcome, measure and mode of administration**	**Follow-up**	**Study quality** (Charles review rating)
FERGUSSON 2008[7]	Longitudinal birth cohort. Christchurch, New Zealand. n = 117. Women reporting an abortion n = 52. Women reporting a live birth that resulted from an unwanted pregnancy or provoked an adverse reaction	Pregnant abortion versus birth of 'unwanted' pregnancy*	Major depression Anxiety disorder Suicidal ideation Alcohol dependence Illicit drug dependence Number of mental health problems Questionnaire based on CIDI and DISC (at age 16 only) *Interview*	5-year lagged model	Very good
GILCHRIST 1995	Women with an unplanned pregnancy recruited from GP surgeries. UK n = 6,151. Women who did not request an abortion n = 6,410. Women who obtained an abortion n = 379. Women who requested an abortion but were refused n = 321. Women who requested an abortion and then changed their minds	Unplanned pregnancy: obtained abortion versus did not request an abortion Unwanted pregnancy: obtained abortion versus requested but refused abortion	Psychotic illness Non-psychotic illness Deliberate self-harm Coded by GP using ICD-8	Variable	Good

[7] Includes data obtained via personal correspondence with the authors.

Study ID and study design	Numbers, participant characteristics and country	Comparison	Outcome, measure and mode of administration	Follow-up	Study quality (Charles review rating)
COUGLE2005	n =1,033. Women reporting an unintended first pregnancy ending in abortion. US n = 1,813. Women reporting an unintended first pregnancy ending in a live birth.	Unplanned pregnancies: abortion versus delivery	Experience of anxiety symptoms reflective of DSM-IV criteria for GAD *Interview*	Cross-sectional	Fair
STEINBERG 2008study1	n = 1,167. Women reporting an unintended first pregnancy ending in abortion. n = 2,315. Women reporting an unintended first pregnancy ending in a live birth A national probability sample.	Unplanned pregnancies: abortion versus delivery	Experience of anxiety symptoms reflective of DSM-IV criteria for GAD *Interview*	Cross-sectional	Fair
n = the number of subjects used in the analysis. *Data which informed this comparison were provided by the authors.					

5.4.2 Findings

Despite the heterogeneity of study design, outcomes and measurement methods used, a meta-analysis of the data has been conducted. However, due to the lack of comparable outcomes, the findings have also been grouped by outcome and reviewed narratively with studies using the same data source reviewed together. Results from all studies and the meta-analysis are detailed in Table 19 (page 114) with a GRADE evidence profile shown in Table 20 (page 115). Forest plots are included in Appendix 10. Limitations of the data, including the difficulties combining the data within the meta-analysis, are discussed in Section 5.4.3.

Anxiety disorders

Three studies (using two data sources) assessed anxiety following either an abortion or delivery. COUGLE2005 and STEINBERG2008study1 used the same data source to assess the impact of abortion or delivery on a cross-sectional measure of anxiety, which were reflective of DSM-IV criteria for GAD. FERGUSSON2008 used the CIDI to assess DSM-IV anxiety disorders within their study.

COUGLE2005 indicated that women who had an abortion were statistically significantly more likely to experience anxiety at the time of follow-up compared with those who delivered a pregnancy (OR = 1.34; 95% CI, 1.05 to 1.70, p <0.018). Although the findings were statistically significant, the OR is consistent with a small effect. Furthermore, although removing women who reported a period of anxiety prior to the date of their pregnancy from the analysis, COUGLE2005 only controlled for age at interview and race within their analysis.

Unlike COUGLE2005, who excluded women with previous experience of anxiety, STEINBERG2008study1 adjusted for previous mental health problems in addition to other confounding variables such as experience of rape, subsequent births, and physical abuse and education level, within their analysis. The adjusted results indicated that women who underwent an abortion were not statistically significantly more likely to experience anxiety compared with those who delivered the pregnancy (OR = 1.24; 95% CI, 0.92 to 1.68, p = 0.15). Further analysis indicated that only women who reported two or more abortions had a higher rate of anxiety at follow-up (OR = 1.69; 95% CI, 1.16 to 2.47, p = 0.007) compared with women who delivered the pregnancy. There was no significant difference in anxiety outcomes for women reporting only one abortion (OR = 1.21; 95% CI, 0.91 to 1.61, p = 0.19). One possibility for the difference between STEINBERG2008study1 and COUGLE2005 may be due to the differences in confounder control and sample selection.

FERGUSSON2008 assessed the differences in rates of anxiety between the abortion and delivery groups using data from a lagged model, in which pregnancy history was measured in the 5 years prior to the assessment of mental health outcomes. Although the original analysis included in the paper did not compare women who had had an abortion with those who delivered an unwanted pregnancy, a re-analysis of the data to include this comparison group was provided for the purpose of this review. Findings indicated that women who had an abortion were not statistically significantly more likely to experience anxiety disorders than those who delivered a pregnancy (OR = 1.82; 95% CI, 0.67 to 4.94, p >0.05).

As shown in Table 19, there was insufficient evidence from the results of the meta-analysis to determine if women who had an abortion were any more or less likely to experience anxiety than those who delivered the pregnancy. Within the analysis, STEINBERG2008Bstudy1 was included as it controlled for more confounding factors than COUGLE2005, which only controlled for age and race.

Major depression

Using the same lagged model as described in the section on anxiety disorders above, FERGUSSON2008 suggested no statistically significant difference in rate of depression between women who had an abortion and those who delivered an unwanted pregnancy (OR = 0.70; 95% CI, 0.32 to 1.96, p >0.05). No other data on depression were available to include within the meta-analysis.

Alcohol and drug misuse

Using their 5-year lagged model, FERGUSSON2008 also assessed both alcohol and illicit drug dependence. In both cases, despite the large effect sizes, there was insufficient evidence to suggest that having an abortion was statistically significantly associated with an increased risk when compared with delivering an unwanted pregnancy due to the large CIs (alcohol dependence: OR = 7.1; 95% CI, 0.51 to 97.94, p >0.05; illicit drug dependence: OR = 13.20; 95% CI, 0.82 to 212.14, p >0.05).

Psychotic illness

With regard to psychotic illnesses GILCHRIST1995 indicated that women in the abortion group were less likely to experience a psychotic illness than those in the delivery group (RR[8] = 0.3; 95% CI, 0.2 to 0.4, p <0.05) and those with an unwanted pregnancy who requested but were refused an abortion (RR= 0.3; 95% CI, 0.17 to 0.53, p <0.05). However, it must be noted that many of these cases, described as 'mild' by the authors, did not lead to a hospital admission. Furthermore, GILCHRIST1995 noted that the number of women included in the sample who were refused an abortion was small, therefore reducing the statistical power of this comparison. Further analysis focused on all cases of psychosis that led to hospital admission and excluded those with puerperal psychosis (which was described by the GPs as mild). Results for this analysis indicated similar rates of psychotic illness following an abortion (rate 0.93 per 1000 abortions) or delivery (rate 1.02 per 1000 deliveries) although no statistical comparison was provided. However, these rates were reported for the whole sample and therefore included women with a history of previous psychosis and other mental health problems.

Non-psychotic illness

GILCHRIST1995 found no difference in the rates of non-psychotic illnesses for women who had an abortion compared with those who delivered the pregnancy and did not request an abortion with the OR consistent with no effect (RR = 1; 95% CI, 1 to 1.1, p = 0.05) and those who requested but were refused an abortion (RR = 1.1; 95% CI, 0.88 to 1.37, p >0.05).

Suicidal ideation

Only FERGUSSON2008 assessed suicidal ideation, with results suggesting that women who undergo an abortion were not statistically significantly more likely to experience suicidal ideation in comparison with those who delivered the pregnancy (OR = 1.58; 95% CI, 0.43 to 5.80, p >0.05).

Self-harm

The final category assessed by GILCHRIST1995 in their prospective study was self-harm. There was a significant increase in the risk of self-harm for women in the abortion group compared with the delivery group (RR 1.7; 95% CI, 1.1 to 2.6, p <0.05). When compared with those who requested but were refused an abortion, there was no statistically significant difference in self-harm (OR = 0.59; 95% CI, 0.17 to 2.08, p >0.05), although it should be noted that numbers in the refused abortion group were small.

Any suicidal behaviour

When assessing any suicidal behaviour by combining studies that reported suicidal ideation and self-harm, results of the meta-analysis indicated that when combining unwanted and unplanned pregnancy comparison groups, women who had had an abortion were more likely to experience any form of suicidal behaviour (OR = 1.69; 95% CI, 1.12 to 2.54, p = 0.01). However, when just focusing on unwanted pregnancies there was no evidence that abortion had an impact on suicidal behaviours (OR = 0.95; 95% CI, 0.36 to 2.51, p >0.05). It should be borne in mind that combining self-harm and suicidal ideation is problematic because they are not measuring the same clinical events, even though they are related.

8 Risk ratios were used to estimate ORs in the analysis due to the rare occurrence of these outcomes.

Any psychiatric illness

Two studies assessed any psychiatric illness following a pregnancy event. In their prospective study, GILCHRIST95 assessed incidence rates for any psychiatric illness, while retrospective and prospective reporting was used by FERGUSSON2008 to assess the number of mental health problems.

Using data from women with no history of mental health problems prior to the pregnancy, GILCHRIST1995 suggested that there was no difference in rates of psychiatric illness in women who had had an abortion compared with those who did not request an abortion for an unplanned pregnancy (RR = 1; CI, 1.0 to 1.1, p = 0.05). There was also no evidence that women who had had an abortion were more likely to experience any psychiatric illness compared with those who had requested but were refused an abortion (RR = 1.0; 95% CI, 0.8 to 1.26, p >0.05).

Similarly, FERGUSSON2008 indicated that women who had had an abortion were not at an increased risk of a higher number of mental health problems compared with those who delivered an unwanted pregnancy (RR = 1.27; 95% CI, 0.82 to 1.97, p >0.05). It should be noted that this comparison was not published by FERGUSSON2008; however, figures were provided by the authors during this review, which informed the analysis.

To combine as many studies as possible, and hence increase the statistical power of the analysis, composite scores for FERGUSSON2008, which combine data across all diagnostic categories reported, were calculated. The calculation of composite scores takes into account the inter-relationship between the different outcomes. As highlighted in Table 19, women who had had an abortion were no more likely to experience mental health problems compared with those who had delivered either an unwanted pregnancy (OR = 1.12; 95% CI, 0.9 to 1.4, p >0.05) or an unplanned pregnancy (OR = 1.10; 95% CI, 0.95 to 1.27, p >0.05).

Table 19: Studies considering unwanted or unplanned pregnancies

Mental health outcome	Study ID	Follow-up	Results OR/RR (CI 95%)
Anxiety	COUGLE2005	Cross-sectional	OR = 1.34 (1.05 to 1.70) p <0.018
	FERGUSSON2008	5-year lagged model	OR = 1.82 (0.67 to 4.94) p >0.05
	STEINBERG2008 study1 (all data) 2 versus 0 abortions 1 versus 0 abortions	Cross-sectional	OR = 1.24 (0.92 to 1.68) p = 0.15 OR = 1.69 (1.16 to 2.47) p <0.01 OR = 1.21 (0.91 to 1.61) p = 0.19
	Pooled effect size+		**OR = 1.28 (0.96 to 1.71) p >0.05**
Major depression	FERGUSSON2008	5-year lagged model	OR = 0.70 (0.32 to 1.96) p >0.05
Alcohol dependence	FERGUSSON2008	5-year lagged model	OR = 7.1 (0.51 to 97.94) p >0.05
Substance dependence	FERGUSSON2008	5-year lagged model	OR = 13.20 (0.82 to 212.14) p >0.05
Psychotic illness	GILCHRIST1995 (unwanted)	Variable	OR* = 0.3 (0.17 to 0.53) p <0.01
	GILCHRIST1995 (unplanned)		OR* = 0.3 (0.2 to 0.4) p <0.01
Non-psychotic illness	GILCHRIST1995 (unwanted)	Variable	OR* = 0.3 (0.17 to 0.53) p >0.05
	GILCHRIST1995 (unplanned)		OR* = 1.0 (1.0 to 1.1) p >0.05
Self-harm	GILCHRIST1995 (unwanted)	Variable	OR* 0.59 (0.17 to 2.08) p >0.05
	GILCHRIST1995 (unplanned)		OR* = 1.7 (1.1 to 2.6) p <0.05
Suicidal ideation	FERGUSSON2008	5-year lagged model	OR = 0.63 (0.17 to 2.32) p >0.05
Any suicidal behaviour	FERGUSSON2008	5-year lagged model	OR = 0.63 (0.17 to 2.32) p >0.05
	GILCHRIST1995 (unwanted)	Variable	OR = 0.59 (0.17 to 2.08) p >0.05
	Pooled effect size		**OR = 0.95 (0.36 to 2.51) p >0.05**
	FERGUSSON2008	5-year lagged model	OR = 0.63 (0.17 to 2.32) p >0.05
	GILCHRIST1995 (unplanned)	Variable	OR* = 1.7 (1.1 to 2.6) p <0.05
	Pooled effect size		**OR = 1.69 (1.12 to 2.54) p = 0.01**
Number of mental health problems	FERGUSSON2008	5-year lagged model	RR = 1.27 (0.82 to 1.97) p >0.05

Mental health outcome	Study ID	Follow-up	Results OR/RR (CI 95%)
Any psychiatric diagnosis	FERGUSSON2008	5-year lagged model	OR = 1.82 (0.75 to 4.43) p >0.05
	GILCHRIST1995 (unwanted)	Variable	OR = 1.00 (0.80 to 1.26) p >0.05
	STEINBERG2008 study1	Cross-sectional	OR = 1.24 (0.92 to 1.68) p = 0.15
	Pooled effect size		**OR = 1.12 (0.9 to 1.4) p >0.05**
	FERGUSSON2008	5-year lagged model	OR =1.82 (0.75 to 4.43) p >0.05
	GILCHRIST1995 (unplanned)	Variable	OR = 1.0 (1.0 to 1.1) p >0.05
	STEINBERG2008 study1	Cross-sectional	OR = 1.24 (0.92 to 1.68) p = 0.15
	Pooled effect size		**OR =1.10 (0.95 to 1.27) p >0.05**

+ Data for the meta-analysis used STEINBERG2008study1 because this controlled for additional variables.
* RRs were used to estimate ORs in the analysis due to the rare occurrence of these outcomes.

Table 20: GRADE evidence summary for profile mental health outcomes for the mental health outcomes of abortion compared with delivery of unwanted/ unplanned pregnancies

Outcomes	Relative effect (95% CI)	No. of participants (studies)	Quality of the evidence (GRADE)
Anxiety: unwanted/unplanned pregnancy	OR 1.28 (0.96 to 1.71)	3,651 (2 studies)	⨁⨀⨀⨀ Very low*
Depression: unwanted pregnancy	OR 0.79 (0.32 to 1.96)	169 (1 study)	⨁⨀⨀⨀ Very low[1]
Alcohol misuse: unwanted pregnancy	OR 7.1 (0.51 to 97.94)	169 (1 study)	⨁⨀⨀⨀ Very low[1,2]
Drug misuse: unwanted pregnancy	OR 13.2 (0.82 to 212.14)	169 (1 study)	⨁⨀⨀⨀ Very low[1]
Psychotic episode: unwanted pregnancy	OR 0.3 (0.17 to 0.53)	Non-estimable (1 study)	⨁⨀⨀⨀ Very low[2]
Psychotic episode: unintended pregnancy	OR 0.3 (0.21 to 0.42)	Non-estimable (1 study)	⨁⨀⨀⨀ Very low[3]

Outcomes	Relative effect (95% CI)	No. of participants (studies)	Quality of the evidence (GRADE)
Non-psychotic episode: unwanted pregnancy	OR 1.1 (0.88 to 1.37)	Non-estimable (1 study)	⨁⊖⊖⊖ Very low[2]
Non-psychotic episode: unintended pregnancy	OR 1.04 (0.99 to 1.09)	Non-estimable (1 study)	⨁⊖⊖⊖ Very low[3]
Suicidal ideation: unwanted pregnancy	OR 1.58 (0.43 to 5.8)	169 (1 study)	⨁⊖⊖⊖ Very low[1]
Self-harm: unwanted pregnancy	OR 0.59 (0.17 to 2.08)	Non-estimable (1 study)	⨁⊖⊖⊖ Very low[1]
Suicidal behaviours (including self-harm): unwanted only	OR 0.95 (0.36 to 2.51)	Non-estimable (2 studies)	⨁⊖⊖⊖ Very low*
Suicidal behaviours (including self-harm): unwanted/unplanned	OR 1.69 (1.12 to 2.54)	Non-estimable (2 studies)	⨁⊖⊖⊖ Very low*
Any psychiatric condition (composite score): using all Gilchrist unwanted data	OR 1.12 (0.9 to 1.4)	Non-estimable (3 studies)	⨁⊖⊖⊖ Very low*

GRADE Working Group grades of evidence
High quality: further research is very unlikely to change our confidence in the estimate of effect.
Moderate quality: further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate.
Low quality: further research is very likely to have an important impact on our confidence in the estimate of effect and is likely to change the estimate.
Very low quality: We are very uncertain about the estimate.
*See full profile for rationale.
[1] CI includes both appreciable benefit and appreciable harm.
[2] Very small numbers of events across groups.
[3] Includes an unplanned comparison group.

5.4.3 Limitations

As shown in Table 19, a GRADE evidence summary was produced for the findings of the review. In general, the evidence available was very low, due to downgrading based on imprecision of the findings. In this case, data for each outcome were sparse, with CIs that were, for the majority of results, consistent with both increased and decreased risk of the mental health outcome assessed. Furthermore, the clinical heterogeneity in the results and the use of overlapping samples meant that outcomes and studies included in the meta-analysis were limited. As this part of the review was focusing on the impact of abortion from the perspective of a women faced with the decision, only studies that had either an unwanted or unplanned pregnancy as a comparison group were included. It must be noted that the quality of the results obtained from the meta-analysis is only

as good as the individual studies included; therefore, the major limitation of conducting this meta-analysis was the relatively low quality of the individual studies and the multiple problems with the research identified below.

In general, the studies reviewed in this section controlled for a number of confounding factors, although the level of confounder control varied between the studies. In particular, control over subsequent pregnancy events including multiple abortions, births and miscarriages differed, with GILCHRIST1995 keeping women who went on to have miscarriages in the analysis, while FERGUSSON2008 controlled for multiple pregnancy outcomes within their analysis. The importance of adequate confounder control was highlighted by the results of COUGLE2005 and STEINBERG2008study1, who, despite using the same dataset, produced contrasting results. COUGLE2005 only controlled for race and age of pregnancy in their analysis, and found a significant effect of abortion on rates of anxiety. In contrast, STEINBERG2008study1 who controlled for a range of potential confounding variables including age, race, marital status, rape history, income and pregnancy outcomes, failed to find a significant effect.

Studies included in this section of the review all considered women with either an unplanned or unwanted pregnancy. Despite being viewed as a more appropriate comparison group (APA review), a number of limitations warrant discussion. COUGLE2005, GILCHRIST1995 and STEINBERG2008study1 all identified unplanned pregnancies. An unplanned pregnancy is not the same as an unwanted pregnancy, although there will be significant overlap. Moreover, the measurement of how much the pregnancy is wanted is very difficult, with many studies providing only minimal details about the methods used. Furthermore, the wantedness of the pregnancy may change throughout; for example, pregnancies that were unwanted at one stage may go on to be wanted, and vice versa. The one study that did consider unwanted pregnancy (FERGUSSON2008) based this classification on whether the women reported having an adverse reaction, felt distressed about the pregnancy or reported that it was unwanted. While this gives an indication as to whether the pregnancy was unwanted, using initial distress as a proxy for an unwanted pregnancy may be questionable.

Only one study included in this part of the review adopted a wholly prospective design (GILCHRIST1995), with FERGUSSON2008 relying on both retrospective and prospective data. Both COUGLE2005 and STEINBERG2008study1 used retrospective and self-report measures of mental health outcomes following an abortion. The follow-up periods included in the studies also varied, particularly in the two cross-sectional studies (COUGLE2005, STEINBERG2008study1), where the time between abortion and follow-up could range from 6 months to 20 years. Furthermore, the use of retrospective data to control for previous mental health problems (STEINBERG2008study1) may lead to recall bias. Finally, only one of the studies used a UK sample (GILCHRIST1995), which may limit the generalisability of results.

5.5 Evidence Statements

1. The evidence for this section of the review was generally rated as poor or very poor, with many studies failing to control for confounding variables and using weak controls for previous mental health problems, such as 1-year previous treatment claims. There was also a lack of comparable data across the diagnostic categories which restricted the use of meta-analysis. These factors limit the interpretation of the results.
2. There was some evidence from studies that did not control for whether or not the pregnancy was planned or wanted suggesting that, compared with those who delivered a pregnancy:
    - there are increased risks of psychiatric treatment, suicide and substance misuse for women who undergo abortions
    - there was insufficient evidence to determine if there was an increased risk of depression, anxiety disorders, suicidal ideation or PTSD.
3. Where studies controlled for whether or not the pregnancy was planned or wanted, compared with those who delivered a pregnancy:
    - there was insufficient evidence of elevated risk of mental health problems such as depression, anxiety and non-psychotic illness following abortion
    - there was some limited evidence to suggest increased rates of self-harm following an abortion, but only in the unplanned group
    - there was some evidence of lower rates of psychotic illness for women following abortion.
4. Inadequate control of confounding factors was shown to impact on the results. Differences between groups did not remain significant when factors such as previous experience of abuse and violence were controlled for.
5. For women with no prior recorded history of psychiatric contact up to 9 months before a pregnancy event:
    - those who have an abortion have significantly higher rates of psychiatric contact before the abortion than do women in the same 9-month period prior to birth
    - for those who have an abortion, rates of psychiatric contact after an abortion are no greater than before the abortion
    - for those who go onto birth, rates of psychiatric contact after birth are significantly higher than before birth

    This suggests that women who have an abortion are already at higher risk of mental health problems, which does not increase following abortion.
6. An unwanted pregnancy may lead to an increase risk of mental health problems, or other factors may lead to both an increased risk of unwanted pregnancy and an increased risk of mental health problems.
7. When a woman has an unwanted pregnancy, rates of mental health problems will be largely unaffected whether she has an abortion or goes on to give birth.

6 DISCUSSION AND CONCLUSION

6.1 Overview

The review questions

When a woman is carrying an unwanted pregnancy in most Western societies, she has the option to continue with the pregnancy to a full-term birth or to elect to terminate the pregnancy, subject to the relevant legal framework (for example, rules on timing and the presence of risk to either the mother or child). It is important in this context for a woman to understand the possible physical and mental health risks associated with each course of action. It is also important that healthcare professionals can identify factors that may be associated with a poor outcome following abortion or birth of an unwanted pregnancy.

It is reasonably well accepted that there is a broad range of physical and mental health risks known to be associated with birth. However, it is less certain whether the mental health risks associated with birth are altered if the pregnancy is unwanted. Similarly, for abortion, it is well accepted that there are some physical risks directly related to the timing and techniques used to undertake an abortion. There is less certainty about the mental health impact of abortion for an unwanted pregnancy.

The relationships between unwanted pregnancy, abortion and mental health have been the subject of much debate and research. In an explicit effort to clarify this area, the APA and Charles reviews have drawn together research addressing these relationships (APA Task Force on Mental Health and Abortion, 2008; Charles *et al.*, 2008). These reviews concluded that abortion of an unwanted pregnancy was no more likely to lead to mental health problems than if the pregnancy went to full term. However, each review can be criticised on the grounds of either quality of included studies or breadth of the field of inquiry. More recently, a meta-analysis by Coleman (2011) concluded that abortion was associated with increased risks of mental health problems compared with no abortion.

The APA review examined the relationships between unwanted pregnancy, birth and mental health very broadly by looking at prevalence and factors associated with poor outcomes, and comparing mental health outcomes following both birth and abortion. This review included a very wide range of studies, a number of which were of low quality.

The Charles review used quality criteria to identify studies of higher quality that were more able to compare the mental health impact of abortion with that for birth in an unwanted pregnancy. The Charles review did not undertake a broader examination of studies to assess the prevalence of, or to identify factors associated with, mental health problems following abortion for unwanted pregnancy.

Coleman also considered only the comparison between women who had an abortion and those who did not have an abortion. However, the Coleman review failed to provide any details about quality assessment, included a number of studies that were of low quality and failed to control for previous mental health problems.

The present review has attempted to address the broader issues and limitations associated with previous reviews and to combine these three approaches, taking the best from each. Therefore, like the APA review, but unlike the Charles and Coleman reviews, the present review covered three questions (see box below).

1. **How prevalent are mental health problems in women who have an induced abortion?**
2. **What factors are associated with poor mental health outcomes following an induced abortion?**
3. **Are mental health problems more common in women who have an induced abortion when compared with women who deliver an unwanted pregnancy?**

Unlike the APA and Coleman reviews, studies were excluded in the present review if they had not used a validated measure of mental health and/or if follow-up was less than 90 days. In addition, to improve confidence in the results three approaches to quality assessment were conducted within the present review. First, NICE (2009) and SIGN (2004) quality checklists for case control, cohort or prognostic studies were applied to all potentially eligible studies. Second, an adapted version of the abortion-specific quality criteria applied in the Charles review was also used to assess the applicability of each study to answer the specific research questions. Finally, the present review utilised the GRADE process to evaluate the quality of outcomes across the different studies.

6.2 Findings

6.2.1 How prevalent are mental health problems in women who have an induced abortion?

What does the evidence say?
The evidence statements from this part of the review are shown in full in Section 3.6. The key points are as follows:

1. The studies included in the review are limited in a number of ways, making it difficult to form confident conclusions from the results.
2. The most important confounding variable appears to be mental health problems prior to the abortion.
3. Where studies included women with previous mental health problems, the rates of mental health problems after an abortion were higher than in studies which excluded women with a history of mental health problems.

There was a broad range of findings across the different mental health diagnostic categories regarding prevalence rates following an abortion. Overall the quality of the studies was poor to fair, with large variation in the study design, including: retrospective study designs and secondary data analysis of population studies; variable and sometimes small sample sizes; considerable variation in the measurement methods and the outcomes reported; and lack of adequate control for confounding variables including whether or not the pregnancy was planned and multiple pregnancy events both before and after abortion. In this context, the high degree of heterogeneity in prevalence rates reported may well result from these variations, making it difficult to form reliable conclusions or to make generalisations from these results.

The single largest confounding variable within this section of the review was the prevalence of mental health problems prior to the abortion. Where studies controlled for previous mental health problems, the prevalence rates reported after abortion were substantially lower than in studies where previous mental health problems were not accounted for.

One important, tangential finding from this part of the review is taken from the samples analysed by STEINBERG2008study1, which suggest that in countries where abortion is legal the majority of abortions (up to 95% in this study) are for unplanned pregnancies with only a small proportion occurring due to other therapeutic reasons such as fetal abnormality or physical risk to the mother. We can therefore assume that in such countries, the abortion rate approximates to the abortion rate for women with an unplanned pregnancy.

6.2.2 What factors are associated with poor mental health outcomes following an induced abortion?

What does the evidence say?

The evidence statements from this part of the present review are shown in full in Section 4.4. The key points are as follows:

1. The evidence reviewed is restricted by a number of limitations and the lack of UK-based studies reduces the generalisability of the data.
2. The most reliable predictor of post-abortion mental health problems is having a history of mental health problems prior to the abortion.
3. A range of other factors produced more mixed results, although there is some suggestion that life events, pressure from a partner to have an abortion, and negative attitudes towards abortions in general and towards a woman's personal experience of the abortion, may have a negative impact on mental health.
4. Women who show a negative emotional reaction immediately following an abortion are likely to have a poorer mental health outcome
5. There was an overlap in the risk factors associated with mental health problems following an abortion and those factors associated with mental health problems following a live birth, and factors associated with mental health problems for women in general.

This section of the review aimed to assess factors associated with mental health problems following an abortion. Identifying these factors would enable healthcare professionals to monitor and provide greater support for women identified as potentially 'at risk'.

All studies were of variable quality and even where studies used the same data source, differential control of confounding factors and variation in the way each factor was classified meant that studies came to different conclusions. Furthermore, a proportion of studies included in the review were not specifically designed to assess the different factors associated with mental health problems following an abortion. Other limitations included heterogeneity within the factors assessed and the outcomes reported, inconsistent reporting of non-significant factors and variations in follow-up times. In addition, it should be noted that this review excluded a number of poorer quality studies, which had been included in the APA review but did not satisfy our eligibility criteria. Also, the associated factors examined were not an exhaustive list. Only one study was UK-based and overall only one very good quality study was identified.

The most reliable predictor of post-abortion mental health problems was having a history of mental health problems prior to the abortion, a finding that emerged regardless of the specific outcome measure or method of reporting used. This confirmed the findings of the APA review. Additional confirmation of this finding came from considering only the prospective studies that found the single consistent factor associated with poorer mental health outcomes post-abortion to be pre-abortion mental health problems. It also appeared that any mental health problem prior to pregnancy increased the risk of post-abortion mental health problems, although studies often were not specific about the pre-abortion mental health problem.

A range of other potentially associated factors had more mixed results, although there was some suggestion that life events, feeling pressure from a partner to have an abortion, and negative attitudes towards abortions in general and towards a woman's personal experience of abortion, may have a negative impact on mental health. In other reviews, stigma, the perceived need for secrecy and lack of social support have also been reported to be important factors associated with poorer post-abortion outcomes. Importantly, the findings suggesting that women who show a negative emotional reaction immediately following the abortion are likely to have a poorer outcome, may act as a useful means of identifying those at risk of developing mental health problems.

When considering the risk of post-abortion mental health problems, it is also instructive to consider factors associated with poorer mental health outcomes following a live birth. In 2007, NICE published a clinical guideline on antenatal and postnatal mental health (NCCMH, 2007). The guideline conducted a systematic review of the best available evidence (large-scale prospective studies and existing systematic reviews) that assessed the mental health outcomes for women following a birth. Similar to the findings from the present review, the most important risk factor for poor mental health following a live birth was a history of mental health problems both before and during the pregnancy. Other important risk factors included low levels of perceived social support, exposure to recent life events, low self-esteem, childcare difficulties, relationship status, 'neuroticism', birth complications, marital discord, obstetric factors, socioeconomic status, age at time of pregnancy and a family history of depression. These risk factors can increase a new mother's chances of developing a range of mental health problems, including depression, puerperal psychosis, anxiety disorders and eating disorders.

The results of this review can also be considered in the light of the risk factors associated with mental health problems in women in the general population. One consistent factor across a range of conditions including depression, anxiety, PTSD and drug and alcohol misuse was experience of violence, particularly intimate partner violence (Campbell, 2002; Parker & Brotchie, 2010). One meta-analysis assessing the impact of intimate partner violence suggested that among battered women, the rates of depression, suicidality and PTSD were 48%, 18% and 64%, respectively (Golding, 1999). Other factors associated with increased rates of mental health problems in women included childhood sexual abuse, bullying, having more children, having children with behavioural problems and neuroticism.

There is evidence to suggest that women who have an unwanted pregnancy may differ on key dimensions, including their exposure to the above risk factors, from women with an unplanned or wanted pregnancy. For example, studies have highlighted that previous mental health problems, experience of violence including intimate partner violence and childhood trauma are more common in women who report an unwanted pregnancy (Campbell, 2002; RUSSO2001). Furthermore, the characteristics of women who go on to keep an unwanted pregnancy compared with who have an abortion may also differ, with many factors influencing the decision such as partner support and religiosity.

In summary, there is some overlap in the factors associated with poor mental health outcomes for post-abortion, postpartum women and for women in general, although large scale comparative data were lacking. The overlap in risk factors suggests, nevertheless, that in particular, for women with a history of mental health problems, monitoring and support may be required regardless of the pregnancy resolution. In addition, particular attention should be paid to those who have a negative emotional reaction after an abortion.

6.2.3 Are mental health problems more common in women who have an induced abortion, when compared with women who deliver an unwanted pregnancy?

What does the evidence say?
The evidence statements from this part of the review are shown in full in Section 5.5. The key points are as follows:

1. The evidence for this section of the review was generally rated as poor or very poor, with many studies failing to control for confounding variables and using weak controls for previous mental health problems, such as 1-year previous treatment claims. There was also a lack of comparable data across the diagnostic categories, which restricted the use of meta-analysis. These factors limit the interpretation of the results.
2. There was some evidence from studies that did not control for whether or not the pregnancy was planned or wanted suggesting that, compared with women who delivered a pregnancy:
   - there are increased risks of psychiatric treatment, suicide and substance misuse for women who undergo abortions
   - there was insufficient evidence to determine if there was an increased risk of depression, anxiety disorders, suicidal ideation or PTSD.
3. Where studies controlled for whether or not the pregnancy was planned or wanted, compared with women who delivered a pregnancy:
   - there was insufficient evidence of elevated risk of mental health problems such as depression, anxiety and non-psychotic illness following abortion
   - there was some limited evidence to suggest increased rates of self-harm following an abortion, but only in the unplanned group
   - there was some evidence of lower rates of psychotic illness for women following abortion.
4. Inadequate control for confounding factors was shown to have an impact on the results. Differences between groups did not remain significant when factors such as previous experience of abuse and violence were controlled for.
5. For women with no prior recorded history of psychiatric contact up to 9 months before a pregnancy event:
   - those who have an abortion have significantly higher rates of psychiatric contact before the abortion than do women in the same 9 month period prior to birth
   - those who have an abortion have rates of psychiatric contact after an abortion no greater than before the abortion
   - those who go onto birth have rates of psychiatric contact after birth significantly higher than before birth.
6. This suggests that women who have an abortion are already at higher risk of mental health problems, which does not increase following abortion.
   - An unwanted pregnancy may lead to an increase risk of mental health problems, or other factors may lead to both an increased risk of unwanted pregnancy and an increased risk of mental health problems.
   - When a woman has an unwanted pregnancy, rates of mental health problems will be largely unaffected whether she has an abortion or goes on to give birth.

The aim of this part of the review was to compare the mental health outcomes of women who had an abortion with those who delivered a live birth at full term. As noted in the Charles and APA reviews, women who delivered an unplanned or unwanted pregnancy are considered the most appropriate comparison for the review. However, the measurement of whether the pregnancy was wanted or unwanted is open to many difficulties. For example, a pregnancy that was unwanted may become wanted at a later stage of pregnancy and vice versa. An unplanned pregnancy can be either wanted or unwanted. Nevertheless, in countries such as Denmark and the US where abortion is 'on demand' in the first trimester, we can assume that those who opt for an abortion in this period, when there is no physical threat to the mother or baby, will be carrying an unwanted pregnancy.

As many of the studies did not account for whether or not the pregnancy was planned or wanted, studies that did account for these factors were reviewed separately with the following comparisons considered:

- any live birth versus abortion
- live birth of an unplanned pregnancy versus abortion of an unplanned pregnancy
- live birth of an unwanted pregnancy versus abortion of an unwanted pregnancy.

Data for all outcomes are limited by a number of factors including a lack of comparable data across a range of diagnostic categories and the generalisability of results to the UK context. A number of limitations shown in studies included in the prevalence and associated factors sections also apply here.

Studies that did not control for whether or not the pregnancy was planned or wanted, suggest that there are increased risks of receiving psychiatric treatment, suicide and substance misuse for women who have abortions compared with those who deliver a live birth. Findings for depression, anxiety disorders, suicidal ideation and PTSD did not indicate an increased risk.

In contrast, where studies controlled for whether or not the pregnancy was planned or wanted, there was insufficient evidence to determine whether or not there was an elevated risk of mental health problems, except for a small increase in possible self-harm in those having an abortion compared with the women who delivered an unplanned, but not unwanted pregnancy, and some evidence of lower rates of psychotic illness for women who had an abortion compared with those who delivered the pregnancy at full term.

Adequate control of confounding factors was shown to have an impact on the results, with previously significant findings no longer being significant when a range of confounding factors were accounted for. In essence, where studies controlled for multiple confounding factors (including the wantedness of the pregnancy), the risk of mental health problems following an abortion was comparable to the risk of mental health problems following a delivery. Consistent with this view, findings from both the APA and Charles reviews indicated that where studies were of better quality, controlling for previous mental health problems and accounting for other confounding factors, the risk of mental health problems was no greater following an abortion compared with a delivery.

Crucially, since the APA and Charles reviews, one national prospective study (MUNK-OLSEN2011) indicated that rates of psychiatric treatment were higher in the abortion group in the 9 months prior to the abortion when compared with the rates in the 9 months prior to delivery, despite controlling for mental health problems prior to this period. Furthermore, rates of psychiatric contact did not increase following an abortion

when compared with the 9 months before the abortion. This suggests that women who have an abortion develop mental health problems before the abortion and that this may be a reaction to an unwanted pregnancy. However, it is also possible that people who develop mental health problems are more likely to have an unplanned and/or unwanted pregnancy. Importantly, the rates of psychiatric contact in women who delivered was significantly higher after delivery than for the same women in the 9 months before delivery.

Finally, a number of studies have suggested that women who have an abortion are more likely to experience a range of risk factors associated with mental health problems, such as exposure to intimate partner violence, childhood physical and sexual abuse. Each of these explanations is consistent with the data in this review, previous reviews and the MUNK-OLSEN2011 study.

Although the focus of the present review is on the best available scientific evidence, the legal frameworks within which the studies were conducted must be considered when interpreting the findings. Studies included in the present and previous reviews have been undertaken in countries that either allow abortion 'on demand', or on the grounds of averting possible harm to the mother's mental health. This makes interpretation of these findings problematic. In the UK and commonwealth countries, our finding that women with an unwanted pregnancy who have an abortion appear not to experience an increase in mental health problems that the abortion was used to avert, could suggest that the current legal framework is proving to be effective. However, we cannot wholly discount the possibility that abortion itself may have little if any effect on mental health outcomes.

6.3 Conclusion

There are significant limitations in the evidence examining the relationships between unwanted pregnancy, abortion, birth and mental health. The effects of confounding factors are substantial, especially the influence of mental health problems prior to abortion, and with regard to other factors known to be associated with mental health problems in women, not only relating to abortion or birth, but among women in the general population. We have used more robust quality checks than previous reviews in an attempt to improve the validity and reliability of findings and to limit the influence of these confounders. In addition, although we have undertaken a meta-analysis, we have restricted its applicability to minimise systematic bias. However, even the small meta-analysis performed for this review has the limitation that it includes studies undertaken in countries with different legal frameworks.

Evidence from the narrative review and meta-analysis indicated that for the majority of mental health outcomes, there was no statistically significant association between pregnancy resolution and mental health problems. Where we found a statistically significant association between abortion and a mental health outcome, for example increased rates of self-harm and lower rates of psychosis, the effects were small (psychosis) and prone to bias (for instance, there were common factors underlying seeking an abortion and later self-harm). In this review, we have surmised that the association between abortion and mental health outcomes are unlikely to be meaningful. Overall, we have therefore largely confirmed the findings of the APA and Charles reviews, both through our narrative review and meta-analysis. When a woman has an unwanted pregnancy, rates of mental health problems will be largely unaffected whether she has an abortion or goes on to give birth.

Further interpretation of the relationship between abortion and mental health outcomes has been made possible through the finding that unwanted pregnancies are associated with higher rates of mental health problems before an abortion, compared with women who give birth. That is, women who have an abortion, presumably for an unwanted pregnancy in the majority of cases, are more likely to experience a mental health problem in the 9 months before the abortion, compared with women who give birth, even when previous mental health problems before this 9-month period are controlled for. Furthermore, the rate of mental health problems did not increase following the abortion. However, we cannot be sure whether the unwanted pregnancy is the result of mental health problems; or that an unwanted pregnancy leads to mental health problems; or, indeed, that some other factors, such as intimate partner violence, may lead to both mental health problems and an unwanted pregnancy. What does seem to be more certain is that for women with an unwanted pregnancy, abortion does not appear to harm their mental health.

Recommendations

- In the light of these findings, it is important to consider the need for support and care for all women who have an unwanted pregnancy, because the risk of mental health problems increases whatever the pregnancy outcome.

- If a woman has a negative attitude towards abortion, shows a negative emotional reaction to the abortion or is experiencing stressful life events, health and social care professionals should consider offering support, and where necessary treatment, because they are more likely than other women who have an abortion to develop mental health problems.

- There is a need for good quality prospective longitudinal research to explore the relationship between previous mental health problems and unwanted pregnancy, especially in a UK context, to gain a better understanding of which women may be at risk of mental health problems and to identify those in need of support.

APPENDICES

APPENDIX 1
DECLARATIONS OF INTERESTS BY STEERING GROUP MEMBERS

Steering Group members were appointed because of their knowledge of induced abortion, experience of scientific issues, health research, the delivery and receipt of healthcare, mental health issues and the role of organisations for people undergoing induced abortion.

To minimise and manage any potential conflicts of interest, and to avoid any public concern that commercial or other financial interests have affected the work of the Steering Group and influenced the findings of the review, members of the Steering Group were required to declare as a matter of public record any interests held by themselves or their families which fall under specified categories (see below). This process followed that set out by NICE (2009) for Guideline Development Groups. These categories included any relationships they had with the healthcare industries, professional organisations, organisations that had a declared position for or against abortion, organisations providing induced abortions as well as organisations providing support for people considering induced abortion and their families and carers.

To allow the management of any potential conflicts of interest that might arise during the development of the guideline, Steering Group members were asked to declare their interests at the outset and at each Steering Group meeting throughout the review process. The interests of all the members of the Steering Group are listed below.

Categories of interest

- Paid employment
- Personal pecuniary interest: financial payments or other benefits from either the manufacturer or the owner of a product or service under consideration, or the industry or sector from which the product or service comes. This includes holding a directorship, or other paid position; carrying out consultancy or fee paid work; having shareholdings or other beneficial interests; receiving expenses and hospitality over and above what would be reasonably expected to attend meetings and conferences.
- Personal family interest: financial payments or other benefits from the healthcare industry that were received by a family member.
- Non-personal pecuniary interest: financial payments or other benefits received by the Steering Group member's organisation or department, but where the member has not personally received payment, including fellowships and other support provided by the healthcare industry. This includes a grant or other payment to sponsor a post, or contribute to the running costs of the department; commissioning of research or other work; contracts with, or grants from organisations such as NICE.
- Personal non-pecuniary interest: these include, but are not limited to, clear opinions or public statements made about induced abortion, holding office in a professional organisation or advocacy group with a direct interest in abortion or other reputational risks relevant to this review.

Declarations of interest - Steering Group	
Dr Roch Cantwell	
Employment	Consultant Perinatal Psychiatrist and Fellow of RCPsych and Chair of the section of Perinatal Psychiatry, RCPsych
Personal pecuniary interest	None
Personal family interest	None
Non-personal pecuniary interest	None
Personal non-pecuniary interest	Member of RCPsych. Publications: Oates, M. Jones, I. Cantwell, R. (2008) Invited commentaries on abortion and mental health disorders. *British Journal of Psychiatry*, 193, 452-454. Cantwell, R. Jones, I. Oates, M. (2009) Letter to the Editor. *British Journal of Psychiatry,* 195, 369.
Actions taken	None required
Professor Tim Kendall	
Employment	Director, NCCMH, RCPsych Consultant Psychiatrist and Medical Director, Sheffield Health and Social Care NHS Foundation Trust
Personal pecuniary interest	None
Personal family interest	None
Non-personal pecuniary interest	NCCMH receives a grant of approximately £1.2m per year from NICE for the development of a programme of mental health clinical guidelines and related evidence based guidance.
Personal non-pecuniary interest	None
Actions taken	None required
Dr Ian Jones	
Employment	Reader in Perinatal Psychiatry and Honorary Consultant Perinatal Psychiatrist, Cardiff University.
Personal pecuniary interest	None
Personal family interest	None
Non-personal pecuniary interest	None
Personal non-pecuniary interest	Member of Executive of the Perinatal Psychiatric Section of the RCPsych. Provided comment on Munk-Olsen‘s (2011) paper. Oates, M. Jones, I. Cantwell, R. (2008) Invited commentaries on abortion and mental health disorders. *British Journal of Psychiatry*, 193, 452-454.
Actions taken	None required
Dr Tahir Mahmood	
Employment	RCOG and Consultatnt Obstetrician and Gynaecologist, NHS Fife Scotland
Personal pecuniary interest	None
Personal family interest	None
Non-personal pecuniary interest	None

Personal non-pecuniary interest	Fellow of RCOG Served on the following Working Parties of the RCOG in capacity as Vice President Standards: The Care of Women Requesting Induced Abortion, Termination of Pregnancy for Fetal Abnormality in England, Scotland and Wales, Fetal Awareness: Review of Research and Recommendations for Practice
Actions taken	None
Dr Judy Shakespeare	
Employment	General Practitioner
Personal pecuniary interest	None
Personal family interest	None
Non-personal pecuniary interest	None
Personal non-pecuniary interest	Fellow of Royal College of General Practitioners
Actions taken	None required
Ms Victoria Bird	
Employment	Institute of Psychiatry, King's College London Consultant Systematic Reviewer to NCCMH
Personal pecuniary interest	None
Personal family interest	None
Non-personal pecuniary interest	None
Personal non-pecuniary interest	None
Actions taken	None required
Ms Henna Bhatti	
Employment	Research Assistant, NCCMH, RCPsych
Personal pecuniary interest	None
Personal family interest	None
Non-personal pecuniary interest	None
Personal non-pecuniary interest	None
Actions taken	None required
Ms Hannah Jackson	
Employment	Research Assistant, NCCMH, RCPsych
Personal pecuniary interest	None
Personal family interest	None
Non-personal pecuniary interest	None
Personal non-pecuniary interest	None
Actions taken	None required
Ms Marie Halton	
Employment	Research Assistant, NCCMH, RCPsych
Personal pecuniary interest	None
Personal family interest	None
Non-personal pecuniary interest	None
Personal non-pecuniary interest	None

Actions taken	None required
Ms Caroline Salter	
Employment	Research Assistant, NCCMH, RCPsych
Personal pecuniary interest	None
Personal family interest	None
Non-personal pecuniary interest	None
Personal non-pecuniary interest	None
Actions taken	None required
Mr Timothy Kember	
Employment	Research Assistant, NCCMH, RCPsych
Personal pecuniary interest	None
Personal family interest	None
Non-personal pecuniary interest	None
Personal non-pecuniary interest	None
Actions taken	None required
Ms Christine Sealey	
Employment	Head of NCCMH, RCPsych
Personal pecuniary interest	None
Personal family interest	None
Non-personal pecuniary interest	None
Personal non-pecuniary interest	None
Actions taken	None required
Dr Craig Whittington	
Employment	Senior Systematic Reviewer, NCCMH, RCPsych
Personal pecuniary interest	None
Personal family interest	None
Non-personal pecuniary interest	None
Personal non-pecuniary interest	None
Actions taken	None required
Dr Nick Meader	
Employment	Systematic Reviewer, NCCMH, RCPsych
Personal pecuniary interest	None
Personal family interest	None
Non-personal pecuniary interest	None
Personal non-pecuniary interest	None
Actions taken	None required
Professor Steve Pilling (Advisor to Steering Group)	
Employment	Clinical Psychologist. Director of Centre for Outcomes Research and Effectiveness, University College London. Director, National Collaborating Centre for Mental Health, London
Personal pecuniary interest	None
Personal family interest	None

Non-personal pecuniary interest	NCCMH receives a grant of approximately £1.2m per year from NICE for the development of a programme of mental health clinical guidelines and related evidence based guidance.
Personal non-pecuniary interest	None
Actions taken	None required
Ms Claudette Thompson (Observer)	
Employment	Department of Health, funders of this project
Personal pecuniary interest	None
Personal family interest	None
Non-personal pecuniary interest	None
Personal non-pecuniary interest	None
Actions taken	None required
Ms Lisa Westall (Observer)	
Employment	Department of Health, funders of this project
Personal pecuniary interest	None
Personal family interest	None
Non-personal pecuniary interest	None
Personal non-pecuniary interest	None
Actions taken	None required
Ms Andrea Duncan (Observer)	
Employment	Department of Health, funders of this project
Personal pecuniary interest	None
Personal family interest	None
Non-personal pecuniary interest	None
Personal non-pecuniary interest	None
Actions taken	None required
Mr Sunjai Gupta (Observer)	
Employment	Department of Health, funders of this project
Personal pecuniary interest	None
Personal family interest	None
Non-personal pecuniary interest	None
Personal non-pecuniary interest	None
Actions taken	None required

APPENDIX 2
RESEARCHERS CONTACTED FOR INFORMATION

The following researchers were contacted for one or more of the following:

- information on existing, unpublished or soon-to-be published research
- information or data from specific studies
- comments on the draft report
- details of studies that may have been missed in this review.

Dr Vignetta Charles
National Aids Fund, Washington DC, USA

Professor Priscilla Coleman
Department of Psychiatry, Bowling Green State University, Ohio, USA

Professor David M Fergusson
Department of Psychological Medicine, University of Otago, New Zealand

Professor Anne Gilcrist
Royal Cornhill Hospital, Aberdeen, Scotland

Professor Phillip C Hannaford
Centre of Academic Primary Care, University of Aberdeen, Scotland

Professor John Horwood
Department of Psychological Medicine, University of Otago, New Zealand

Dr Brenda Major
Department of Psychology, University of California-Santa Barbara, CA, USA

Dr Philip Ney
Mount Joy College, Victoria, British Columbia, Canada

Professor Julia Steinberg
Department of Psychiatry, University of California, San Francisco, CA, USA

Esther Isabelle Wilder
Lehman College Department of Sociology, City University of New York, New York, USA

APPENDIX 3
ORGANISATIONS AND INVITED EXPERTS WHO RESPONDED TO CONSULTATION

Responses were received from the following organisations and individuals who responding to the public consultation, including a number of researchers who were specifically invited to comment (see Appendix 2). The full set of comments, with NCCMH responses, was published on the NCCMH website http://www.nccmh.org.uk.

Organisations

— American Association of ProLife Obstetricians and Gynecologists (AAPLOG), Holland, Michigan, USA
— American Psychiatric Association, Arlington, Virginia, US
— The Anscombe Bioethics Centre, Oxford, UK
— Bowling Green State University Department of Psychiatry, Ohio, USA
— British Psychological Society, UK
— CARE, London, UK
— Catholic Medical Association, UK
— Christian Concern, London, UK
— Christian Medical Fellowship, London, UK
— Church of England: Mission and Public Affairs Council, UK
— Comment on Reproductive Ethics (CORE), London, UK
— Department of Adult Psychiatry, University College Dublin, Ireland
— Elliot Institute, Springfield, Illinois, USA
— Family Planning Association, London, UK
— Global Doctors for Choice, New York, USA
— The Maranatha Community, Manchester, UK
— Mind, London, UK
— Mount Joy College, British Columbia, Canada
— Otago University Department of Psychological Medicine, New Zealand
— Pension and Population Research Institute (PAPRI), London, UK
— ProLife Alliance, London, UK
— Right to Life, UK
— Royal College of Obstetricians and Gynaecologists, London, UK
— Secular Medical Forum, UK
— Society for the Protection of Unborn Children (SPUC), London, UK
— University of California Department of Psychiatry, San Francisco, CA, USA

Individuals

Seventeen individuals responded (names withheld to protect their privacy)

APPENDIX 4
STUDIES IDENTIFIED BY CONSULTEES

The following studies were identified during the consultation process, by consultees, as having been missed from the review. Where consultees referred to missed studies but did not give full details, the NCCMH contacted them requesting the full references, in order that they could be reviewed to ascertain their eligibility for inclusion.

Studies missed in the original search are marked with an asterisk. Many of these did not meet inclusion criteria and full details for each can be found in Apendix 7.

*Bankole, A., Singh, S. & Haas, T. (1999) Characteristics of women who obtained induced abortion: a worldwide review. *International Family Planning Perspectives*, 25, 68-77.

*Belsey, E. M., Greer, H. S., Lal, S., *et al.* (1977) Predictive factors in emotional response to abortion: King's termination study-IV. *Social Science & Medicine*, 11, 71-82.

Bradshaw, Z. & Slade, P. (2003) The effects of induced abortion on emotional experiences and relationships: A critical review of the literature. *Clinical Psychology Review*, 23, 929-958.

Bradshaw, Z. & Slade, P. (2005) The relationships between induced abortion, attitudes to sexuality and sexual problems. *Sexual and Relationship Therapy*, 20, 391-406.

*Brewer, C (1977) Third time unlucky: a study of women who have three or more legal abortions. *Journal of Biosocial Science*, 9, 99-105.

*Brewer, C. (1977) Incidence of post-abortion psychosis: a prospective study. *British Medical Journal,* 1, 476-477.

*Brewer, C. (1978) Huntington P. J. (1978) Mortality from abortion, the NHS record. *British Medical Journal*, 2, 6136-6562.

*Broen, A. N., Moum, T., Bödtker, A. S. & Ekeberg, Ö. (2005) Reasons for induced abortion and their relation to women's emotional distress: a prospective, two-year follow-up study. *General Hospital Psychiatry*, 27, 36-43.

*Cameron, P. (1972) How much do mothers love their children? Unpublished manuscript presented to the Rocky Mountain Psychological Association, Albuquerque, New Mexico, 12 May 1972, cited in P. Cameron & J.C. Tichenor (1976) The Swedish 'Children Born to Women Denied Abortion' study: a radical criticism. *Psychological Reports*, 39, 391-394.

Cameron, S. (2010) Induced abortion and psychological sequelae. *Best Practice & Research: Clinical Obstetrics & Gynaecology*, 24, 657-665.

Casey, P. R. (2010) Abortion among young women and subsequent life outcomes. *Best Practice & Research: Clinical Obstetrics & Gynaecology*, 24, 491-502.

Coleman, P.K. & Nelson, E.S. (1998) The quality of abortion decisions and college students' reports of post-abortion emotional sequelae and abortion attitudes. *Journal of Social and Clinical Psychology*, 17, 425-442.

*Coleman, P. K., Reardon, D. C. & Cougle, J. (2002) The quality of care-giving environment and child developmental outcomes associated with maternal history of abortion using NLSY data. *The Journal of Child Psychology and Psychiatry*, 43, 743-757.

Coleman, P. K. (2005) Induced abortion and increased risk of substance use: a review of the evidence. *Current Women's Health Reviews*, 1, 21-34.

*Coleman, P. K., Maxey, C. D., Rue, V. M, *et al.* (2005) Associations between voluntary and involuntary forms of perinatal loss and child mistreatment among low-income mothers. *Acta Paediatrica*, 10, 1476-1483.

Coleman, P. K., Reardon, D. C., Strahan, T., *et al.* (2005) The psychology of Abortion: A review and suggestions for future research. *Psychology and Health*, 20, 237-271.

Coleman, P. K. (2006) Resolution of unwanted pregnancy during adolescence through abortion versus childbirth: individual and family predictors and consequences. *Journal of Youth and Adolescence*, 35, 903-911.

*Coleman, P.K. (2011) Abortion and mental health: quantitative synthesis and analysis of research published 1995-2009. *British Journal of Psychiatry*, 199, 180-186.

Felton, G. M., Parsons, M. A. & Hassell, J. S. (1998). Health behavior and related factors in adolescents with a history of abortion and never-pregnant adolescents. *Health Care for Women International*, 19, 37-47.

Fisher, W. A., Singh, S. S., Shuper, P. A., *et al.* (2005) Characteristics of women undergoing repeat induced abortion. *Canadian Medical Association*, 172, 637-641.

Gissler, M., Berg, C., Bouvier Colle, M. H., *et al.* (2004) Pregnancy associated mortality after birth, spontaneous abortion or induced abortion in Finland, 1987-2000. *American Journal of Obstetrics and Gynaecology,* 19, 422 427.

Goodwin, P. & Ogden, J. (2007) Women's reflections upon their past abortions: an exploration of how and why emotional reactions change over time. *Psychology and Health,* 22, 231–248.

Hathaway, J. E., Willis, G., Zimmer, B., *et al.* (2005) Impact of partner abuse on women's reproductive lives. *Journal of the American Medical Women's Association*, 60, 42-45.

Hopker, S.W. & Brockington, I. F. (1991) Psychosis following hydatidiform mole in a patient with recurrent puerperal psychosis. *British Journal of Psychiatry*, 158, 122-123.

Howie, F. L., Henshaw, R. C., Naji, S. A., *et al.* (1997) Medical abortion or vacuum aspiration? Two year follow up of a patient preference trial. *British Journal of Obstetrics & Gynaecology*, 104, 829-833.

*Kent, I. & Nicholls, W. (1981) Bereavement in post-abortive women: a clinical report. *World Journal of Psychosynthesis*, 13, 14-17

Kersting, A. K. Kroker, K.& Steinhard, J. (2009) Psychiatric morbidity after termination of pregnancy for fetal anomaly. *American Journal of Obstetrics and Gynaecology*, 201, 160. e1-7.

Klock, S. C. (1997) Psychological distress among women with recurrent spontaneous abortion. *Psychomatics,* 38, 503-507.

Kulkarni, J., McCauly-Elson, K., Marston, N., *et al.* (2008) Preliminary findings from the National Register of Antipsychotic Medication in Pregnancy. *Australian and New Zealand Journal of Psychiatry,* 42, 38-44

Layer, S. D., Roberts, C., Wild, K., *et al.* (2004) Post-abortion grief: evaluating the possible efficacy of a spiritual group intervention. *Research on Social Work Practice*, 14, 344-350.

Major, B., Mueller, P. & Hildebrandt, K. (1985) Attributions, expectations and coping with abortion. *Journal of Personality and Social Psychology*, 48, 585-599.

*Mattison, P. C. (1979). The interaction between legalisation of abortion and contraception in Denmark. *World Health Statistics Quarterly*, 32, 246-256.

*Morgan, C., Evans, M., Peter, J., *et al.* (1997) Suicides after pregnancy: mental health may deteriorate as a direct effect of induced abortion. *British Medical Journal*, 314, 902.

Munk-Olsen, T., Laursen, T.M., Pedersen, C.B., *et al.* (2011) Induced first-trimester abortion and risk of mental disorder. *New England Journal of Medicine*, 364, 332-339.

*Ney, P. G. (1968) Psychodynamics of behaviour therapies. *Canadian Psychiatric Association Journal*, 13, 555-559.

*Ney, P. G. (1971) Quantitative measurement in psychiatry. *Indonesian Journal of Psychiatry*, 2, 66-78.

*Ney, P. G. (1983) A consideration of abortion survivors. *Child Psychiatry and Human Development*, 13, 168-179.

*Ney, P. G. & Barry, J. E. (1983) Children who survive. *New Zealand Medical Journal,* 96, 127-129.

*Ney, P. G., Johnson, I. & Herron, J. (1985) Social and legal ramifications of a child crisis line. *Child Abuse and Neglect, 9*, 47-55.

*Ney, P. G., McPhee, J., Moore, C., et al (1986) Child abuse: a study of the child's perspective. *Child Abuse and Neglect, 10,* 511-518.

*Ney, P. G. (1987) Does verbal abuse leave deeper scars: a study of children & parents. *Canadian Journal of Psychiatry*, 32, 371-378.

*Ney, P. G. (1987) The treatment of abused children: the natural sequence of events. *American Journal of Psychiatry*, 46, 391-401.

*Ney, P. G. (1988) Transgenerational child abuse. *Child Psychiatry & Human Development*, 18,151-168.

*Ney, P. G. (1988) Triangles of child abuse: a model of maltreatment. *Child Abuse and Neglect*, 12, 363-373.

*Ney, P. G. (1989) Child mistreatment: possible reasons for its transgenerational transmission. *Canadian Journal of Psychiatry*, 34, 594-601.

Ney, P. G. & Wickett, A. R. (1989) Mental health and abortion: review and analysis. *Psychiatric Journal of the University of Ottawa*, 14, 506-516.

*Ney, P. G., Wickett, A. R. & Fung, T. (1992) Causes of child abuse and neglect. *Canadian Journal of Psychiatry, 37*, 401-405.

*Ney, P. G., Fung, T. & Wickett, A. R. (1993) Child neglect: the precursor to child abuse. *Pre and Perinatal Psychology Journal*, 8, 95-112.

Ney, P. G., Fung, T., Wickett, A. R. (1993) Relationships between induced abortion and child abuse and neglect: four studies. *Pre and Perinatal Psychology Journal, 8*, 43-63.

Ney, P. G., Fung, T., Wickett, A. R., *et al.* (1994) The effects of pregnancy loss on women's health. *Social Science & Medicine, 38*, 1193-1200.

*Ney, P. G., Fung, T. & Wickett, A. R. (1994) The worst combinations of child abuse and neglect. *Child Abuse and Neglect*, 18, 705-714.

*Ney, P. G., Sheils, C. & Gajowy, M. (2006) Post abortion survivor syndrome (PASS): signs and symptoms. *Southern Medical Journal, 99*, 1405-1406.

Ney, P. G., Ball, K. & Sheils, C. (2010) Results of group psychotherapy for abuse, neglect and pregnancy loss. *Current Women's Health Review*, 6, 332-340.

Ney, P. G., Sheils, C. & Gajowy, M. (2010) Post-abortion survivor syndrome: signs and symptoms. *Journal of Pre and Perinatal Psychology and Health, 25*, 107-129.

*Ney, P.G., Fung, T. & Sheils, C. Factors that determine pregnancy outcome. Manuscript submitted for publication, 2011

*Ney, P.G., Shiels, C. & Fung, T. How partner support affects pregnancy outcome. Manuscript submitted for publication, 2011

Norris, A., Bessett, D., Steinberg, J. R., *et al.* (2011) Abortion stigma: a reconceptualization of constituents, causes, and consequences. *Women's Health Issues, 21*, S49-S54.

Ostbye, T., Wenghofer, E. F., Woodward, C. A., *et al.* (2001) Health services utilization after induced abortion in Ontario: a comparison between community clinics and hospitals. *American Journal of Medical Quality, 16*, 99-106.

Reardon, D. C., Coleman, P. K. & Cougle, J. (2004) Substance use associated with prior history of abortion and unintended birth: a national cross-sectional cohort study. *American Journal of Drug and Alcohol Abuse, 26*, 369-383.

Reardon, D.C. & Coleman, P.K. (2006) Relative treatment rates for sleep disorders and sleep disturbances following abortion and childbirth: a prospective record based study. *Sleep, 29*, 105-106.

Robinson, G. E., Stotland, N. L., Russo, N. F., *et al.* (2009). Is there an “Abortion Trauma Syndrome”? Critiquing the evidence. *Harvard Review of Psychiatry, 17*, 268-290.

Silverman, J. G., Decker, M. R., McCauley, H. L., *et al.* (2010) Male perpetration of intimate partner violence and involvement in abortions and abortion-related conflict. *American Journal of Public Health, 100*, 1415-1417.

*Söderberg, H. (1998) Urban women applying for induced abortion. *Studies of epidemiology, attitudes, and emotional reactions*. Dissertation, University Hospital Malmö, Sweden.

Söderberg, H., Andersson, C., Janzon, L., *et al.* (1997) Continued pregnancy among abortion applications. A study of women having a change of mind. *Acta Obstetricia et Gynecologica Scandinavica, 76*, 942-947.

*Söderberg, H., Andersson, C., Janzon, L., et al (1998) Selection bias in a study on how women experienced induced abortion. *European Journal of Obstetrics &. Gynecology and Reproductive Biology, 77,* 67-70.

*Söderberg, H., Janzon, L. & Sjöberg, N., O. (1998) Emotional distress following induced abortion**:** a study of its incidence and determinants among abortees in Malmö, Sweden. *European Journal of Obstetrics & Gynecology and Reproductive Biology,* 79, 173-178.

Steinberg, J. R. & Finer, L. B. (2011) Examining the association of abortion history and current mental health: a reanalysis of the National Comorbidity Survey using a common-risk-factors model. *Social Science & Medicine, 72,* 72-82.

Steinberg, J. R., Becker, D. & Henderson, J. T. (2011) Does the outcome of a first pregnancy predict depression, suicidal ideation, or lower self-esteem? Data from the National Comorbidity Survey. *American Journal of Orthopsychiatry, 81*, 193-201.

*Thiel de Bocanegra, H., Rostovtseva, D. P., Khera, S. *et al.* (2010) Birth control sabotage and forced sex: experiences reported by women in domestic violence shelters. *Violence Against Women, 16*, 601.

Thorp, J. M., Hartmann, K. E. & Shadigin, E. (2003) Long-term physical and psychological health consequences of induced abortion: review of the evidence. *Obstetrical & Gynecological Survey, 58*, 67-79.

*Vogel, L. (2011) “Do it yourself” births prompt alarm. *Canadian Medical Association Journal, 183*, 648-650.

Walker, *A. Pregnancy, Pregnancy Loss and Induced Abortion*. Oxford: Blackwell

Warren, J. T., Harvey, S. M. & Henderson, J. T. (2010) Do depression and low self-esteem follow abortion among adolescents? Evidence from a national study. *Perspectives on Sexual and Reproductive Health, 42*, 230-235.

Wilmoth, G. H., de Alteriis, M. & Bussell, D. (1992) Prevalence of psychological risks following legal abortion in the U.S.: Limits of the evidence. *Journal of Social Issues, 48*, 37–66.

APPENDIX 5
SEARCH STRATEGIES FOR THE IDENTIFICATION OF CLINICAL STUDIES

Search strategies
The search strategies should be referred to in conjunction with information set out in Chapters 3, 4 and 5. A summary of search strategies is shown in Table A. Each search was constructed using groups of terms as set out in below and the full set of search terms constructed for use in MEDLINE follow.

Table A: Summary of systematic search strategies

Review areas	Search construction	Study designs	Databases and years searched	Hit rate
All	[(Abortion terms) AND (Mental health terms OR somatoform terms OR substance abuse terms OR domestic violence terms OR emotion terms OR employment terms OR life satisfaction terms OR self-esteem terms OR stigma terms OR post-abortion adjustment/syndrome terms)]	All	MEDLINE, 1990 to (week 27) 2011; MEDLINE In-Process and Other Non-Indexed Citations through 21 July 2011; EMBASE, 1990 to week 28 of 2011; CINAHL, 1990 to (week 27) of 2011; PsycINFO, 1990 to (week 27) of 2011	5813 [excludes APA2008 search results]

MEDLINE
The following search strategy was used to identify papers in MEDLINE (see Table B). A similar strategy was used to identify references in other databases. The resulting evidence was evaluated with respect to its ability to address all the review areas.

Table B: Search strategy used IN MEDLINE

Abortion
(abortion applicants or abortion, criminal or abortion, eugenic or abortion, habitual or abortion, incomplete or abortion, induced or abortion, legal or abortion, therapeutic or abortion, threatened).sh. • (abort$ or postabort$ or preabort$ or ((f?etal$ or f?etus$ or gestat$ or interpregnan$ or midtrimester$ or pregnan$ or prenatal$ or pre natal$ or trimester$) and terminat$) or ((interpregnan$ or pregnan$) adj3 loss$) or ((f?etal$ or f?etus$) adj loss$) or (((elective$ or threaten$ or voluntar$) adj2 interrupt$) and (f?etal$ or f?etus$ or gestat$ or interpregnan$ or midtrimester$ or pregnan$ or prenatal$ or pre natal$ or trimester$))).ti,ab. • or/1-2
Mental health terms **General mental health terms**
• (mental disorders or mental health).sh. • ((mental$ or psychological$) adj2 (condition$ or disease$ or disorder$ or distress or health or ill$ or problem$)).ti,ab. • or/4-5
Schizophrenia and psychosis
• exp psychotic disorders/ or exp schizophrenia/ or (affective disorders, psychotic or delusions or hallucinations or paranoid disorders).sh. • (delusion$ or hallucin$ or paranoi$ or psychiatric$ or psychosis or psychoses or psychotic$ or schizo$).hw,ti,ab. • or/7-8
Depression and bipolar disorder
• (adjustment disorders or affective symptoms or mood disorders).sh. • (((adjustment or affective or mood) adj disorder$) or affective symptom$).ti,ab. • or/10-11 • exp bipolar disorder/ • (bipolar disorder$ or mania$ or manic$ or rapid cycl$).ti,ab. • or/13-14 • (depression or depressive disorder or depressive disorder, major or dysthymic disorder).sh. • (depres$ or dysphori$ or dysthymi$).ti,ab. • or/16-17
Self-harm
• (overdose or self injurious behavior or self mutilation or suicide or suicide, assisted or suicide, attempted).sh. • (selfharm$ or self harm$ or selfinjur$ or self injur$ or selfmutilat$ or self mutilat$ or suicid$ or selfdestruct$ or self destruct$ or selfpoison$ or self poison$ or (self adj2 cut$) or cutt$ or overdose$ or selfimmolat$ or self immolat$ or selfinflict$ or self inflict$ or automutilat$ or auto mutilat$).ti,ab. • or/19-20

Anxiety disorders

- exp anxiety disorders/
- (anxiet$ or anxious$ or ((chronic$ or excessiv$ or intens$ or (long$ adj2 last$) or neuros$ or neurotic$ or ongoing or persist$ or serious$ or sever$ or uncontrol$ or un control$ or unrelent$ or un relent$) adj2 worr$)).ti,ab.
- (obsessive$ or clean response$ or compulsi$ or obsession$ or ocd or recur$ thought$).ti,ab.
- panic$.ti,ab.
- (phobi$ or agoraphobi$ or claustrophobi$).ti,ab.
- (posttraumatic$ or post traumatic$ or stress disorder$ or acute stress or desnos or ptsd or (extreme stress or flashback$ or flash back$ or hypervigilan$ or hypervigilen$ or psych$ stress or psych$ trauma$ or psychotrauma$) or (railway spine or (rape adj2 trauma$) or reexperienc$ or re experienc$ or traumatic neuros$ or traumatic stress) or (trauma$ and (avoidance or emotion$ or grief or horror or nightmare$ or night mare$))).ti,ab.
- or/22-27

Eating disorders

- exp eating disorders/ or exp hyperphagia/
- (anorexi$ or ((appetite or eating) adj disorder$) or binge$ or bulimia or bulimic$ or (compulsive$ and (eat$ or vomit$)) or (food$ and bing$) or hyperphagi$ or (self induc$ and vomit$)).ti,ab.
- or/29-30

Somatoform disorders

- exp somatoform disorders/ or (malingering or munchausen syndrome or psychosomatic medicine).sh.
- (somato$ or psychosomat$).ti,ab.
- or/32-33

Substance misuse

- "codependency (psychology)"/ or exp substance related disorders/ or (alcohol dehydrogenase or alcohol drinking or alcohol withdrawal$ or behavior, addictive or needle sharing or needle-exchange programs or neonatal abstinence syndrome or overdose or solvents).sh.
- (((alcohol$ or drug$1 or nicotine or polydrug$ or substance$ or tobacco) adj3 (abstain$ or abstinen$ or abus$ or addict$ or criminal or dependen$ or excessive use$ or illegal$ or illicit$ or intoxicat$ or misus$ or over dos$ or overdos$ or recreation$ or unlawful$)) or ((alcohol$ or drug$1 or nicotine or polydrug$ or substance$ or tobacco) adj use$1) or ((drug$1 or polydrug$ or recreational or substance$) adj rehab$) or abusable product$ or (crave$ adj2 inject$) or hard drugs or needle fixation or soft drugs or vsa$1 or ((amphetamin$ or cannabis$ or cocaine or dexamfetamin$ or dextroamphetamin$ or dexedrine or heroin or marijuana or marihuana or methamphetamin$ or psychostimulant$ or stimulant$1) adj (abus$ or addict$ or misus$ or depend$ or use$1))).ti,ab.
- or/35-36

Domestic violence

- (battered women or child abuse or child abuse, sexual or domestic violence or family conflict or incest or mandatory reporting or pedophilia or rape or sex offenses or spouse abuse or violence).sh.
- (abuse$ or abusing or assault$ or batter$ or violen$ or conflict or incest$ or p?edophil$ or rape or rapist$ or (sex$ adj2 offenc$)).ti,ab.
- or/38-39

Emotions

- exp emotions/ or (anxiety, separation or emotional intelligence).sh.
- (emotion$ or grief or griev$ or regret$ or relief or shame$).ti,ab.
- or/41-42

Employment
• (career choice or career mobility or employment or employment, supported or job application or occupational exposure or occupational health or occupations or personnel downsizing or rehabilitation, vocational or unemployment or vocational education or women, working or workplace).sh. • (career$ or employ$ or job$1 or occupation$ or psychosocial$ or psycho social$ or unemploy$).ti,ab. or psychosocial$.hw. • or/44-45
Life satisfaction
• "quality of life"/ or (job satisfaction or life style or personal satisfaction).sh. • (((life$ or personal) adj5 satisf$) or (life$ adj2 (change$ or qualit$ or modif$)) or wellbeing or well being).ti,ab. • or/47-48
Self-esteem
• "self assessment (psychology)"/ or "unconscious (psychology)"/ or (self concept or self disclosure).sh. • ((self adj (concept or esteem or confiden$ or critici$ or evaluat$ or express$ or perception)) or selfconcept or selfesteem or selfconfiden$ or selfcritici$ or selfevaluat$ or selfexpress$ or selfperception).ti,ab. • or/50-51
Stigma
• exp social behaviour/ or (attitude or social perception).sh. • (prejudice$ or discrimin$ or stereotyp$ or stigma$).ti,ab. • or/53-54
Post-abortion adjustment/syndrome
• ((postabort$ or post abort$ or ((after or follow$) adj8 abort$)) adj8 (adjust$ or counsel$ or interven$ or problem$ or program$ or therap$ or treat$)).ti,ab. • ((postabort$ or abort$) adj2 syndrom$).ti,ab. • or/56-57
Abortion AND [Mental health or Somatoform or Substance abuse or Domestic violence or Emotions or Employment or Life satisfaction or Self-esteem or Stigma or Post-abortion adjustment/syndrome]
3 and (or/4-58)

APPENDIX 6
METHODOLOGY CHECKLISTS FOR CLINICAL STUDIES AND REVIEWS

The methodological quality of each study was evaluated using three different quality checklists depending on study design. The checklists reproduced below are for case-control studies (NICE 2009) (Table C), prognostic studies (Hayden *et al*. 2006) (Table D) and cohort studies (SIGN, 2004) (Table E).

For other checklists and further information about how to complete each checklist, see *The Guidelines Manual* (NICE, 2009).

Table C: Methodology checklist: case–control studies

Study identification *Include author, title, reference, year of publication*			
Guideline topic:		Review question no:	
Checklist completed by:			
Section 1: Internal validity			
		Circle one option for each question	
1.1	The study addresses an appropriate and clearly focused question.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
Selection of participants			
1.2	The cases and controls are taken from comparable populations	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.3	The same exclusion criteria are used for both cases and controls	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.4	What was the participation rate for each group (cases and controls)?	Cases: Controls:	
1.5	Participants and non-participants are compared to establish their similarities or differences	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.6	Cases are clearly defined and differentiated from controls	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.7	It is clearly established that controls are not cases	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
Assessment			
1.8	Measures were taken to prevent knowledge of primary exposure influencing case ascertainment	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.9	Exposure status is measured in a standard, valid and reliable way	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
Confounding factors			
1.10	The main potential confounders are identified and taken into account in the design and analysis	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
Statistical analysis			
1.11	Have confidence intervals been provided?		

Table D: Methodology checklist: prognostic studies

The criteria used in this checklist are adapted from Hayden, J.A., Cote P, Bombardier, C. (2006) Evaluation of the quality of prognosis studies in systematic reviews. *Annals of Internal Medicine* 144, 427–37.

Study identification Include author, title, reference, year of publication				
Guideline topic:	Review question no:			
Checklist completed by:				
Circle one option for each question				
1.1	The study sample represents the population of interest with regard to key characteristics, sufficient to limit potential bias to the results	Yes	No	Unclear
1.2	Loss to follow-up is unrelated to key characteristics (that is, the study data adequately represent the sample), sufficient to limit potential bias	Yes	No	Unclear
1.3	The prognostic factor of interest is adequately measured in study participants, sufficient to limit potential bias	Yes	No	Unclear
1.4	The outcome of interest is adequately measured in study participants, sufficient to limit bias	Yes	No	Unclear
1.5	Important potential confounders are appropriately accounted for, limiting potential bias with respect to the prognostic factor of interest	Yes	No	Unclear
1.6	The statistical analysis is appropriate for the design of the study, limiting potential for the presentation of invalid results	Yes	No	Unclear

Table E: Methodology checklist: cohort studies

Study identification Include author, title, reference, year of publication			
Guideline topic:		Review question no:	
Checklist completed by:			
Section 1: Internal validity			
		Circle one option for each question	
1.1	The study addresses an appropriate and clearly focused question.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
Selection of participants			
1.2	The two groups being studied are selected from source populations that are comparable in all respects other than the factor under investigation.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.3	The study indicates how many of the people asked to take part did so, in each of the groups being studied.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.4	The likelihood that some eligible subjects might have the outcome at the time of enrolment is assessed and taken into account in the analysis.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.5	What percentage of individuals or clusters recruited into each arm of the study dropped out before the study was completed.		
1.6	Comparison is made between full participants and those lost to follow-up, by exposure status.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
Assessment			
1.7	The outcomes are clearly defined.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.8	The assessment of outcome is made blind to exposure status.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.9	Where blinding was not possible, there is some recognition that knowledge of exposure status could have influenced the assessment of outcome.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.10	The measure of assessment of exposure is reliable.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
1.11	Evidence from other sources is used to demonstrate that the method of outcome assessment is valid and reliable.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable

1.12	Exposure level or prognostic factor is assessed more than once.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
Confounding factors			
1.13	The main potential confounders are identified and taken into account in the design and analysis.	Well covered Adequately addressed Poorly addressed	Not addressed Not reported Not applicable
Statistical analysis			
1.14	Have confidence intervals been provided?		

APPENDIX 7
INCLUDED AND EXCLUDED STUDIES

All included and excluded studies with reasons for exclusion

In the table, studies with 'no useable data' were excluded because they did not report any of the data items described in Chapter 2, section 2.3.

In the table, studies with 'an inappropriate sample' were excluded because they did not include a population as described in Chapter 2, section 2.3.

Study ID	Full reference	Reason for exclusion from each review		
		Chapter 3: Prevalence	Chapter 4: Factors	Chapter 5: Mental health Outcomes
ALDER1990	Alder, N.E., David, H.P., Major, B., *et al.* (1990) Psychological responses after abortion. *Science*, 248, 41-44.	Excluded - review	Excluded - review	Excluded - review
AMERICAN MEDICAL ASSOCIATION1992	American Medical Association (1992) Induced termination of pregnancy before and after Roe versus Wade, *JAMA*, 268 (22), 3231-9	Excluded - review	Excluded - review	Excluded - review
ASHAN1993	Ahsan, S. K. & Soreng, J. (1993) Death anxiety before and after abortions among unmarried women. *Journal of Personality and Clinical Studies*, 9, 1-2.	Excluded - no useable data	Excluded - no useable data	Excluded - no useable data
ASHOK2005	Ashok, P.W., Hamoda, H., Flett, G.M.M. *et al.* (2005) Psychological sequelae of medical and surgical abortion at 10-13 weeks gestation. *Acta Obstetricia et Gynecologica Scandinavica*, 84, 761-66.	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up
BAILEY2001	Bailey, P. E., Bruno, Z. V., Bezerra, M. F., *et al.* (2001) Adolescent pregnancy 1 year later: the effects of abortion versus motherhood in northeast Brazil. *Journal of Adolescent Health*, 29, 223–232.	Excluded - inappropriate sample - illegal abortions	Excluded - inappropriate sample - illegal abortions	Excluded - inappropriate sample - illegal abortions
BARNETT 1986	Barnett, W., Freudenberg, N. & Wille, R. (1986) A regional prospective study of psychological sequelae of legal abortion. *Fortschritte der Neurologie, Psychiatrie*, 54, 106–118.	Excluded - not in English	Excluded - not in English	Excluded - not in English

Study ID	Full reference	Reason for exclusion from each review		
		Chapter 3: Prevalence	Chapter 4: Factors	Chapter 5: Mental health Outcomes
BARNETT1992	Barnett, W., Freudenberg, N. & Wille, R. (1992) Partnership after induced abortion: a prospective controlled study. *Archives of Sexual Behavior*, 21, 443–455.	Excluded - no useable data	Excluded - no useable data	Excluded - no useable data
BARNOW2001	Barnow, S., Ball, J., Doring, K., et al. (2001) The influence of psychosocial factors on mental well-being and physical complaints before and after undergoing an in-patient abortion. *Psychotherapie Psychosomatik Medizinische Psychologie,* 51, 356–364.	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up
BELSEY1977	Belsey, E. M., Greer, H. S., Lal, S., *et al.* (1977) Predictive factors in emotional response to abortion: King's termination study-IV. *Social Science & Medicine,* 11, 71-82.	Excluded - pre-1990	Excluded - pre-1990	Excluded - pre-1990
BESSE2002	Besse, D., Wirthner, D. & De Grandi, P. (2002) The psychological experience of patients who have undergone an early medical abortion. *Medecine et Hygiene*, 60, 1535–1538.	Excluded - not in English	Excluded - not in English	Excluded - not in English
BREWER1977	Brewer, C. (1977) Incidence of post-abortion psychosis: a prospective study. *British Medical Journal*, 1, 476-477.	Excluded - pre-1990	Excluded - pre-1990	Excluded - pre-1990
BREWER1977	Brewer, C. (1977) Third time unlucky: a study of women who have three or more legal abortions. *Journal of Biosocial Science*, 9, 99-105.	Excluded - pre-1990	Excluded - pre-1990	Excluded - pre-1990
BREWER1978	Brewer C (1978) Huntington PJ, mortality from abortion, the NHS record. *British Medical Journal*, 2, 562.	Excluded - pre-1990	Excluded - pre-1990	Excluded - pre-1990
BRADSHAW2005	Bradshaw, Z. & Slade, P. (2005) The relationships between induced abortion, attitudes towards sexuality and sexual problems. *Sexual and Relationship Therapy*, 20, 391–406.	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up

Study ID	Full reference	Reason for exclusion from each review		
		Chapter 3: Prevalence	Chapter 4: Factors	Chapter 5: Mental health Outcomes
BROEN2004	Broen, A. N., Moum, T., Bodtker, A. S. *et al.* (2004) Psychological impact on women of miscarriage versus induced abortion: a 2-year follow-up study. *Psychosomatic Medicine*, 66, 265–271.	Included	Excluded - no useable data, regression analysis conducted across groups and not abortion only	Excluded - inappropriate comparison group
BROEN2005A	Broen, A. N., Moum, T., Bodtker, A. S. *et al.* (2005A) The course of mental health after miscarriage and induced abortion: a longitudinal, five-year follow-up study. *BMC Medicine*, 3, 18.	Included	Excluded - no useable data, regression analysis conducted across groups and not abortion only	Excluded - inappropriate comparison group
BROEN2005B	Broen, A. N., Moum, T., Bödtker, A. S. & Ekeberg, Ö. (2005B) reasons for induced abortion and their relation to women's emotional distress: a prospective, two-year follow-up study. *General Hospital Psychiatry*, 27(1), 36-43.	Excluded - no useable data	Included	Excluded - inappropriate comparison group
BROEN2006	Broen, A. N., Moum, T., Bodtker, A. S., *et al.* (2006) Predictors of anxiety and depression following pregnancy termination: a longitudinal five year follow-up study. *Acta Obstetricia et Gynecologica Scandinavica*, 85, 317–323.	Included	Included	Excluded - inappropriate comparison group
BURNELL1987	Burnell, G. & Norfleet, M. (1987) Women's self-reported responses to abortion. *Journal of Psychology: Interdisciplinary and Applied*, 121, 71–76.	Excluded - inappropriate mental health measure	Excluded - inappropriate mental health measure	Excluded - inappropriate mental health measure
CAGNACCI2001	Cagnacci, A. V. (2001) Is voluntary abortion a seasonal disorder of mood? *Human Reproduction,* 16, 1748-1752.	Excluded - beyond scope of the review	Excluded - beyond scope of the review	Excluded - beyond scope of the review

Study ID	Full reference	Reason for exclusion from each review		
		Chapter 3: Prevalence	Chapter 4: Factors	Chapter 5: Mental health Outcomes
CAMERON1972	Cameron, P. (1972) How much do mothers love their children? Unpublished manuscript presented to the Rocky Mountain Psychological Association, Albuquerque, New Mexico, 12 May 1972, cited in P. Cameron & J.C. Tichenor (1976) The Swedish 'Children Born to Women Denied Abortion' study: a radical criticism. *Psychological Reports*, 39, 391-394.	Excluded - pre-1990	Excluded - pre-1990	Excluded - pre-1990
CAMERON2010	Cameron, S. (2010) Induced abortion and psychological sequelae, *Best Practice & Research: Clinical Obstetrics & Gynaecology,* 24, 657-665.	Excluded – review	Excluded – review	Excluded – review
CASEY2010	Casey, P. R. (2010) Abortion among young women and subsequent life outcomes. *Best Practice & Research: Clinical Obstetrics & Gynaecology,* 24(4), 491-502.	Excluded – review	Excluded – review	Excluded – review
COBAN2010	Coban, A. A. (2010) Assessment of maternal quality of life and short-term psychological response after termination of pregnancy. *Journal of Maternal-Fetal & Neo-natal Medicine.* May, 2010.	Excluded - conference abstract, less than 90 days follow-up	Excluded - conference abstract, less than 90 days follow-up	Excluded - conference abstract, less than 90 days follow-up
COHAN1993	Cohan, C., Dunkel-Schetter, C. & Lydon, J. (1993) Pregnancy decision making: predictors of early stress and adjustment. *Psychology of Women Quarterly,* 17, 223–239.	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow up, less than 100 participants
COLEMAN1998	Coleman, P. K. & Nelson, E.S. (1998) The quality of abortion decisions and college students' reports of post-abortion emotional sequelae and abortion attitudes. *Journal of Social and Clinical Psychology,* 17, 425-442.	Excluded - inappropriate mental health measure	Excluded - inappropriate mental health measure	Excluded - inappropriate mental health measure

Study ID	Full reference	Reason for exclusion from each review		
		Chapter 3: Prevalence	Chapter 4: Factors	Chapter 5: Mental health Outcomes
COLEMAN2002	Coleman, P. K., Reardon, D. C. & Cougle, J. (2002) The quality of care-giving environment and child developmental outcomes associated with maternal history of abortion using NLSY data. *The Journal of Child Psychology and Psychiatry*, 43, 743-757.	Excluded - beyond scope of the review	Excluded - beyond scope of the review	Excluded - beyond scope of the review
COLEMAN2002A	Coleman, P. K., Reardon, D. C, Rue, V. M., *et al.* (2002A) State-funded abortions versus deliveries: a comparison of outpatient mental health claims over 4 years. *American Journal of Orthopsychiatry,* 72, 141–152.	Included	Included	Included
COLEMAN2002B	Coleman, P. K., Reardon, D. C., Rue, V. M., *et al.* (2002B) A history of induced abortion in relation to substance use during subsequent pregnancies carried to term. *American Journal of Obstetrics and Gynecology,* 187, 1673–1678.	Excluded - no useable data, OR & CI	Excluded - no useable data	Excluded - no useable data
COLEMAN2005	Coleman, P. K., Reardon, D. C. & Cougle, J. R. (2005) Substance use among pregnant women in the context of previous reproductive loss and desire for current pregnancy. *British Journal of Health Psychology,* 10, 255–268.	Excluded - no useable data, OR & CI	Excluded - no useable data	Excluded - inappropriate comparison group
COLEMAN2005	Coleman, P. K., Maxey, C. D., Rue, V. M., *et al.* (2005) Associations between voluntary and involuntary forms of perinatal loss and child mistreatment among low-income mothers. *Acta Paediatrica,* 10, 1476-1483.	Excluded - beyond scope of the review	Excluded - beyond scope of the review	Excluded - beyond scope of the review

Study ID	Full reference	Reason for exclusion from each review		
		Chapter 3: Prevalence	Chapter 4: Factors	Chapter 5: Mental health Outcomes
COLEMAN2006	Coleman, P.K. (2006) Resolution of unwanted pregnancy during adolescence through abortion versus childbirth: individual and family predictors and psychological consequences. *Journal of Youth and Adolescence*, 35, 903–911.	Excluded - no useable data, OR & CI	Excluded - no useable data	Excluded - inappropriate control of previous mental health
COLEMAN2009A	Coleman, P. K., Coyle, C. T., Shuping, M., *et al.* (2009) Induced abortion an anxiety, mood, and substance disorders: isolating the effects of abortion in the national co morbidity survey. *Journal of Psychiatric Research*. 43, 770–776.	Included	Excluded - no useable data	Excluded - inappropriate comparison group
COLEMAN2009B	Coleman, P. K., Maxey, C. D., Spence, M., *et al.* (2009) Predictors and correlates of abortion in the Fragile Families and Well-Being Study: paternal behavior, substance use, and partner violence. *International Journal of Mental Health Addiction*, 7, 405–422.	Included	Excluded - no useable data	Excluded - inappropriate control of previous mental health
COLEMAN2010	Coleman, P. K., Coyle, C. T. & Rue, V. M. (2010) Late-term elective abortion and susceptibility to posttraumatic stress symptom, *Journal of Pregnancy*, 10, 1-10,	Included	Included	Excluded - inappropriate comparison group
CONGLETON1993	Congleton, G. K., & Calhoun, L. G. (1993) Post-abortion perceptions: A comparison of self-identified distressed and non-distressed populations. *International Journal of Social Psychiatry,* 39, 255–265.	Excluded - inappropriate sample	Included	Excluded - no comparison group
CONKLIN1995	Conklin, M. P. & O'Connor, B. P. (1995) Beliefs about the fetus as a moderator of post-abortion psychological well-being. *Journal of Social and Clinical Psychology*, 14, 76–95.	Excluded - no useable data	Excluded - no useable data	Excluded - inappropriate control of previous mental health

Study ID	Full reference	Reason for exclusion from each review		
		Chapter 3: Prevalence	Chapter 4: Factors	Chapter 5: Mental health Outcomes
COUGLE2003	Cougle, J. R., Reardon, D. C. & Coleman, P. K. (2003) Depression associated with abortion and childbirth: A long-term analysis of the NLSY cohort. *Medical Science Monitor*, 9, CR105-112.	Included	Excluded – no useable data	Excluded - inappropriate control of previous mental health
COUGLE2005	Cougle, J. R., Reardon, D. C. & Coleman, P. K. (2005) Generalized anxiety following unintended pregnancies resolved through childbirth and abortion: a cohort study of the 1995 National Survey of Family Growth. *Journal of Anxiety Disorders,* 19, 137–142.	Included	Included	Included
COYLE2010	Coyle, C. T., Coleman, P. K. & Rue, V. M. (2010) Inadequate pre-abortion counseling and decision conflict as predictors of subsequent relationship difficulties and psychological stress in men and women, *Traumatology*, 16, 16–30.	Included	Included	Excluded - no comparison group
COZZARELLI1993	Cozzarelli, C. (1993) Personality and self-efficacy as predictors of coping with abortion. *Journal of Personality and Social Psychology,* 65, 1224–1236.	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up
COZZARELLI1998	Cozzarelli, C., Sumer, N. & Major, B. (1998) Mental models of attachment and coping with abortion. *Journal of Personality and Social Psychology*, 74, 453–467.	Excluded - less than 90 days follow up	Excluded - less than 90 days follow up	Excluded - less than 90 days follow up
DEVEBER1991	De Veber, L.L., Ajzenstat, J. & Chisholm, D. (1991) Post-abortion grief: Psychological sequelae of induced abortion. *Humane Medicine*, 7, 203-9	Excluded - review	Excluded - review	Excluded - review
DINGLE2008	Dingle, K., Alati, R., Clavarino, A., *et al.* (2008) Pregnancy loss and psychiatric disorders in young women: an Australian birth cohort study. *British Journal of Psychiatry*, 193, 455–460.	Excluded - lifetime disorder	Excluded - lifetime disorder	Excluded - inappropriate comparison group

Study ID	Full reference	Reason for exclusion from each review		
		Chapter 3: Prevalence	Chapter 4: Factors	Chapter 5: Mental health Outcomes
DUTTA2007	Dutta, P. (2007) Mental health status (MHS) of the MTP clients in Kolkata: a facility based study. *Psychological Studies*, 52, 62–69.	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up
ELUL1999	Elul, B., Ellertson, C., Winikoff, B., *et al.* (1999) Side effects of mifepristone-misoprostol abortion versus surgical abortion: Data from a trial in China, Cuba, and India. *Contraception*, 59, 107-114.	Excluded - less than 90 days follo-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up
ELY2010	Ely, G., E; Flaherty, C., & Cuddeback, G. (2010) The relationship between depression and other psychosocial problems in a sample of adolescent pregnancy termination patients. *Child & Adolescent Social Work Journal*, 27, 269-280.	Excluded - less than 90 days follo-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up
FALCON2010	Falcon, M. V. (2010) Exposure to psychoactive substances in women who request voluntary termination of pregnancy assessed by serum and hair testing. *Forensic Science International*, 196, 22-26.	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up
FAURE2003	Faure, S. & Loxton, H. (2003) Anxiety, depression and self-efficacy levels of women undergoing first trimester abortion. *South African Journal of Psychology*, 33, 28–38.	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up
FELTON1998	Felton, G. M., Parsons, M. A., & Hassell, J. S. (1998) Health behavior and related factors in adolescents with a history of abortion and never-pregnant adolescents. *Health Care for Women International*, 19, 37-47.	Excluded - inappropriate sample	Excluded - inappropriate sample	Excluded - inappropriate sample
FERGUSSON2006	Fergusson, D. M., Horwood, L. J. & Ridder, E. M. (2006) Abortion in young women and subsequent mental health. *Journal of Child Psychology and Psychiatry*, 47, 16–24.	Excluded - no useable data, unclear if data is pre- or post-abortion	Excluded - no useable data	Included

Study ID	Full reference	Reason for exclusion from each review		
		Chapter 3: Prevalence	Chapter 4: Factors	Chapter 5: Mental health Outcomes
FERGUSSON2007	Fergusson, D. M. B. (2007) Abortion among young women and subsequent life outcomes. *Perspectives on Sexual & Reproductive Health*, 39, 6-12.	Excluded - no mental health outcomes	Excluded - no mental health outcomes	Excluded - no mental health outcomes
FERGUSSON2008	Fergusson, D. M., Horwood, J. & Boden, J. M. (2008) Abortion and mental health disorder: evidence from a 30-year longitudinal study. *The British Journal of Psychiatry*, 193, 444–451.	Excluded - no useable data – unclear if data is pre- or post-abortion	Excluded - no useable data	Included
FERGUSSON2009	Fergusson, D. M., Horwood, J. & Boden, J. M. (2009) Reactions to abortion and subsequent mental health. *The British Journal of Psychiatry*, 195, 420–426.	Excluded - no useable data	Included	Excluded - no useable data
FERTL2009	Fertl, K.I., Beyer, R., Geissner, E & Rauchfuβ, M. (2009) Women with a history of pregnancy loss or abortion in a behavioural medicine hospital – an exploratory field study. *Psychotherapy, Psychosomatik, Midizinische Psychologie*, 60, 298-306.	Excluded - inappropriate sample	Excluded - no useable data	Excluded - no comparison group
FOK2006	Fok, W. Y., Siu, S. S. N. & Lau, T. K. (2006) Sexual dysfunction after a first trimester induced abortion in a Chinese population. *European Journal of Obstetrics Gynecology and Reproductive Biology,* 126, 255-258	Excluded - inappropriate mental health measure	Excluded - inappropriate mental health measure	Excluded - inappropriate mental health measure
FONTRIBERA2007	Font-Ribera, L., Perez, G., Salvador, J. & Borrell, C. (2007) Socioeconomic inequalities in unintended pregnancy and abortion decision. *Journal of Urban Health*, 85, 125-35.	Excluded - inappropriate mental health measure	Excluded - inappropriate mental health measure	Excluded - inappropriate mental health measure

Study ID	Full reference	Reason for exclusion from each review		
		Chapter 3: Prevalence	Chapter 4: Factors	Chapter 5: Mental health Outcomes
FRANCO1989	Franco, K. N., Tamburrino, M. B., Campbell, N. B., *et al.* (1989) Psychological profile of dysphoric women post-abortion. *Journal of the American Medical Women's Association*, 44, 113–115.	Excluded - inappropriate sample	Excluded - no useable data	Excluded - less than 100 participants, inappropriate sample
FRANZ1992	Franz, W. & Reardon, D. (1992) Differential impact of abortion on adolescents and adults. *Adolescence*, 27, 161–172	Excluded - inappropriate sample	Excluded - inappropriate sample	Excluded - inappropriate sample
FREUDENBERG1988	Freudenberg, N. & Barnett, W. (1988) Relationship with a partner following legal abortion – a longitudinal comparative study. *Fortschritte der Neurologie Psychiatrie*, 56, 300–318.	Excluded - not in English	Excluded - not in English	Excluded - not in English
GILCHRIST1995	Gilchrist, A. C., Hannaford, P. C., Frank, P., *et al.* (1995) Termination of pregnancy and psychiatric morbidity. *British Journal of Psychiatry*, 167, 243–248.	Excluded - no useable data, sample size not reported	Included	Included
GISSLER1996	Gissler, M., Hemminki, E. & Lonnqvist, J. (1996) Suicides after pregnancy in Finland, 1987–94: register linkage study. *British Medical Journal*, 313, 1431–1434.	Included	Excluded - no useable data	Excluded - inappropriate control for previous mental health
GISSLER1997	Gissler, M., Kauppila, R., Merilainen, J., *et al.* (1997) Pregnancy-associated deaths in Finland 1987–1994 – definition problems and benefits of record linkage. *Acta Obstetricia et Gynecologica Scandinavica,* 76, 651–657.	Excluded - no useable data	Excluded - no useable data	Excluded - inappropriate control for previous mental health
GISSLER1999	Gissler, M. & Hemminki, E. (1999) Pregnancy-related violent deaths. *Scandinavian Journal of Public Health*, 1, 54–55.	Excluded – sample same as GISSLER1996	Excluded - no useable data	Excluded - inappropriate control for previous mental health

Study ID	Full reference	Reason for exclusion from each review		
		Chapter 3: Prevalence	Chapter 4: Factors	Chapter 5: Mental health Outcomes
GISSLER2004A	Gissler, M., Berg, C., Bouvier-Colle, M. H., et al. (2004A) Methods for identifying pregnancy-associated deaths: Population-based data from Finland 1987–2000. *Paediatric and Perinatal Epidemiology*, 18, 448–455.	Excluded - no relevant or useable data	Excluded - no relevant or useable data	Excluded - no relevant or useable data
GISSLER2004B	Gissler, M., Berg, C., Bouvier-Colle, M. H., *et al.* (2004B) Pregnancy-associated mortality after birth, spontaneous abortion or induced abortion in Finland, 1980–2000. *American Journal of Obstetrics and Gynecology*, 190, 422–427.	Excluded - no useable data	Excluded - no useable data	Excluded - no useable data
GISSLER2005	Gissler, M., Berg, C., Bouvier-Colle, M. H., *et al.* (2005) Injury deaths, suicides and homicides associated with pregnancy, Finland 1987–2000. *European Journal of Public Health*, 15, 458–463.	Included	Included	Excluded - inappropriate control for previous mental health
GISSLER2010	Gissler,M., Artama, M., Ritvanen, A. & Wahlbeck, K. (2010) Use of psychotropic drugs before pregnancy and the risk for induced abortion: population-based register-data from Finland 1996-2006. *BMC Public Health*, 10, 383.	Excluded - pre-abortion data	Excluded - pre-abortion data	Excluded - pre-abortion data
HAMAMA2010	Hamama, L., Rauch, S., Sperlich, M, *et al.* (2010) Previous experience of spontaneous or elective abortion and risk for posttraumatic stress and depression during subsequent pregnancy. *Depression & Anxiety*, 27, 699-707.	Included	Excluded - no useable data, regression analysis conducted across groups	Excluded - inappropriate comparison group

Study ID	Full reference	Reason for exclusion from each review		
		Chapter 3: Prevalence	Chapter 4: Factors	Chapter 5: Mental health Outcomes
HAMARK1995	Hamark, B., Uddenber, N. & Forssman, L. (1995) The influence of social class on parity and psychological reactions in women coming for induced abortion. *Acta Obstetricia et Gynecologica Scandinavica*, 74, 302-6.	Excluded - inappropriate mental health measure	Excluded - inappropriate mental health measure	Excluded - inappropriate mental health measure
HARLOW2004	Harlow, B. L., Cohen, L. S., Otto, M. W., *et al.* (2004) Early life menstrual characteristics and pregnancy experiences among women with and without major depression: the Harvard Study of Moods and Cycles. *Journal of Affective Disorders*, 79, 167–176.	Excluded - lifetime outcome	Excluded - lifetime outcome	Excluded - lifetime outcome
HARRIS2004	Harris, A. A. (2004) Supportive counselling before and after elective pregnancy termination. *Journal of Midwifery and Woman's Health*, 49, 105-112.	Excluded - no useable data as commentary	Excluded - no useable data as commentary	Excluded - no useable data as commentary
HARWOOD2008	Harwood, B., Nansel, T. & National, I. (2008) Quality of life and acceptability of medical versus surgical management of early pregnancy failure. *BJOG: An International Journal of Obstetrics & Gynaecology*. 115, 501–508.	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up
HATHAWAY2005	Hathaway, J. E., Willis, G., Zimmer, B., *et al.* (2005) Impact of partner abuse on women's reproductive lives. *Journal of the American Medical Women's Association*, 60, 42- 45.	Excluded - beyond scope of the review	Excluded - beyond scope of the review	Excluded - beyond scope of the review
HELLBERG1998	Hellberg, D., Mogilevkina, I. & Mårdh, P. A. (1998) Reproductive and contraceptive history, smoking and drug use, and demographic characteristics in women with a history of induced abortions. *Italian Journal of Gynaecology and Obstetrics*, 10, 136-139.	Excluded - lifetime outcome	Excluded - lifetime outcome	Excluded - inappropriate comparison group

Study ID	Full reference	Reason for exclusion from each review		
		Chapter 3: Prevalence	Chapter 4: Factors	Chapter 5: Mental health Outcomes
HEMMERLING2005	Hemmerling, A. S. (2005) Emotional impact and acceptability of medical abortion with mifepristone: A German experience. *Journal of Psychosomatic Obstetrics & Gynecology*, 26, 23-31.	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up
HENSHAW1994	Henshaw, R., Naji, S., Russell, I. & Templeton, A. (1994) Psychological responses following medical abortion (using mifepristone and gemeprost, and surgical vacuum aspiration: A patient-centered, partially randomised prospective study. *Acta Obstetricia et Gynecologica Scandinavica*, 73, 812–818.	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up
HITTNER1987	Hittner, A. (1987) Feelings of well-being before and after an abortion. *American Mental Health Counselors Association Journal*, 9, 98–104.	Excluded - inappropriate mental health measure	Excluded - inappropriate mental health measure	Excluded - inappropriate mental health measure
HOPE2003	Hope, T. L., Wilder, E. I. & Terling Watt, T. (2003) The relationships among adolescent pregnancy, pregnancy resolution, and juvenile delinquency. *Sociological Quarterly*, 44, 555–576.	Excluded - inappropriate mental health measure	Excluded - inappropriate mental health measure	Excluded - inappropriate mental health measure
HOUSTON1996	Houston, H. & Jacobson, L. (1996) Overdose and termination of pregnancy: an important association? *British Journal of General Practice*, *46*, 737–738.	Excluded - lifetime outcome	Excluded - lifetime outcome	Excluded - inappropriate comparison group
HOWIE1997	Howie, F. L., Henshaw, R. C., Naji, S. A., *et al.* (1997) Medical abortion or vacuum aspiration? Two year follow up of patient preference trial. *British Journal of Obstetrics and Gynaecology 104*, 829–833.	Excluded - inappropriate mental health measure	Excluded - inappropriate mental health measure	Excluded - inappropriate comparison group

Study ID	Full reference	Reason for exclusion from each review		
		Chapter 3: Prevalence	Chapter 4: Factors	Chapter 5: Mental health Outcomes
KENT1981	Kent, I. & Nicholls, W. (1981) Bereavement in post-abortive women: a clinical report. *World Journal of Psychosynthesis*,*13,* 14-17	Excluded - pre-1990	Excluded - pre-1990	Excluded - pre-1990
KERO2004	Kero, A., Hogberg, U., Lalos, A. (2004) Wellbeing and mental growth – long-term effects of legal abortion. *Social Science & Medicine, 58*, 2259-69.	Excluded - inappropriate mental a Excluded - inappropriate mental health measure	Excluded - inappropriate mental health measure	Excluded - inappropriate mental health measure
KERSTING2009	Kersting, A. K., Kroker, K. & Steunhard, J. (2009) Psychiatric morbidity after termination of pregnancy for fetal anomaly. American *Journal of Obstetrics and Gynaecology, 201*, *160.e1-7*	Excluded - fetal anomaly	Excluded - fetal anomaly	Excluded - fetal anomaly
KESSLER1995	Kessler, R.C., Sonnega, A., Bromet, E. *et al.* (1995) Posttraumatic stress disorder in the National Comorbidity Survey. *Archives of General Psychiatry, 52*, 1048-60.	Excluded - not relevant, no abortion only data	Excluded - not relevant, no abortion only data	Excluded - not relevant, no abortion only data
KLOCK1997	Klock, S. C. (1997) Psychological distress among women with recurrent spontaneous abortion. *Psychomatics, 38*, 503-507.	Excluded inappropriate sample - miscarriage	Excluded inappropriate sample - miscarriage	Excluded inappropriate sample - miscarriage
KULKARNI2008	Kulkarni, J., McCauly-Elson, K., Marston, N., *et al.* (2008) Preliminary findings from the National Register of Antipsychotic Medication in Pregnancy. *Australian and New Zealand Journal of Psychiatry,* 42, 38-44	Excluded - not relevant	Excluded - not relevant	Excluded - not relevant
LAUZON2000	Lauzon, P., Roger-Achim, D., Achim, A., *et al.* (2000) Emotional distress among couples involved in first-trimester induced abortions. *Canadian Family Physician, 46,* 2033–2040.	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up

Study ID	Full reference	Reason for exclusion from each review		
		Chapter 3: Prevalence	Chapter 4: Factors	Chapter 5: Mental health Outcomes
LAYER2004	Layer, S. D., Roberts, C., Wild, K., *et al.* (2004) Postabortion grief: evaluating the possible efficacy of a spiritual group intervention. *Research on Social Work Practice, 14,* 344–350.	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up
LAZARUS1985	Lazarus, A. (1985) Psychiatric sequelae of legalized elective first trimester abortion. *Journal of Psychosomatic Obstetrics & Gynecology, 4,* 141–150.	Excluded - less than 90 days follow up	Excluded - less than 90 days follow up	Excluded - less than 90 days follow up
LEMKAU1991	Lemkau, J. P. (1991) Post-abortion adjustment of health care professionals in training. *American Journal of Orthopsychiatry, 61*, 92–102.	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up
LOWENSTEIN2006	Lowenstein, L., Deutcsh, M., Gruberg, R., *et al.* (2006) Psychological distress symptoms in women undergoing medical versus surgical termination of pregnancy. *General Hospital Psychiatry, 28*, 43–47.	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up
LYDON1996	Lydon, J., Dunkel-Schetter, C., Cohan, C. L., *et al.* (1996) Pregnancy decision-making as a significant life event: a commitment approach. *Journal of Personality and Social Psychology, 71,* 141–151.	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up
MAJOR1985	Major, B., Mueller, P. & Hildebrandt, K. (1985) Attributions, expectations and coping with abortion. *Journal of Personality and Social Psychology, 48,* 585-599.	Excluded - pre-1990	Excluded - pre-1990	Excluded - pre-1990
MAJOR1990	Major, B., Cozzarelli, C., Sciacchitano, A., *et al.* (1990) Perceived social support, self-efficacy, and adjustment to abortion. *Journal of Personality and Social Psychology, 59*, 452–463.	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up

Study ID	Full reference	Reason for exclusion from each review		
		Chapter 3: Prevalence	Chapter 4: Factors	Chapter 5: Mental health Outcomes
MAJOR1992	Major, B., Cozzarelli, C., Testa, M., *et al.* (1992) Male partners' appraisals of undesired pregnancy and abortion: Implications for women's adjustment to abortion. *Journal of Applied Social Psychology, 22*, 599–614.	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up
MAJOR1997	Major, B., Zubek, J., Cooper, M. L., *et al.* (1997) Mixed messages: Implications of social conflict and social support within close relationships for adjustment to a stressful life event. *Journal of Personality and Social Psychology, 72*, 1349–1363.	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up
MAJOR1998	Major, B., Richards, C., Cooper, M. *et al.* (1998) Personal resilience, cognitive appraisals, and coping: An integrative model of adjustment to abortion. *Journal of Personality and Social Psychology, 74*, 735–752.	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up
MAJOR1999	Major, B. & Gramzow, R. (1999) Abortion as stigma: Cognitive and emotional implications of concealment. *Journal of Personality and Social Psychology, 77*, 735–745.	Excluded - inappropriate mental health measure	Excluded - inappropriate mental health measure	Excluded - inappropriate mental health measure
MAJOR2000	Major, B., Cozzarelli, C., Cooper, M. L. *et al.* (2000) Psychological responses of women after first-trimester abortion. *Archives of General Psychiatry, 57*, 777–784.	Included	Included	Excluded - inappropriate comparison group
MAJOR2010	Major, B. & Cozzarelli, C. (2010) Psychosocial predictors of adjustment to abortion. *Journal of Social Issues, 48*, 121-142	Excluded – review	Excluded – review	Excluded – review
MAKO2011	Mak, H. S. (2011) Nature of fears at the time of abortion and possible correlation to anxiety and depression. *European Psychiatry, 25*, 1687.	Excluded – conference abstract	Excluded – conference abstract	Excluded – conference abstract

Study ID	Full reference	Reason for exclusion from each review		
		Chapter 3: Prevalence	Chapter 4: Factors	Chapter 5: Mental health Outcomes
MATTISON1979	Mattison, P. C. (1979) The interaction between legalisation of abortion and contraception in Denmark. *World Health Statistics Quarterly*, 32, 246-256.	Excluded - pre-1990	Excluded - pre-1990	Excluded - pre-1990
MAUELSHAGEN2009	Mauelshagen, A., Sadler, L. C., Roberts, H., *et al.* (2009) Audit of short term outcomes of surgical and medical second trimester termination of pregnancy. *Reproductive Health, 6,* 1742-4755.	Excluded - no useable data	Excluded - no useable data	Excluded - no useable data
MEDORA1993	Medora, N. P., Goldstein, A., & von der Hellen, C. (1993) Variables related to romanticism and selfesteem in pregnant teenagers. *Adolescence, 28,* 159–170.	Excluded - no useable data	Excluded - no useable data	Excluded - inappropriate comparison group
MEDORA1997	Medora, N. P. & Hellen, C. D. (1997) Romanticism and self-esteem among teen mothers. *Adolescence, 32,* 811-824.	Excluded - no relevant outcomes	Excluded - no useable data	Excluded - inappropriate comparison group
MILLER1992	Miller, W. B. (1992) An empirical study of the psychological antecedents and consequences of induced abortion. *Journal of Social Issues, 48*, 67–93.	Excluded - inappropriate mental health measure	Excluded - inappropriate mental health measure	Excluded - no comparison group
MOLLBORN2009	Mollborn, S. & Morningstar, E. (2009) Investigating the relationship between teenage childbearing and psychological distress using longitudinal evidence. *Journal of Health and Social Behavior, 50*, 310-26.	Excluded – inappropriate sample, no abortion group	Excluded – inappropriate sample, no abortion group	Excluded – inappropriate sample, no abortion group
MORGAN1997	Morgan, C., Evans, M., Peter, J., *et al* (1997) Suicides after pregnancy: mental health may deteriorate as a direct effect of induced abortion. *British Medical Journal,* 314, 902.	Excluded – commentary	Excluded – commentary	Excluded – commentary

Study ID	Full reference	Reason for exclusion from each review		
		Chapter 3: Prevalence	Chapter 4: Factors	Chapter 5: Mental health Outcomes
MOTA2010	Mota, N.P., Burnett, M. & Sareen, J. (2010) Associations between abortion, mental disorders, and suicidal behavior in a nationally representative sample. *The Canadian Journal of Psychiatry, 55*, 239–247.	Included	Excluded - no useable data	Excluded - inappropriate comparison group
MUNK-OLSEN2011	Munk-Olsen, T., Laursen, T.M., Pedersen, C.B., *et al.* (2011) Induced first-trimester abortion and risk of mental disorder. *New England Journal of Medicine, 364,* 332-339.	Included	Included	Included
NEY	Ney, P.G., Fung, T. & Sheils, C. Factors the determine pregnancy outcome. Manuscript submitted for publication, 2011	Excluded - not available	Excluded - not available	Excluded - not available
NEY	Ney, P.G., Shiels, C. & Fung, T. How partner support affects pregnancy outcome. Manuscript submitted for publication, 2011	Excluded - not available	Excluded - not available	Excluded - not available
NEY1968	Ney, P. G. (1968) Psychodynamics of behavior therapies. *Canadian Psychiatric Association Journal, 13*, 555-559.	Excluded - pre-1990	Excluded - pre-1990	Excluded - pre-1990
NEY1971	Ney, P. G. (1971) Quantitative measurement in psychiatry. *Indonesian Journal of Psychiatry, 2*, 66-78.	Excluded - pre-1990	Excluded - pre-1990	Excluded - pre-1990
NEY1983	Ney, P. G. (1983) A consideration of abortion survivors. *Child Psychiatry and Human Development, 13*, 168-179.	Excluded - pre-1990	Excluded - pre-1990	Excluded - pre-1990
NEY1983	Ney, P. G. & Barry, J. E. (1983) Children who survive. *New Zealand Medical Journal, 96,* 127-129.	Excluded - pre-1990	Excluded - pre-1990	Excluded - pre-1990
NEY1985	Ney, P. G., Johnson, I. & Herron, J. (1985) Social and legal ramifications of a child crisis line. *Child Abuse and Neglect, 9,* 47-55.	Excluded - pre-1990	Excluded - pre-1990	Excluded - pre-1990

Study ID	Full reference	Reason for exclusion from each review		
		Chapter 3: Prevalence	Chapter 4: Factors	Chapter 5: Mental health Outcomes
NEY1986	Ney, P. G., McPhee, J., Moore, C., *et al.* (1986) Child abuse: a study of the child's perspective. *Child Abuse and Neglect, 10,* 511-518.	Excluded - pre-1990	Excluded - pre-1990	Excluded - pre-1990
NEY1987	Ney, P. G. (1987) Does verbal abuse leave deeper scars: a study of children & parents. *Canadian Journal of Psychiatry, 32,* 371-378.	Excluded - pre-1990	Excluded - pre-1990	Excluded - pre-1990
NEY1987	Ney, P. G. (1987) The treatment of abused children: the natural sequence of events. *American Journal of Psychiatry, 46*, 391-401.	Excluded - pre-1990	Excluded - pre-1990	Excluded - pre-1990
NEY1988	Ney, P. G. (1988) Triangles of child abuse: A model of maltreatment. *Child Abuse Negl, 12*, 363-373.	Excluded - pre-1990	Excluded - pre-1990	Excluded - pre-1990
NEY1988	Ney, P. G. (1988) Transgenerational child abuse. *Child Psychiatry & Human Development, 18*, 151-168.	Excluded - pre-1990	Excluded - pre-1990	Excluded - pre-1990
NEY1992	Ney, P. G., Wickett, A. R. & Fung, T. (1992) Causes of child abuse and neglect. *Canadian Journal of Psychiatry, 37,* 401-405.	Excluded - beyond scope of the review as not specific to abortion	Excluded - beyond scope of the review as not specific to abortion	Excluded - beyond scope of the review as not specific to abortion
NEY1993A	Ney, P. G., Fung, T. & Wickett, A. R. (1993A) Child neglect: The precursor to child abuse. *Pre and Perinatal Psychology J, 8(2),* 95-112.	Excluded - beyond scope of the review	Excluded - beyond scope of the review	Excluded - beyond scope of the review
NEY1993B	Ney, P. G., Fung, T. & Wickett, A. R. (1993B) Relationships between induced abortion and child abuse and neglect: four studies. *Pre and Perinatal Psychology Journal, 8*, 43-63.	Excluded - beyond scope of the review	Excluded - beyond scope of the review	Excluded - beyond scope of the review
NEY1994A	Ney, P. G., Fung, T. & Wickett, A. R. (1994A) The worst combinations of child abuse and neglect, *Child Abuse and Neglect, 18*, 705-714.	Excluded - beyond scope of the review	Excluded - beyond scope of the review	Excluded - beyond scope of the review

Study ID	Full reference	Reason for exclusion from each review		
		Chapter 3: Prevalence	Chapter 4: Factors	Chapter 5: Mental health Outcomes
NEY1994B	Ney, P. G., Fung, T., Wickett, A. R., *et al.* (1994B) The effects of pregnancy loss on women's health. *Social Science and Medicine, 38*, 1193–1200.	Inappropriate mental health measure - Health questionnaire	Inappropriate mental health measure	Inappropriate mental health measure
NEY2006	Ney, P. G., Sheils, C. & Gajowy, M. (2006) Post abortion survivor syndrome (PASS): signs and symptoms. *Southern Medical Journal, 99*, 1405-1406.	Excluded - beyond scope of the review	Excluded - beyond scope of the review	Excluded - beyond scope of the review
NEY2010A	Ney, P. G., Sheils, C. & Gajowy, M. (2010A) Post-abortion survivor syndrome: Signs and symptoms. *Journal of Pre and Perinatal Psychology and Health, 25*, 107-129	Excluded - beyond scope of the review	Excluded - beyond scope of the review	Excluded - beyond scope of the review
NEY2010B	Ney, P. G., Ball, K., & Sheils, C. (2010B) Results of group psychotherapy for abuse, neglect and pregnancy loss. *Current Women's Health Review, 6*, 332-340.	Excluded - beyond scope of the review	Excluded - beyond scope of the review	Excluded - beyond scope of the review
NIINIMAKI2009A	Niinimaki, M., Pouta, A., Bloigu, A., *et al.* (2009A) Frequency and risk factors for repeat abortions after surgical compared with medical termination of pregnancy. *Obstetrics & Gynecology, 113*, 845–852.	Excluded - no useable data	Excluded - no useable data	Excluded - no useable data
NIINIMAKI2009B	Niinimaki, M., Pouta, A., Bloigu, A., *et al.* (2009B) Immediate complications after medical compared with surgical termination of pregnancy. *Obstetrics and Gynecology, 114*, 795–804.	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up
NIINIMAKI2011	Niinimaki, M., Suhonen, S., Mentula, M., *etal.* (2011) Comparison of rates of adverse events in adolescent and adult women undergoing medical Abortion: population register based study, *BMJ, 342,* d2111.	Excluded - no mental health outcomes	Excluded - no mental health outcomes	Excluded - no mental health outcomes

Study ID	Full reference	Reason for exclusion from each review		
		Chapter 3: Prevalence	Chapter 4: Factors	Chapter 5: Mental health Outcomes
PEDERSEN2007	Pedersen, W. (2007) Childbirth, abortion and subsequent substance use in young women: a population-based longitudinal study. *Addiction, 102,* 1971–1978.	Included	Included	Included
PEDERSEN2008	Pedersen, W. (2008) Abortion and depression: a population-based longitudinal study of young women. *Scandinavian Journal of Public Health, 36*, 424–428.	Included	Included	Included
PHELPS2001	Phelps, R. H., Schaff, E. A. & Fielding, S. L. (2001) Mifepristone abortion in minors. *Contraception, 64,* 339–343.	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up
POPE2001	Pope, L. M., Adler, N. E. & Tschann, J. M. (2001) Postabortion psychological adjustment: are minors at increased risk? *Journal of Adolescent Health, 29*, 2–11.	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up
QUINTON2001	Quinton, W. J., Major, B. & Richards, C. (2001) Adolescents and adjustment to abortion: are minors at greater risk? Psychology, *Public Policy, and Law, 7,* 491–514.	Excluded - no useable data, means and SDs	Included	Excluded - no comparison group
REARDON2000	Reardon, D. & Ney, P. (2000) Abortion and subsequent substance abuse. *The American Journal of Drug and Alcohol Abuse, 26,* 61–75.	Excluded - lifetime outcomes	Excluded - inappropriate mental health measure	Excluded - inappropriate mental health measure
REARDON2002A	Reardon, D. C., Ney, P. G., Scheuren, F. *et al.* (2002A) Deaths associated with pregnancy outcome: a record linkage study of low income women. *Southern Medical Journal, 95*, 834–841.	Included	Included	Included
REARDON2002B	Reardon, D.C. & Cougle, J.R. (2002B) Depression and unintended pregnancy in the National Longitudinal Survey of Youth: a cohort study. *British Medical Journal, 324,* 151–152.	Included	Included	Excluded – inappropriate control of mental health measure

Study ID	Full reference	Reason for exclusion from each review		
		Chapter 3: Prevalence	Chapter 4: Factors	Chapter 5: Mental health Outcomes
REARDON2003A	Reardon, D. C., Cougle, J. R., Rue, V. M., Shuping, M. W. *et al.* (2003) Psychiatric admissions of low-income women following abortion and childbirth. *Canadian Medical Association Journal, 168*, 1253–1256.	Included	Included	Included
REARDON2003B	Reardon, D.C. (2003) Abortion decisions and the duty to screen: Clinical, ethical and legal implications of predictive risk factors for post-abortion maladjustment. *The Journal of Contemporary Health Law & Policy, 20,* 33-114	Excluded - review	Excluded - review	Excluded - review
REARDON2004	Reardon, D. C., Coleman, P. K. & Cougle, J. (2004) Substance use associated with prior history of abortion and unintended birth: a national cross-sectional cohort study. *American Journal of Drug and Alcohol Abuse, 26,* 369-383.	Included	Excluded - no useable data	Excluded - inappropriate control for previous mental health
REARDON2006	Reardon, D.C. & Coleman, P.K. (2006) Relative treatment rates for sleep disorders and sleep disturbances following abortion and childbirth: a prospective record based study. *Sleep, 29,* 105-106.	Excluded - sleep disorders beyond scope of the review	Excluded - sleep disorders beyond scope of the review	Excluded - sleep disorders beyond scope of the review
REES2007	Rees, D. I. & Sabia, J. J. (2007) The relationship between abortion and depression: new evidence from the Fragile Families and Child Wellbeing Study. *Medical Science Monitor, 13,* 430–436.	Included	Included	Excluded - inappropriate comparison group
RIZZARDO1991	Rizzardo, R., Novarin, S., Forza, G. & Cosentino, M. (1991) Personality and psychological distress in legal abortion, threatened miscarriage and normal pregnancy. *Psychotherapy and Psychosomatics, 56,* 227-34.	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up

Study ID	Full reference	Reason for exclusion from each review		
		Chapter 3: Prevalence	Chapter 4: Factors	Chapter 5: Mental health Outcomes
RIZZARDO1992	Rizzardo, R., Magni, G., Desideri, A., *et al.* (1992) Personality and psychological distress before and after legal abortion: *a prospective study. Journal of Psychosomatic Obstetrics and Gynecology, 13,* 75-91.	Included	Included	Excluded - no comparison group
ROBSON2009	Robson, S. C., Kelly, T., Howel, D., *et al.* (2009) Randomised preference trial of medical versus surgical termination of pregnancy less than 14 weeks' gestation (TOPS). *Health Technology Assessment, 13,* 1–124.	Excluded - inappropriate sample	Excluded - inappropriate sample	Excluded - inappropriate sample
RUE2004	Rue, V. M., Coleman, P. K., Rue, J. J., *et al.* (2004) Induced abortion and traumatic stress: preliminary comparison of American and Russian women. *Medical Science Monitor, 10,* SR5–16.	Included	Included	Excluded - no useable data
RUSSO1992	Russo, N. & Zierk, K. (1992) Abortion, childbearing, and women's well-being. *Professional Psychology: Research and Practice, 23,* 269–280.	Excluded - no useable data	Excluded - no useable data	Excluded - inappropriate comparison group
RUSSO1997	Russo, N. F. & Dabul, A. J. (1997) The relationship of abortion to well-being: do race and religion make a difference. *Professional Psychology: Research and Practice, 28,* 23–31.	Excluded - no useable data	Included	Excluded - inappropriate comparison group
RUSSO2001	Russo, N. F. & Denious, J. E. (2001) Violence in the lives of women having abortions: implications for practice and public policy. *Professional Psychology: Research and Practice, 32,* 142–150.	Included	Excluded - no useable data	Excluded - inappropriate comparison group

Study ID	Full reference	Reason for exclusion from each review		
		Chapter 3: Prevalence	Chapter 4: Factors	Chapter 5: Mental health Outcomes
SCHMIEGE2005	Schmiege, S. & Russo, N.F. (2005) Depression and unwanted first pregnancy: longitudinal cohort study. *British Medical Journal,* 331, 130-1306	Included	Included	Excluded - inappropriate control for mental health
SIT2007	Sit, D., Rothschild, A. J., Creinin, M. D., *et al.* (2007) Psychiatric outcomes following medical and surgical abortion. *Human Reproduction, 22,* 878–884.	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up
SLONIM-NEVO1991	Slomim-Nevo, V. (1991) The experiences of women who face abortions, *Health Care for Women International, 12,* 283-292.	Excluded -no useable data	Excluded - no useable data	Excluded - no useable data
SÖDERBERG1998	Söderberg, H., Janzon, L., & Sjöberg, N. O. (1998) Emotional distress following induced abortion: A study of its incidence and determinants among abortees in Malmö, Sweden. E*uropean Journal of Obstetrics & Gynecology and Reproductive Biology, 79,* 173-178.	Excluded - inappropriate sample – subgroup of distressed women	Included	Excluded - inappropriate comparison group
SPECKHARD2003	Speckhard, A. & Mufel, N. (2003) Universal responses to abortion? Attachment, trauma, and grief responses in women following abortion. *Journal of Prenatal & Perinatal Psychology & Health, 18*, 3–38.	Excluded - no useable data	Excluded - no useable data	Excluded - less than 100 participants
STEINBERG2008 Study1 Study 2	Steinberg, J. & Russo, N. (2008) Abortion and anxiety: what's the relationship? *Social Science and Medicine, 6*, 238–252.	Included Included	Included Included	Included Included
STEINBERG2011A Study1 Study 2	Steinberg, J. R. & Finer, L. B. (2011) Examining the association of abortion history and current mental health: A reanalysis of the National Comorbidity Survey using a common-risk-factors model. *Social Science & Medicine, 72*, 72-82.	Included Included	Excluded - no useable data Included	Excluded – inappropriate comparison group Included

Study ID	Full reference	Reason for exclusion from each review		
		Chapter 3: Prevalence	Chapter 4: Factors	Chapter 5: Mental health Outcomes
STEINBERG2011B	Steinberg, J. R., Becker, D. & Henderson, J. T. (2011) Does the outcome of a first pregnancy predict depression, suicidal ideation, or lower self-esteem? Data from the National Comorbidity Survey. *American Journal of Orthopsychiatry, 81*, 193-201.	Excluded - no useable data, odds ratios only	Excluded - no useable data	Included
STEINBERG2011C	Steinberg,J. R. (2011) Later abortions and mental health: psychological experiences of women having later abortions: a critical review of research, *Women's Health Issues: Official Publication of the Jacobs Institue of Women's Health, 21,* S44-S48.	Excluded - review	Excluded - review	Excluded - review
STOTLAND1997	Stotland, N. L. (1997) Psychosocial aspects of induced abortion. *Clinical Obstetrics & Gynecology, 40,* 673-686.	Excluded - review	Excluded - review	Excluded - review
STRASSBERG1985	Strassberg, D. & Moore, M. (1985) Effects of a film model on the psychological and physical stress of abortion. *Journal of Sex Education & Therapy, 11*, 46-50.	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up
SULIMAN2007	Suliman, S. E. (2007) Comparison of pain, cortisol levels, and psychological distress in women undergoing surgical termination of pregnancy under local anaesthesia versus intravenous sedation. *BMC Psychiatry, 7* , 24.	Included	Excluded - no useable data	Excluded - no comparison group
TAFT2008	Taft, A. J. & Watson, L. F. (2008) Depression and termination of pregnancy (induced abortion) in a national cohort of Australian women: the confounding effect of women's experience of violence. *BMC Public Health, 8*.	Included	Excluded - no useable data	Excluded - not mutually exclusive groups

Study ID	Full reference	Reason for exclusion from each review		
		Chapter 3: Prevalence	Chapter 4: Factors	Chapter 5: Mental health Outcomes
TEICHMAN1993	Teichman, Y., Shenhar, S. & Segal, S. (1993) Emotional distress in Israeli women before and after abortion. *American Journal of Orthopsychiatry, 63*, 277–288.	Excluded - inappropriate sample	Excluded - inappropriate sample	Excluded - inappropriate sample
TERZIOGLU2010	Terzioglu, F. Z. (2010) Identification of the problems and anxiety levels of the women who had elective or therapeutic abortion. *European Journal of Contraception & Reproductive Health Care,* May, 2010	Excluded - conference abstract	Excluded - conference abstract	Excluded - conference abstract
THATTE1989	Thatte, S. & Pundlik, J. (1989) Psychological sequelae of MTP: a study of anxiety and hostility in married and unmarried abortees. *Indian Journal of Clinical Psychology, 16,* 29–33.	Excluded - less than 90 days follow up	Excluded - less than 90 days follow up	Excluded - less than 90 days follow up
THOMAS2011	Thomas, J. (2011) Risk of mental disorders does not rise following a first-trimester abortion. *Perspectives on Sexual & Reproductive Health, 43,* 130.	Excluded - summary of Munk-Olsen	Excluded - summary of Munk-Olsen	Excluded - summary of Munk-Olsen
URQUHART1991	Urquhart, D. R. & Templeton, A. A. (1991) Psychiatric morbidity and acceptability following medical and surgical methods of abortion. *British Journal of Obstetrics and Psychiatry, 98,* 369–399.	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up
VOGEL2011	Vogel, L. (2011) “Do it yourself” births prompt alarm. *Canadian Medical Association Journal, 183*, 648-650.	Excluded – not relevant	Excluded – not relevant	Excluded – not relevant
WALKER2002	Walker A. (2002) Pregnancy, pregnancy loss and induced abortion. In: Miller D. & Green J., *The Psychology of Sexual Health*. Oxford: Blackwell Science	Excluded - review book	Excluded - review book	Excluded - review book

Study ID	Full reference	Reason for exclusion from each review		
		Chapter 3: Prevalence	Chapter 4: Factors	Chapter 5: Mental health Outcomes
WARREN2010	Warren, J. T., Harvey, S. M. & Henderson, J. T. (2010) Do depression and low self-esteem follow abortion among adolescents? Evidence from a national study. *Perspectives on Sexual and Reproductive Health, 42,* 230-235.	Included	Excluded - no useable data assessing risk factors across groups	Included
WIEBE2011	Wiebe, E. N. (2011) Muslim women having abortions in Canada: Attitudes, beliefs and experiences. *Canadian Family Physician, 57*, e134-e138.	Excluded - inappropriate mental health measure – not validated	Excluded - inappropriate mental health measure – not validated	Excluded - inappropriate mental health measure – not validated
WILLIAMS2001	Williams, G. B. (2001). Short-term grief after an elective abortion. *Journal of Obstetric, Gynecologic and Neonatal Nursing, 30,* 174–183.	Excluded - no useable data, means and SDs	Excluded - no useable data	Excluded - inappropriate comparison group
YILMAZ2010	Yilmaz, N. K-P. (2010) Medical or surgical abortion and psychiatric outcomes. J*ournal of Maternal-Fetal & Neonatal Medicine, 23*, 541-544.	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up
ZABIN1989	Zabin, L. S., Hirsch, M. B. & Emerson, M. R. (1989) When urban adolescents choose abortion: effects on education, psychological status and subsequent pregnancy. *Family Planning Perspectives, 21,* 248–255.	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up	Excluded - less than 90 days follow-up
ZEENAH1993	Zeanah, C. H., Dailey, J. V., Rosenblatt, M. J., *et al.* (1993) Do women grieve after terminating pregnancies because of fetal anomalies? A controlled investigation. *Obstetrics and Gynecology, 82,* 270–275.	Excluded - inappropriate sample - fetal abnormality	Excluded - inappropriate sample - fetal abnormality	Excluded - inappropriate sample - fetal abnormality

APPENDIX 8
DATA EXTRACTION FORMS FOR INCLUDED STUDIES

Study ID: BROEN2004	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: Yes
	Comparison: No
Study design	Prospective cohort
Country	Norway
Participant characteristics and numbers	**Abortion:** N = 70 to 80. Women treated in a gynaecology department in a hospital in Drammen, Norway.
	Comparisons group(s): n/a
Outcomes	PTSD Anxiety Depression
Measurement and mode of administration	Impact of Event Scale Hospital Anxiety and Depression Scale Self-administered
Follow-up	6 months 2 years
Factors Assessed	n/a
NICE quality rating	**Checklist used:** Cohort studies
	Details of assessment: 1.1 Adequately addressed 1.2 Adequately addressed 1.3 Well covered 1.4 Poorly addressed 1.5 Abortion 10% 1.6 Poorly addressed 1.7 Well covered 1.8 Not addressed 1.9 Not addressed 1.10 Well covered 1.11 Not addressed 1.12 Adequately addressed 1.13 Adequately addressed 1.14 Yes
Prevalence results	6 months - 25.68 (15.73 to 35.63) 2 years - 18.06 (9.17 to 26.95)
Prevalence quality rating	Very poor
Factors results	n/a
Factors quality rating	n/a
Comparison results	n/a
Comparison quality rating	n/a

Study ID: BROEN2005A	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: No
	Comparison: No
Study design	Prospective cohort
Country	Norway
Participant characteristics and numbers	**Abortion:** N = 70 to 80. Women treated in a gynaecology department in a hospital in Drammen, Norway.
	Comparisons group(s): n/a
Outcomes	PTSD Anxiety Depression
Measurement and mode of administration	Impact of Event Scale Hospital Anxiety and Depression Scale Self-administered
Follow-up	6 months 2 years 5 years
Factors Assessed	n/a
NICE quality rating	**Checklist used:** Cohort studies
	Details of assessment: 1.1 Well covered 1.2 Adequately addressed 1.3 Well covered 1.4 Adequately addressed 1.5 Abortion 12.5% 1.6 Poorly addressed 1.7 Well covered 1.8 Not addressed 1.9 Not addressed 1.10 Well covered 1.11 Not addressed 1.12 Adequately addressed 1.13 Adequately addressed 1.14 Yes
Prevalence results	5 years - 20.00% (10.63 to 29.37)
Prevalence quality rating	Very poor
Factors results	n/a
Factors quality rating	n/a
Comparison results	n/a
Comparison quality rating	n/a

Study ID: BROEN2005B	
Reviews	**Prevalence:** No
	Factors associated with mental health problems: Yes
	Comparison: No
Study design	Prospective
Country	Norway
Participant characteristics and numbers	**Abortion:** N = 70 to 80. Women treated in a Norwegian gynaecology department
	Comparisons group(s): n/a
Outcomes	PTSD
Measurement and mode of administration	Impact of Event Scale Self-administered
Follow-up	6 months to 5 years
Factors Assessed	Age Reasons for abortion Previous mental health Life events Education Multiple pregnancy events Pregnancy length Marital status Employment
NICE quality rating	**Checklist used:** Cohort studies
	1.1 Well covered 1.2 Adequately addressed 1.3 Well covered 1.4 Adequately addressed 1.5 10% 1.6 Poorly addressed 1.7 Adequately addressed 1.8 Not addressed 1.9 Not addressed 1.10 Well covered 1.11 Not addressed 1.12 Adequately addressed 1.13 Adequately addressed 1.14 Yes
Prevalence results	n/a
Prevalence quality rating	n/a

Factors results	Previous mental illness: With reference to PTSD, the regression analysis indicated that previous mental health problems were associated with intrusion at 6 months and 2 years after the abortion ($\beta = 0.23$, $p < 0.1$ and $\beta = 0.38$, $p < 0.001$ respectively) but not with symptoms of avoidance. **Age:** no relationship between age and measures of PTSD symptoms. **Education:** not associated with measures of PTSD. **Marital status:** not associated with any measure of PTSD. **Religion:** not associated with any measure of PTSD. **Employment:** was associated with intrusion scores, with women working at home or in temporary employment scoring higher on this measure at 2 years follow-up. However, vocational activity was not associated with any other symptoms of PTSD at both 6 months and 2 years follow-up. **Reasons for abortion:** only "pressure from male partner" was significant associated with both measures of intrusion and avoidance at 6 months and 2 years follow-up (intrusion: $\beta = 0.27$, $p < 0.05$ and $\beta = 0.32$, $p < 0.01$; Avoidance $\beta = 0.34$, $p < 0.01$ and $\beta = 0.24$, $p < 0.05$ respectively). Pressure from friends was associated with higher intrusion and avoidance scores at 6 months ($\beta = 0.25$, $p < 0.05$; $\beta = 0.31$, $p < 0.01$) but not at 2 years. **Multiple pregnancy events:** Number of previous abortions: having one child was associated with higher rates of avoidance at 2 years ($\beta = 0.25$, $p < 0.05$) but not at 6 months, and was not related to intrusion at any time. **Pregnancy length:** not related to length of pregnancy or previous abortions.
Factors quality rating	Very poor
Comparison results	n/a
Comparison quality rating	n/a

Study ID: BROEN2006	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: Yes
	Comparison: No
Study design	Prospective cohort
Country	Norway
Participant characteristics and numbers	**Abortion:** N = 70 to 80. Women treated in a gynaecology department in a hospital in Drammen, Norway.
	Comparisons group(s): n/a
Outcomes	PTSD Anxiety Depression
Measurement and mode of administration	Impact of Event Scale Hospital Anxiety and Depression Scale (HADS) Self-administered
Follow-up	6 months 2 years 5 years
Factors Assessed	Negative attitudes to abortions Doubt (negative reaction) Previous mental health Life events Education Multiple pregnancy events Marital status Employment
NICE quality rating	**Checklist used:** Cohort studies
	Details of assessment: 1.1 Well covered 1.2 Adequately addressed 1.3 Well covered 1.4 Adequately addressed 1.5 Abortion 12.5% 1.6 Poorly ddressed 1.7 Well covered 1.8 Not addressed 1.9 Not addressed 1.10 Well covered 1.11 Not addressed 1.12 Adequately addressed 1.13 Adequately addressed 1.14 Yes
Prevalence results	2 years- 11.1% (3.85 to 18.37) 5 years- 11.43% (3.98 to 18.88)
Prevalence quality rating	Very poor

Factors results	History of poor psychiatric health prior to the abortion was associated with higher depression scores ($p < 0.001$) at 6 months, and higher depression and anxiety scores ($p < 0.001$ and $p < 0.05$, respectively). Negative attitudes towards abortion at the time of the procedure: women with a negative attitude had significantly more anxiety at 6 months' ($p < 0.01$), 2 years' ($p < 0.05$) and 5 years' ($p < 0.05$) follow-up. Life events: if women experienced an increased number of life events during the year of follow-up (1 to 2 years after the abortion), this was associated with increased HADS anxiety scores ($p < 0.001$) as measured at 2 years' follow-up. If women experienced at least three life events in the year of the assessment (4 to 5 years after the abortion) this was also associated with higher level of anxiety as measured at 5 years' follow-up. Number of previous abortions, number of children and whether the women were pregnant between 'time 2' (6 months) and 'time 4' (5 years): for both anxiety and depression none of the variables were found to be significant predictors at any time point.
Factors quality rating	Very poor
Comparison results	n/a
Comparison quality rating	n/a

Study ID: COLEMAN2002A	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: Yes
	Comparison: Yes
Study design	Retrospective
Country	US
Participant characteristics and numbers	**Abortion:** N = 14,297. Women who claimed from state-funded medical insurance programme, California, US
	Comparisons group(s): N = 40,122. Women who claimed from state-funded medical insurance programme, California, US
Outcomes	Outpatient treatment for ICD-9 mental illness
Measurement and mode of administration	Insurance claims for psychiatric outpatient treatment
Follow-up	1 year 2 years 3 years 4 years
Factors Assessed	Age at time of pregnancy
NICE quality rating	**Checklist used:** Cohort studies

	Details of assessment 1.1 Adequately addressed 1.2 Adequately addressed 1.3 Not applicable 1.4 Adequately addressed 1.5 Not reported 1.6 Not applicable 1.7 Adequately addressed 1.8 Not addressed 1.9 Not addressed 1.10 Adequately addressed 1.11 Not addressed 1.12 Adequately addressed 1.13 Adequately addressed 1.14 Yes
Prevalence results	2.48% (2.23 to 2.73)
Prevalence quality rating	Poor
Factors results	Incidence rates of psychiatric outpatient treatment per 10,000 were greatest for women aged between 35 and 49 years at the time of the abortion (2,237.6) and lowest for women aged between 13 and 19 years (1,044.7)
Factors quality rating	Poor
Comparison results	Psychiatric outpatient claims Up to 90 days: OR 1.63 (1.40 to 1.91) p <0.0001 Up to 180 days: OR 1.42 (1.25 to 1.60) p <0.0001 Up to 1 year: OR 1.30 (1.18 to 1.44) p <0.0001 Up to 4 years: OR 1.17 (1.10 to 1.25) p <0.0001 2nd year: OR 1.16 (1.03 to 1.30) p = 0.018 3rd year: OR 1.10 (0.97 to 1.23) p >0.05 4th year: OR 1.05 (0.93 to 1.18) p >0.05 Depression not elsewhere classified: OR 1.06 (0.85 to1.34) p >0.05 Neurotic depression: OR 1.40 (1.18 to 1.67) p <0.0001 Acute stress reaction: OR 1.02 (0.75 to 1.40) p >0.05 Depressive psychosis, single episode: OR 1.08 (0.82 to 1.41) p >0.05 Depressive psychosis, recurrent episode: OR 1.00 (0.70 to 1.43) p >0.05 Schizophrenic disorders: OR 1.97 (1.32 to 2.96) p = 0.002 Nonorganic psychoses: OR 1.33, (0.88 to 2.02) p = 0.18 Bipolar disorder: OR 1.95 (1.21 to 3.16) p = 0.006 Drug and alcohol abuse: OR 1.16 (1.00 to 1.36) p = 0.056 Psychalgia: OR 0.90 (0.78 to 1.05) p >0.05 Other diagnoses: OR 1.11 (0.95 to 1.29) p = 0.18
Comparison quality rating	Poor

Study ID: COLEMAN2009A	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: No
	Comparison: No
Study design	Cross-sectional
Country	US
Participant characteristics and numbers	Abortion N = 399. Women who completed the US National Co-morbidity Survey. A nationally representative sample.
	Comparisons group(s) n/a
Outcomes	DSM-III-R psychiatric disorders
Measurement and mode of administration	University of Michigan-Composite International Diagnostic Interview (UM-CIDI)
Follow-up	Cross-sectional
Factors Assessed	n/a
NICE quality rating	**Checklist used:** Prognostic studies
	Details of assessment 1.1 Yes 1.2 Unclear 1.3 Yes 1.4 No 1.5 Yes 1.6 Yes
Prevalence results	Major depression with hierarchy: 36.59% (31.86 to 41.32) Major depression without hierarchy: 40.6% (35.78 to 45.42) Panic disorder: 11.03% (7.96 to 14.1) Panic attacks: 18.05% (14.28 to 21.82) Agoraphobia: 18.05% (14.28 to 21.82) Agoraphobia without panic disorder: 14.04% (10.63 to 17.45) PTSD: 19.8% (15.89 to 23.71) Alcohol dependence: 23.31% (19.16 to 27.46) Alcohol misuse (without drug dependence): 14.54% (11.08 to 18) Alcohol misuse: 36.84% (32.11 to 41.57) Drug dependence: 16.79% (13.12 to 20.46) Drug misuse (without alcohol dependence): 9.52% (6.64 to 12.4) Drug misuse: 23.56% (19.4 to 27.72) Bipolar I disorder: 5.51% (3.27 to 7.75) New mania: 2.01% (0.63 to 3.39)
Prevalence quality rating	Fair
Factors results	n/a
Factors quality rating	n/a
Comparison results	n/a
Comparison quality rating	n/a

Study ID: COLEMAN2009B	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: No
	Comparison: No
Study design	Cross-sectional
Country	US
Participant characteristics and numbers	**Abortion:** N = 112. Women who had another pregnancy and aborted the pregnancy
	Comparisons group(s): n/a
Outcomes	Alcohol use
Measurement and mode of administration	Measure of excessive drinking Self-report
Follow-up	0 to 1 year
Factors Assessed	n/a
NICE quality rating	**Checklist used:** Prognostic studies
	Details of assessment 1.1 Yes 1.2 Unclear 1.3 Yes 1.4 Yes 1.5 No 1.6 Yes
Prevalence results	Heavy drinking: 54.5% (45.28 to 63.72)
Prevalence quality rating	Fair
Factors results	n/a
Factors quality rating	n/a
Comparison results	n/a
Comparison quality rating	n/a

Study ID: COLEMAN2010	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: Yes
	Comparison: No
Study design	Cross-sectional
Country	A range of countries
Participant characteristics and numbers	**Abortion:** N = 374. Women completed surveys on an online website. N = 307. Women had an early abortion (up to 12 weeks gestation). N = 52. Women had a late abortion (13 to 20 weeks).
	Comparisons group(s): n/a
Outcomes	PTSD
Measurement and mode of administration	PTSD Checklist-Civilian Version (PCL-C) Self-administered
Follow-up	Cross-sectional
Factors Assessed	Timing of abortion (late versus early)
NICE quality rating	**Checklist used:** Prognostic studies
	Details of assessment 1.1 No 1.2 Unclear 1.3 Yes 1.4 Yes 1.5 No 1.6 Yes
Prevalence results	**Early abortion:** 52.5 (46.91 to 58.09) **Late abortion:** 67.4% (54.66 to 80.14)
Prevalence quality rating	Very poor
Factors results	Women who had a late abortion (13 to 30 weeks) were significantly more likely to met DSM-IV criteria for PTSD compared with those who had an early abortion (up to 12 weeks: OR = 2.04; 95% CI, 1.09 to 3.83, p = 0.03).
Factors quality rating	Very poor
Comparison results	n/a
Comparison quality rating	n/a

Study ID: CONGELTON1993	
Reviews	**Prevalence:** No
	Factors associated with mental health problems: Yes
	Comparison: No
Study design	Retrospective
Country	US
Participant characteristics and numbers	**Abortion:** N = 25 women with self-identified distress following an abortion and N = 25 women who reported neutral feeling or feeling of relief following abortion
	Comparisons group(s): n/a
Outcomes	PTSD
Measurement and mode of administration	Impact of Life Events (PTSD) Global Severity Index (GSI) Counselling Self-administered
Follow-up	Various
Factors Assessed	Negative reactions to abortion
NICE quality rating	**Checklist used:** Cohort studies
	Details of assessment 1.1 Adequately addressed 1.2 Adequately addressed 1.3 Not addressed 1.4 Adequately addressed 1.5 Not reported 1.6 Not applicable 1.7 Adequately addressed 1.8 Not addressed 1.9 Not addressed 1.10 Adequately addressed 1.11 Not addressed 1.12 Poorly addressed 1.13 Poorly addressed 1.14 No
Prevalence results	n/a
Prevalence quality rating	n/a
Factors results	Women who reported negative feelings of distress following the abortion scored higher on a measure of PTSD at both the present time and at the most distressing time (SMD = 0.63; 95% CI, 0.02 to 1.23 and SMD = 1.26; 95% CI, 0.61 to 1.91 respectively) and were more likely to seek counselling for the abortion (64% compared to 0%). Results also indicated that distressed women scored significantly higher on the GSI (SMD = 0.78; 95% CI, 0.16 to 1.39) however, the authors noted that the mean group scores did not indicate psychological distress in either group.
Factors quality rating	Very poor
Comparison results	n/a

Comparison quality rating	n/a

Study ID: COUGLE2003	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: No
	Comparison: No
Study design	Retrospective
Country	Norway
Participant characteristics and numbers	**Abortion:** N = 304 Women who reported a first pregnancy within the National Longitudinal Survey of Youth
	Comparisons group(s): n/a
Outcomes	Depression
Measurement and mode of administration	CES-D Interview
Follow-up	1 to 12 years
Factors Assessed	n/a
NICE quality rating	**Checklist used:** Cohort studies
	Details of assessment 1.1 Adequately addressed 1.2 Adequately addressed 1.3 Not applicable 1.4 Poorly addressed 1.5 Not reported 1.6 Not addressed 1.7 Adequately addressed 1.8 Not addressed 1.9 Not addressed 1.10 Adequately addressed 1.11 Not addressed 1.12 Adequately addressed 1.13 Adequately addressed 1.14 Yes
Prevalence results	27.3% (22.2 to 32.4)
Prevalence quality rating	Fair
Factors results	n/a
Factors quality rating	n/a
Comparison results	n/a
Comparison quality rating	n/a

Study ID: COUGLE2005	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: Yes
	Comparison: Yes
Study design	Cross-sectional
Country	US
Participant characteristics and numbers	**Abortion:** N =1,033 Women having an unintended pregnancy ending in abortion for their first pregnancy event from The National Survey of Family Growth Cycle V
	Comparisons group(s): N =1,813 Women having an unintended pregnancy ending live birth delivery for their first pregnancy event from The National Survey of Family Growth Cycle V
Outcomes	Experience of anxiety symptoms
Measurement and mode of administration	A measure of experience of anxiety symptoms which is reflective of DSM-IV criteria for GAD Interview
Follow-up	Cross-sectional
Factors Assessed	Marital status Ethnicity Age
NICE quality rating	**Checklist used:** Prognostic studies
	Details of assessment 1.1 Yes 1.2 Unclear 1.3 Yes 1.4 Yes 1.5 Yes 1.6 Yes
Prevalence results	13.75% (11.65 to15.85)
Prevalence quality rating	Fair
Factors results	**Age:** Women who had an abortion under the age of 20 years had slightly higher rates of anxiety symptoms (14.1%) than women over the age of 20 (12.8%). Converting this raw data into odds ratios indicated that there was no significant difference between age groups (OR = 1.15; 95% CI, 0.79 to 1.65, p >0.05). **Ethnicity:** Fewer black women developed post-pregnancy anxiety (6.0%) compared with white women (16.3%), Hispanic women (14.9%) and women of other ethnic backgrounds (24.2%). When converting the raw percentages into odds ratios, black women had significantly lower rates of anxiety when compared with white women (OR = 0.33; 95% CI, 0.19 to 0.57, p <0.001) and all other ethnic groups (OR = 0.31; 95% CI, 0.16 to 0.61, p <0.001). **Marital status:** No association between marital status at time of first pregnancy and post-abortion anxiety, with 17.2% of married women and 13.5% of unmarried women meeting criteria (OR = 1.33; 95% CI, 0.66 to 2.69, p >0.05).

Factors quality rating	Fair
Comparison results	OR 1.34 (1.05 to1.70) p <0.018
Comparison quality rating	Fair

Study ID: COYLE2010	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: Yes
	Comparison: No
Study design	Cross-sectional
Country	A range of countries
Participant characteristics and numbers	**Abortion:** N = 374. Women completed surveys on an online website.
	Comparisons group(s): n/a
Outcomes	PTSD
Measurement and mode of administration	PTSD Checklist-Civilian Version (PCL-C) Self-administered
Follow-up	Cross-sectional
Factors Assessed	Negative attitudes to abortion Negative reactions to abortion
NICE quality rating	**Checklist used:** Prognostic studies
	Details of assessment 1.1 No 1.2 Unclear 1.3 Yes 1.4 Yes 1.5 No 1.6 Yes
Prevalence results	54.9% (49.86 to 59.94)
Prevalence quality rating	Very poor
Factors results	Within their analysis they controlled for a number of factors such as race, education, previous abuse and mental health counselling prior to the abortion. Although the effect of disagreement between partners was attenuated by controlling for these factors, it was still linked to a significant increase in PTSD scores (β = 0.64, SE = 0.32, p <0.05). Likewise, women who perceived their pre-abortion counselling to be inadequate also scored significantly higher on measures of PTSD, despite controlling for a number of factors (β = 1.34, SE = 0.57, p <0.05).
Factors quality rating	Very poor
Comparison results	n/a
Comparison quality rating	n/a

Study ID: FERGUSSON2006	
Reviews	**Prevalence:** No
	Factors associated with mental health problems: No
	Comparison: Yes
Study design	Retrospective (with some prospective data)
Country	New Zealand
Participant characteristics and numbers	**Abortion:** N = 51. Women from the Christchurch Health and Development Study reporting an abortion. Longitudinal cohort study of New Zealand children.
	Comparisons group(s): N =84. Women from the Christchurch Health and Development Study. Longitudinal cohort study of New Zealand children.
Outcomes	Any mental health problems
Measurement and mode of administration	Self-administered questionnaire based on CIDI and Assessment of Dominance, Influence, Steadiness, Conscientiousness (DISC) Interview
Follow-up	5-year lagged model
Factors Assessed	n/a
NICE quality rating	**Checklist used:** Cohort studies
	Details of assessment 1.1 Well covered 1.2 Adequately addressed 1.3 Not addressed 1.4 Not addressed 1.5 Not reported 1.6 Not addressed 1.7 Adequately addressed 1.8 Not addressed 1.9 Not addressed 1.10 Adequately addressed 1.11 Not addressed 1.12 Adequately addressed 1.13 Adequately addressed 1.14 Yes
Prevalence results	n/a
Prevalence quality rating	n/a
Factors results	n/a
Factors quality rating	n/a
Comparison results	OR 0.55 (0.23 to 1.36) p >0.05
Comparison quality rating	Good

Study ID: FERGUSSON2008	
Reviews	**Prevalence:** No
	Factors associated with mental health problems: No
	Comparison: Yes
Study design	Retrospective (with some prospective data)
Country	New Zealand
Participant characteristics and numbers	**Abortion:** N = 117. Women from the Christchurch Health and Development Study reporting an abortion. Longitudinal cohort study of New Zealand children.
	Comparisons group(s): N = 52. Women who had an unwanted pregnancy or one that provoked an adverse reaction that resulted in a live birth, from the Christchurch Health and Development Study. Longitudinal cohort study of New Zealand children.
Outcomes	Major depression Anxiety
Measurement and mode of administration	Self-administered questionnaire based on CIDI and DISC
Follow-up	5-year lagged model
Factors Assessed	n/a
NICE quality rating	**Checklist used:** Cohort studies
	Details of assessment 1.1 Adequately addressed 1.2 Adequately addressed 1.3 Well covered 1.4 Well covered 1.5 Overall 13 to 20% 1.6 Well covered 1.7 Adequately addressed 1.8 Not addressed 1.9 Not addressed 1.10 Adequately addressed 1.11 Not addressed 1.12 Adequately addressed 1.13 Adequately addressed 1.14 Yes
Prevalence results	n/a
Prevalence quality rating	n/a
Factors results	n/a
Factors quality rating	n/a

Comparison results	**Depression:** there was not a statistically significant difference in rate of depression between women who had an abortion and those who delivered an unwanted pregnancy (OR = 0.70; 95% CI, 0.32 to 1.96, p >0.05). **Anxiety:** women who had an abortion were not statistically significantly more likely to experience anxiety disorders than those who delivered a pregnancy (OR = 1.82; 95% CI, 0.67 to 4.94, p >0.05). **Alcohol and illicit drug dependence:** there was insufficient evidence to suggest that having an abortion was statistically significantly associated with an increased risk when compared with delivering an unwanted pregnancy due to the large confidence intervals (alcohol dependence: OR = 7.1; 95% CI, 0.51 to 97.94, p >0.05; illicit drug dependence: OR = 13.20; 95% CI, 0.82 to 212.14, p >0.05). **Mental health problem:** women who had an abortion were no more likely to experience mental health problems compared with those who delivered either an unwanted pregnancy (OR = 1.12; 95% CI, 0.9 to 1.4, p >0.05) or an unplanned pregnancy (OR = 1.10; 95% CI, 0.95 to 1.27, p >0.05).
Comparison quality rating	Very good

Study ID: FERGUSSON2009	
Reviews	**Prevalence:** No
	Factors associated with mental health problems: Yes
	Comparison: No
Study design	Retrospective (with some prospective data)
Country	New Zealand
Participant characteristics and numbers	**Abortion:** N = 104. Women from the Christchurch Health and Development Study, followed from birth to 30 years old reporting an abortion
	Comparisons group(s): n/a
Outcomes	DSM-IV diagnosis
Measurement and mode of administration	Self-administered questionnaire based on the CIDI
Follow-up	At age 15 to 18 years 18 to 21 21 to 25 25 to 30
Factors Assessed	Negative reaction to abortion
NICE quality rating	**Checklist used:** Cohort studies

	Details of assessment 1.1 Adequately addressed 1.2 Adequately addressed 1.3 Well covered 1.4 Adequately addressed 1.5 Not reported 1.6 Adequately addressed 1.7 Adequately addressed 1.8 Not addressed 1.9 Not addressed 1.10 Adequately addressed 1.11 Not addressed 1.12 Adequately addressed 1.13 Adequately addressed 1.14 Yes
Prevalence results	n/a
Prevalence quality rating	n/a
Factors results	The study demonstrated a linear relationship between increased measures of negative emotions following an abortion and higher incidence rates of post-abortion mental health problems. Specifically, when compared with women who did not report any negative reactions to their abortion, the incidence rate ratios (IRR) indicate a 23 and 51% increase in the rate of developing a mental health problem for women reporting one to three and four to six negative emotions, respectively (IRR = 1.23; 95% CI, 1.00 to 1.51 and IRR = 1.51; 95% CI, 1.01 to 2.27). Although not providing any statistical comparisons, this increase in rates was more pronounced for depression, anxiety and suicidal ideation in comparison with drug and alcohol dependence. There was no relationship between positive emotions and post-abortion mental health problems.
Factors quality rating	Good
Comparison results	n/a
Comparison quality rating	n/a

Study ID: GISSLER2005	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: Yes
	Comparison: No
Study design	Record data analysis
Country	Finland
Participant characteristics and numbers	**Abortion:** N = 156,789. Register linkage study using death certificates and abortion register
	Comparisons group(s): n/a
Outcomes	Suicide
Measurement and mode of administration	Death certificate
Follow-up	1 year
Factors Assessed	Age
NICE quality rating	**Checklist used:** Cohort studies
	Details of assessment 1.1 Adequately addressed 1.2 Poorly addressed 1.3 Not applicable 1.4 Not applicable 1.5 Not reported 1.6 Not applicable 1.7 Adequately addressed 1.8 Not addressed 1.9 Not addressed 1.10 Adequately addressed 1.11 Not addressed 1.12 Adequately addressed 1.13 Poorly addressed 1.14 Yes
Prevalence results	.0319% (.0317-.0321)
Prevalence quality rating	Very poor
Factors results	Assessed suicide rates per 100,000 pregnancies for three different age groups (15 to 24, 25 to 34 and 35 to 49). Although there was an increase in the suicide rates with age (28.1; 33.1; 37.7 respectively) no statistical analysis was conducted to compare these rates.
Factors quality rating	Very poor
Comparison results	n/a
Comparison quality rating	n/a

Study ID: HAMAMA2010	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: No
	Comparison: No
Study design	Cross-sectional
Country	US
Participant characteristics and numbers	**Abortion:** Women who took part in the first prenatal survey in a longitudinal outcomes study, Psychobiology of PTSD & Adverse Outcomes of Childbearing. N = 199. Women reported a prior elective abortion N = 22. Women reported both a prior elective and spontaneous abortion.
	Comparisons group(s): n/a
Outcomes	PTSD Depression PTSD and depression comorbidity
Measurement and mode of administration	National Women's Study PTSD Module (NWS-PTSD) Composite International Diagnostic Interview Interview
Follow-up	Cross-sectional
Factors Assessed	n/a
NICE quality rating	**Checklist used:** Prognostic studies
	Details of assessment 1.1 Yes 1.2 Unclear 1.3 Yes 1.4 Yes 1.5 No 1.6 Yes
Prevalence results	Depression Prior elective abortion: 15.6% (2.08 to 34.32) Prior elective and spontaneous Abortion: 18.2% (10.56 to 20.64) PTSD Prior elective abortion: 12.6% (7.99 to 17.21) Prior elective and spontaneous abortion: 13.6% (-0.72 to 27.92) Comorbid depression and anxiety Prior elective abortion: 4.5 (1.62 to 7.38) Prior elective and spontaneous abortion: 4.5 (-4.16 to 13.16)
Prevalence quality rating	Fair
Factors results	n/a
Factors quality rating	n/a
Comparison results	n/a
Comparison quality rating	n/a

Study ID: MAJOR2000	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: Yes
	Comparison: No
Study design	Prospective
Country	US
Participant characteristics and numbers	**Abortion:** N = 386 to 442. Women undergoing a first trimester abortion at 3 sites (2 clinics and 1 clinician's office)
	Comparisons group(s): n/a
Outcomes	Depression PTSD
Measurement and mode of administration	Adapted Diagnostic Interview Schedule Adapted measure of PTSD Self-report
Follow-up	2 years
Factors Assessed	Previous mental health problems Age Ethnicity Marital status Religious affiliation Multiple pregnancy events Medical complications
NICE quality rating	**Checklist used:** Cohort studies
	Details of assessment 1.1 Adequately addressed 1.2 Not applicable 1.3 Well covered 1.4 Poorly addressed 1.5 15% 1.6 Well covered 1.7 Adequately addressed 1.8 Not addressed 1.9 Not addressed 1.10 Well covered 1.11 Not addressed 1.12 Adequately addressed 1.13 Adequately addressed 1.14 No
Prevalence results	20.21% (16.2 to 24.22)
Prevalence quality rating	Fair

Factors results	**Previous mental health problems:** were associated with poorer post-abortion outcomes for all measures of depression and PTSD. A history of depression was the only significant predictor included in the model for both post-abortion depression as measured by the diagnostic interview schedule and PTSD (β = 0.87, SE = 0.30, p <0.01 and β = 2.26, SE = 0.75, p <0.05, respectively). A history of depression was also significantly associated with a continuous measure of depression (the Brief Symptom Inventory Depression Interview score (β = 0.49, SE = 0.11, p <0.001)) and with post-abortion negative emotions (β = 0.54, SE = 0.13, p <0.001). **Age:** at 2-year follow-up, age was a significant predictor of negative emotions post-abortion (β = -0.05, SE = 0.01, p <0.001), with younger women reporting more negative attitudes. There was no impact of age on either scale-based or interview measures of depression (β = -0.02, SE = 0.01, p >0.05 and β = -0.01, SE = 0.03, p >0.05, respectively), or on PTSD (β = -0.05, SE = 0.11, p >0.05). **Ethnicity:** had an impact on post-abortion self-esteem at 2 years, with African–American women reporting higher self-esteem than other ethnic groups (β = 0.25, SE = 0.13, p <0.05). Ethnicity was linked to depression (as measured on the Brief Symptom Inventory Depression Interview), with Hispanic women scoring significantly higher at 2-year follow-up (β = 0.95, SE = 0.32, p <0.01). However, results for depression (as measured on the Diagnostic Interview Schedule) and PTSD indicated that ethnicity did not have an effect on outcomes as reported at 2-year follow-up. **Marital status:** failed to find an effect of marital status on self-esteem. Marital status was also not associated with any measure of depression or PTSD. **Religious affiliation:** was entered into a regression model and no relationship with any measure of post-abortion depression, self-esteem or PTSD was found. **Multiple pregnancy events:** prior births were associated with a decreased rating of post-abortion relief, decision satisfaction and benefit appraisal; neither prior births nor prior abortions were significantly associated with increased levels of depression or PTSD at 2 years' follow-up. **Medical complications:** for all measures of post-abortion well-being (self-esteem, depression and PTSD), medical complications following the abortion were not associated with differences in outcome.
Factors quality rating	Fair
Comparison results	n/a
Comparison quality rating	n/a

Study ID: MOTA2010	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: No
	Comparison: No
Study design	Cross-sectional
Country	US
Participant characteristics and numbers	**Abortion:** N = 452. Women who completed the National Comorbidity Survey Replication.
	Comparisons group(s): n/a
Outcomes	DSM-IV psychiatric disorders
Measurement and mode of administration	Unmodified CIDI Interview
Follow-up	Cross-sectional
Factors Assessed	n/a
NICE quality rating	**Checklist used:** Prognostic studies
	Details of assessment 1.1 Yes 1.2 Unclear 1.3 Yes 1.4 Yes 1.5 Yes 1.6 Yes
Prevalence results	GAD: 9.29% (6.61 to 11.97) Social phobia: 2.88% (1.34 to 4.42) Major depression: 18.14% (14.59 to 21.69) Suicidal ideation: 10.62% (7.78 to 13.46) Suicide attempt: 3.54% (1.84 to 5.24) Alcohol misuse: 10.62% (7.78 to 13.46) Alcohol dependence: 4.65% (2.71 to 6.59) Alcohol misuse: 7.96% (5.46 to 10.46) Drug dependence: 4.65% (2.71 to 6.9)
Prevalence quality rating	Fair
Factors results	n/a
Factors quality rating	n/a
Comparison results	n/a
Comparison quality rating	n/a

Study ID: MUNK-OLSEN2011	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: Yes
	Comparison: Yes
Study design	Prospective
Country	Denmark
Participant characteristics and numbers	**Abortion:** N = 84,620. Women with no history of a mental disorder (prior inpatient psychiatric contact) prior to first abortion in the first trimester.
	Comparisons group(s): N = 280,930. Women with no history of a mental disorder (prior inpatient psychiatric contact) prior to first live born child.
Outcomes	Psychiatric inpatient and outpatient contact
Measurement and mode of administration	Danish Psychiatric Central Register
Follow-up	Up to 12 years
Factors Assessed	Age Prior child birth
NICE quality rating	**Checklist used:** Cohort studies
	Details of assessment 1.1 Adequately addressed 1.2 Adequately addressed 1.3 Not addressed 1.4 Poorly addressed 1.5 Not reported 1.6 Not addressed 1.7 Adequately addressed 1.8 Not addressed 1.9 Not addressed 1.10 Well covered 1.11 Not addressed 1.12 Adequately addressed 1.13 Poorly addressed 1.14 Yes
Prevalence results	9 months before: 1.03% (0.96 to 1.1) 0 to 12 months: 1.52% (1.44 to 1.6) Total time period: 2.53% (2.42 to 2.64)
Prevalence quality rating	Good

Factors results	**Age:** The study reported, as an additional analysis, that age, in general, did not significantly affect the rate of psychiatric contact following an abortion. However, it was not possible to ascertain whether there were any differences between specific age groups because no further statistical comparisons were conducted. The precise significance of depression or other mental health problems, several years post-abortion, is unclear. **Prior childbirth:** was not significantly associated with the effect of abortion on the risk of a psychiatric contact. The only data provided was a p-value (p = 0.09).
Factors quality rating	Good
Comparison results	**9 months prior to pregnancy event:** OR 3.68 (3.34 to 4.05) p <0.001 12-month follow-up: OR 2.25 (2.09 to 2.41) p <0.001
Comparison quality rating	Good

Study ID: PEDERSEN2007	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: Yes
	Comparison: Yes
Study design	Retrospective
Country	Norway
Participant characteristics and numbers	**Abortion:** N = 76 to 125. Women from the Young in Norway Longitudinal Study. Longitudinal cohort study recruited adolescents from schools and followed them for 13 years.
	Comparisons group(s): N = 183. Women from the Young in Norway Longitudinal Study who delivered a child. N = 49. Women who reported both a delivery and an abortion.
Outcomes	Depression Alcohol problems Illicit drug use
Measurement and mode of administration	Kandals and Davies Depressive Mood Inventory The Alcohol Use Disorders Identification Test (AUDIT) Self-report
Follow-up	11 years
Factors Assessed	Other pregnancy events
NICE quality rating	**Checklist used:** Cohort studies

	Details of assessment 1.1 Well covered 1.2 Adequately addressed 1.3 Adequately addressed 1.4 Adequately addressed 1.5 Not reported 1.6 Poorly addressed 1.7 Adequately addressed 1.8 Not addressed 1.9 Not addressed 1.10 Adequately addressed 1.11 Not addressed 1.12 Adequately addressed 1.13 Adequately addressed 1.14 Yes
Prevalence results	Alcohol misuse/ problems: 30.3% (19.93 to 40.59) Cannabis use: 31.6% (2.6 to 8.2) Other illegal drug use: 17.1% (3.4 to 17.7)
Prevalence quality rating	Fair
Factors results	Women who reported both a delivery and an abortion had significantly lower rates of alcohol problems, illegal substance misuse and use of cannabis compared with women who only reported a history of abortion (OR = 0.38; 95% CI, 0.15 to 0.98; OR = 0.21; 95% CI, 0.04 to 0.96 and OR = 0.19; 95% CI, 0.06 to 0.60, respectively).
Factors quality rating	Fair
Comparison results	Alcohol problems: OR 20.00 (7.89 to 50.68) p <0.001 Cannabis use: OR 11.33 (3.55 to 36.20) p <0.001 Illicit drug use: OR 7.83 (1.68 to 36.61) p <0.001
Comparison quality rating	Good

Study ID: PEDERSEN2008	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: Yes
	Comparison: Yes
Study design	Retrospective
Country	Norway
Participant characteristics and numbers	**Abortion:** N = 125. Women from the Young in Norway Longitudinal Study. Longitudinal cohort study recruited as adolescence from schools and followed for 13 years
	Comparisons group(s): N = 183. Women from the Young in Norway Longitudinal Study who delivered a child.
Outcomes	Depression
Measurement and mode of administration	Kandals and Davies Depressive Mood Inventory Self-administered
Follow-up	11 years

Factors Assessed	Age at time of pregnancy
NICE quality rating	**Checklist used:** Cohort studies
	Details of assessment 1.1 Well covered 1.2 Adequately addressed 1.3 Adequately addressed 1.4 Adequately addressed 1.5 Not reported 1.6 Not addressed 1.7 Adequately addressed 1.8 Not addressed 1.9 Not addressed 1.10 Adequately addressed 1.11 Not addressed 1.12 Adequately addressed 1.13 Adequately addressed 1.14 Yes
Prevalence results	1 to 6 years: 26.25% (16.61 to 35.89) 7 to 11 years: 11.11% (1.93 to 20.29) 1 to 11 years: 20.8% (21.6 to 37.6)
Prevalence quality rating	Fair
Factors results	**Age:** 21% of women aged 21 to 26 years experienced depression up to 11 years post-abortion, compared with only 5% of women aged 15 to 20 years. Odds ratios for the data indicated that this difference between the two age groups was significant (OR = 0.35; 95% CI, 0.12 to 1.01, p = 0.05).
Factors quality rating	Fair
Comparison results	15 to 20 years: OR 0.52 (0.14 to1.91) p >0.05 21 to 26 years: OR 2.90 (1.31 to 6.40) p <0.01
Comparison quality rating	Good

Study ID: QUNITON2001	
Reviews	**Prevalence:** No
	Factors associated with mental health problems: Yes
	Comparison: No
Study design	Prospective
Country	US
Participant characteristics and numbers	**Abortion:** N = 436. Minors and adults from one of three abortion clinics in Buffalo, NY
	Comparisons group(s): n/a
Outcomes	Depression
Measurement and mode of administration	Depression subscale of the Brief Symptom Inventory Self-administered
Follow-up	2 years

Factors Assessed	Age
NICE quality rating	**Checklist used:** Cohort studies
	Details of assessment 1.1 Adequately addressed 1.2 Adequately addressed 1.3 Well covered 1.4 Not addressed 1.5 Total attrition: 49.9% 1.6 Adequately addressed 1.7 Adequately addressed 1.8 Not addressed 1.9 Not addressed 1.10 Well covered 1.11 Not addressed 1.12 Adequately addressed 1.13 Adequately addressed 1.14 Yes
Prevalence results	n/a
Prevalence quality rating	n/a
Factors results	When comparing minors (17 years old and younger) with adults (over 17 years old), no effect of age on negative emotions at 2-year **Follow-up** (F = 0.00; 95% CI, 1.0 to 5.0, p >0.05) was found. By grouping the women in this way QUINTON2001 also failed to show any effect of age on measures of post-abortion depression at 2-year **Follow-up** (F = 0.23; 95% CI, 0.0 to 4.0, p >0.05).
Factors quality rating	Poor
Comparison results	n/a
Comparison quality rating	n/a

Study ID: REARDON2002A	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: Yes
	Comparison: Yes
Study design	Retrospective
Country	US
Participant characteristics and numbers	**Abortion:** N = 17,472. Women who received funding for an abortion from a state funded medical insurance programme, California.
	Comparisons group(s): N = 41,956. Women who claimed for a delivery.
Outcomes	Suicide
Measurement and mode of administration	Death certificate
Follow-up	0 to 8 years
Factors Assessed	Multiple pregnancy events

NICE quality rating	**Checklist used:** Cohort studies
	Details of assessment 1.1 Adequately addressed 1.2 Poorly addressed 1.3 Not applicable 1.4 Poorly addressed 1.5 n/a 1.6 n/a 1.7 Adequately addressed 1.8 Not addressed 1.9 Not addressed 1.10 Adequately addressed 1.11 Not addressed 1.12 Adequately addressed 1.13 Poorly addressed 1.14 Yes
Prevalence results	Up to 8 years: 0.06% (0.02 to 0.1)
Prevalence quality rating	Poor
Factors results	Using medical records, women were categorised into the following groups: abortion only, abortion followed by delivery or delivery followed by abortion. Suicide rates ranged from 16.3 to 62.8 per 100,000 across the three groups; however, none of the pair-wise comparisons indicated a significant difference in rates between groups.
Factors quality rating	Poor
Comparison results	Women who had an abortion were at a significantly increased risk of suicide compared with those who had delivered a pregnancy (OR = 3.12; 95% CI, 1.25 to 7.78, p <0.001).
Comparison quality rating	Poor

Study ID: REARDON2002B	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: Yes
	Comparison: No
Study design	Retrospective
Country	US
Participant characteristics and numbers	**Abortion:** N = 293. Women who reported an unintended first pregnancy. National Longitudinal Survey of Youth, US.
	Comparisons group(s): n/a
Outcomes	Depression
Measurement and mode of administration	CES-D Interview
Follow-up	0-12 years
Factors Assessed	Marital status
NICE quality rating	**Checklist used:** Cohort studies

	Details of assessment 1.1 Adequately addressed 1.2 Adequately addressed 1.3 Not addressed 1.4 Poorly addressed 1.5 Not reported 1.6 Not addressed 1.7 Adequately addressed 1.8 Not addressed 1.9 Not addressed 1.10 Adequately addressed 1.11 Not addressed 1.12 Adequately addressed 1.13 Adequately addressed 1.14 Yes
Prevalence results	27.3% (22.2 to 32.4)
Prevalence quality rating	Fair
Factors results	No significant association between marital status and post-abortion depression, with 26.2% of married women and 28.7% of unmarried women meeting CES-D criteria (OR = 0.88; 95% CI, 0.53 to 1.48, p >0.05).
Factors quality rating	Fair
Comparison results	n/a
Comparison quality rating	n/a

Study ID: REARDON2003A	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: Yes
	Comparison: Yes
Study design	Retrospective
Country	US
Participant characteristics and numbers	**Abortion:** N = 15,299. Women who claimed from state-funded medical insurance programme, California
	Comparisons group(s): N = 41,442. Women whose pregnancy ended in delivery of a live birth and who had no known subsequent abortions.
Outcomes	Psychiatric admission for ICD-9 mental illness
Measurement and mode of administration	Insurance claims for psychiatric inpatient admission
Follow-up	90 days to 4 years
Factors Assessed	Age at time of pregnancy
NICE quality rating	**Checklist used:** Cohort studies

	Details of assessment 1.1 Adequately addressed 1.2 Adequately addressed 1.3 Not applicable 1.4 Adequately addressed 1.5 n/a 1.6 n/a 1.7 Adequately addressed 1.8 Not addressed 1.9 Not addressed 1.10 Adequately addressed 1.11 Not addressed 1.12 Adequately addressed 1.13 Adequately addressed 1.14 Yes
Prevalence results	Up 1 year: 0.3% (0.21 to 0.39) Up to 2 years: 0.56% (0.44 to 0.68) Up to 3 years: 0.84% (0.7 to 0.98) Up to 4 years: 1.18 (1.01 to 1.35)
Prevalence quality rating	Poor
Factors results	The rate of first time psychiatric admissions per 10,000 increased as age at the time of the abortion increased. Rates of inpatient admissions ranged from 915.4 in every 10,000 at age 13 to 19 years, to 1,065.2 in every 10,000 at age 25 to 29 years and to 1,117.1 in every 10,000 at age 35 to 49 years.
Factors quality rating	Poor
Comparison results	Psychiatric inpatient claims Up to 90 days: OR 2.6 (1.3 to 5.3) p <0.01 Up to 180 days: OR 2.2 (1.3 to 3.7) p <0.01 Up to 1 year: OR 1.9 (1.3 to 2.8) p <0.01 2nd year: OR 2.1 (1.3 to 3.2) p <0.01 3rd year: OR 1.6 (1.1 to 2.3) p <0.05 4th year: OR 1.5 (1.1 to 2.1) p <0.05 Depression not elsewhere classified: OR 1.5 (0.6 to 3.8) p >0.05 Depressive psychosis, single episode: OR 1.9 (1.3 to 2.9) p <0.01 Depressive psychosis, recurrent episode: OR 2.1 (1.3 to 3.5) p <0.01 Schizophrenic disorders: OR 1.2, 0.7 to 1.9) p >0.05 Nonorganic psychoses: OR 1.2 (0.6 to 2.3) p >0.05 Bipolar disorder: OR 3.0 (1.5 to 6.0) p <0.01 Neurotic disorders: OR 1.7 (0.8 to 3.6) p >0.05 Other diagnoses: OR 1.5 (0.9 to 2.6) p >0.05
Comparison quality rating	Poor

Study ID: REARDON2004	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: No
	Comparison: No

Study design	Retrospective
Country	US
Participant characteristics and numbers	**Abortion:** N = 154 to 213. Women who reported an unintended first pregnancy. National Longitudinal Survey of Youth, US.
	Comparisons group(s): n/a
Outcomes	Alcohol abuse Marijuana use Cocaine use
Measurement and mode of administration	Self-report
Follow-up	0 to 12 years
Factors Assessed	n/a
NICE quality rating	**Checklist used:** Prognostic studies
	Details of assessment 1.1 Adequately addressed 1.2 Adequately addressed 1.3 Not addressed 1.4 Not addressed 1.5 Not reported 1.6 Not addressed 1.7 Adequately addressed 1.8 Not addressed 1.9 Not addressed 1.10 Adequately addressed 1.11 Not addressed 1.12 Adequately addressed 1.13 Adequately addressed 1.14 Yes
Prevalence results	Alcohol abuse: 6.5% (2.61 to 10.39) Cannabis use:18.6% (13.37 to 23.83) Cocaine use: 4.85 (1.93 to 7.67)
Prevalence quality rating	Fair
Factors results	n/a
Factors quality rating	n/a
Comparison results	n/a
Comparison quality rating	n/a

Study ID: REES2007	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: Yes
	Comparison: No
Study design	Retrospective

Country	US
Participant characteristics and numbers	**Abortion:** N = 99. New mothers who had previously had a live birth recruited into Fragile Families and Child Wellbeing studies
	Comparisons group(s): n/a
Outcomes	Major depression
Measurement and mode of administration	Composite International Diagnostic Interview - Short Form (CIDI-SF) Interview
Follow-up	0 to 2 years
Factors Assessed	Multiple pregnancy events
NICE quality rating	**Checklist used:** Cohort studies
	Details of assessment 1.1 Adequately addressed 1.2 Adequately addressed 1.3 Poorly addressed 1.4 Adequately addressed 1.5 Total attrition: 8.4% 1.6 Poorly addressed 1.7 Adequately addressed 1.8 Not addressed 1.9 Not addressed 1.10 Adequately addressed 1.11 Not addressed 1.12 Adequately addressed 1.13 Adequately addressed 1.14 Yes
Prevalence results	31.3% (22.17 to 40.45)
Prevalence quality rating	Fair
Factors results	31.6% of women who reported having an abortion compared with 37.8% women who reported having an abortion followed by a delivery met criteria for depression, a difference that was not significant (OR = 0.75; 95% CI, 0.36 to 1.57, p >0.05).
Factors quality rating	Fair
Comparison results	n/a
Comparison quality rating	n/a

Study ID: RIZZARDO1992	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: Yes
	Comparison: No
Study design	Prospective
Country	Italy
Participant characteristics and numbers	**Abortion:** N = 253 to 164. Women who attended the Obstetrics and Gynecology Department of the General Hospital in Padua.
	Comparisons group(s): n/a

Outcomes	Psychological distress
Measurement and mode of administration	The Symptoms Checklist – 90 (SCL-90) Self-report
Follow-up	3 months
Factors Assessed	Marital/relationship status Previous mental health Partner support Multiple pregnancy events Multiple abortions
NICE quality rating	**Checklist used:** Cohort studies
	Details of assessment 1.1 Well covered 1.2 Adequately addressed 1.3 Well covered 1.4 Adequately addressed 1.5 34% 1.6 Adequately addressed 1.7 Adequately addressed 1.8 Not addressed 1.9 Not addressed 1.10 Well covered 1.11 Not addressed 1.12 Adequately addressed 1.13 Poorly addressed 1.14 No
Prevalence results	18.9% (12.91 to 24.89)
Prevalence quality rating	Poor
Factors results	**Previous mental health:** individuals with a history of emotional problems scored higher on all scales of the SCL-90, including the GSI ($P < 0.0001$). This effect was evident both before and after the abortion. **Marital status:** was not significantly related to general psychological symptoms, nor was having a good partner relationship. **Partner support:** no significant relationship with measures of psychological distress at 3 months post-abortion. However, having a confidante was significantly associated with improvements in psychological symptoms when comparing pre- and post-abortion measures ($p = 0.049$). **Multiple pregnancy events:** a history of previous pregnancy was not related to scores on the GSI measure of psychological distress. Multiple abortions: a history of previous pregnancy was not related to scores on the GSI measure of psychological distress.
Factors quality rating	Poor
Comparison results	n/a
Comparison quality rating	n/a

Study ID: RUE2004	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: Yes
	Comparison: No
Study design	Cross-sectional
Country	US and Russia
Participant characteristics and numbers	**Abortion:** N = 548. Women surveyed at US and Russian healthcare facilities
	Comparisons group(s): n/a
Outcomes	PTSD
Measurement and mode of administration	Institute for Pregnancy Loss Questionnaire Interview
Follow-up	Cross-sectional
Factors Assessed	Age Marital status Number of children Employment Education Religion Pregnancy length Partner support Pre-abortion counselling Reasons for abortion Attitude to abortion Medical complications
NICE quality rating	**Checklist used:** Prognostic studies
	Details of assessment 1.1 Yes 1.2 Unclear 1.3 Yes 1.4 Yes 1.5 No 1.6 Yes
Prevalence results	American women: 14.3% (9.64 to 18.96) Russian women: 0.9% (-0.12 to 1.92)
Prevalence quality rating	Fair

Factors results	**Age:** was a significant predictor of PTSD within Russian women (P = 0.01), but not American. **Marital status:** was not associated with any measure of PTSD. **Education:** was not associated with measures of PTSD. **Religion:** was associated with PTSD within the Russian sample (p = 0.0019), but not within the American sample. **Employment:** was not associated with measures of PTSD. Reasons for abortion: pressure from others was not significantly associated with total PTSD scores. **Partner support:** the partner's supportiveness of the decision to abort was not significantly associated with measures of PTSD within both samples. **Pre-abortion counselling:** A lack of pre-abortion counselling was associated with increased PTSD symptoms, however, this was only significant for the Russian women included in the study (p = 0.031). **Attitude to abortion:** specifically the impact of whether or not the women believed it was their right to have an abortion was assessed. Within the American sample, where women felt it was not their right to have an abortion, this was significantly associated with higher rates of PTSD. However, this relationship was not apparent within the Russian sample. Believing abortion to be morally wrong was not significantly associated with PTSD in either sample. **Number of children:** having more children was associated with significant increases in PTSD within the Russian women (p = 0.031) even when factors such as sexual abuse, physical abuse and rape were controlled for. However, this relationship was not apparent within the American sample included in the study, where number of children was not significantly associated with PTSD. **Pregnancy length:** later abortion was significantly associated with PTSD scores within the Russian (p = 0.001) but not American sample included in the study. **Medical complications:** was significantly associated with post-abortion PTSD within the Russian sample (p <0.01). It is unclear whether these health complications were related to the abortion procedure or to general health complications. Furthermore, this relationship was not apparent in the American sample.
Factors quality rating	Fair
Comparison results	n/a
Comparison quality rating	n/a

Study ID: RUSSO1997	
Reviews	**Prevalence:** No
	Factors associated with mental health problems: Yes
	Comparison: No
Study design	Retrospective
Country	US
Participant characteristics and numbers	**Abortion:** N = 721. Non-institutionalised US women with a history of at least one abortion
	Comparisons group(s): n/a
Outcomes	Well-being
Measurement and mode of administration	10 item Rosenberg Self-Esteem Scale Self-administered
Follow-up	8 years
Factors Assessed	Previous self-esteem Ethnicity Education Religion Marital status Income Employment Multiple pregnancy outcomes
NICE quality rating	**Checklist used:** Cohort studies
	Details of assessment 1.1 Adequately addressed 1.2 Adequately addressed 1.3 Not addressed 1.4 Adequately addressed 1.5 Not reported 1.6 Not addressed 1.7 Adequately addressed 1.8 Not addressed 1.9 Not addressed 1.10 Adequately addressed 1.11 Not addressed 1.12 Adequately addressed 1.13 Adequately addressed 1.14 Yes
Prevalence results	n/a
Prevalence quality rating	n/a

Factors results	**Previous self-esteem:** was the only significant predictor of post-abortion self-esteem. **Ethnicity:** when controlling for education, net family income and total number of children there was no evidence that ethnicity (in this case black versus white) had an impact on post-abortion self-esteem. Specifically, in their analysis, black women showed no evidence of better wellbeing following an abortion compared with white women (F [2; 4,861] 0.27, p >0.05). **Education:** a multiple regression found that education did not have an impact on levels of post-abortion self-esteem when focusing purely on women who reported an abortion. **Marital status:** had no effect on self-esteem. **Religion:** had no relationship with self-esteem (F [5; 4,150] = 0.59, p >0.05). When assessing this relationship specifically in women with a history of abortion, having a religious affiliation was not predictive of post-abortion self-esteem. **Income:** After controlling for other contextual variables, income was not significantly associated with outcome. However, it is unclear from this retrospective study whether income was measured at the time of the abortion, or at the time of follow-up. **Employment:** had no significant effect on post-abortion self-esteem. **Multiple Pregnancy Outcomes**: neither the number of children nor the number of abortions was associated with changes in or lower post-abortion self-esteem.
Factors quality rating	Fair
Comparison results	n/a
Comparison quality rating	n/a

Study ID: RUSSO2001	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: No
	Comparison: No
Study design	Cross-sectional
Country	US
Participant characteristics and numbers	**Abortion:** N = 324. Women who completed The Health of American Women Survey.
	Comparisons group(s): n/a
Outcomes	Suicidal thoughts Anxiety and/or depression
Measurement and mode of administration	Clinician diagnosis Self-report
Follow-up	Cross-sectional
Factors Assessed	n/a
NICE quality rating	**Checklist used:** Prognostic studies

	Details of assessment 1.1 Yes 1.2 Unclear 1.3 Yes 1.4 Yes 1.5 No 1.6 Yes
Prevalence results	Depression and/or anxiety : 21.3% (16.84 to 25.76) Suicidal thoughts: 10.5% (7.16 to 13.84)
Prevalence quality rating	Very poor
Factors results	n/a
Factors quality rating	n/a
Comparison results	n/a
Comparison quality rating	n/a

Study ID: SCHMEIGE2005	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: Yes
	Comparison: No
Study design	Retrospective
Country	US
Participant characteristics and numbers	**Abortion:** N = 479. Women who reported an unwanted first abortion
	Comparisons group(s): n/a
Outcomes	Depression
Measurement and mode of administration	CES-D Self-administered
Follow-up	Up to 22 years
Factors Assessed	Marital status Ethnicity Religion
NICE quality rating	**Checklist used:** Cohort studies

	Details of assessment 1.1 Adequately addressed 1.2 Adequately addressed 1.3 Adequately addressed 1.4 Adequately addressed 1.5 Not reported 1.6 Poorly addressed 1.7 Adequately addressed 1.8 Not addressed 1.9 Not addressed 1.10 Adequately addressed 1.11 Not addressed 1.12 Adequately addressed 1.13 Adequately addressed 1.14 Yes
Prevalence results	1 to 11 years: 23.71% (18.24 to 29.18) 12+ years: 26.22% (20.47 to 31.97) 1 to 12+ years: 24.95% (20.98 to 28.92)
Prevalence quality rating	Fair
Factors results	**Ethnicity:** 19.9% of white women compared with 32.5% of black women reported post-abortion depression. When converting these raw percentages into odds ratios, these results were not significant (OR = 1.54; 95% CI, 0.86 to 2.65, p >0.05). **Marital status:** more unmarried white women exceeded the cut-off score for depression on the CES-D than married white women (30 and 16%, respectively). The same was true for black women (38 and 24% of unmarried and married women, respectively). However, only the difference between white women was statistically significant (OR = 0.46; 95% CI, 0.25 to 0.86, p <0.05; OR = 0.52; 95% CI, 0.19 to 1.39, p >0.05, respectively). **Religion:** no association between having a Catholic religious affiliation and measures of post-abortion depression was found, with 21% of Catholic women compared with 27% of non-Catholic women meeting criteria (OR = 1.01; 95% CI, 0.64 to 1.59, p >0.05).
Factors quality rating	Fair
Comparison results	n/a
Comparison quality rating	n/a

Study ID: SÖDERBERG1998	
Reviews	**Prevalence:** No
	Factors associated with mental health problems: Yes
	Comparison: No
Study design	Retrospective
Country	Sweden
Participant characteristics and numbers	**Abortion:** N = 854. Women who underwent legal abortion in Malmö in Sweden in 1989.
	Comparisons group(s): n/a
Outcomes	Serious emotional distress
Measurement and mode of administration	Interview
Follow-up	Various
Factors Assessed	Relationship status Education Employment Social support Quality of the relationship with partner Religion Negative attitudes towards abortion Immigrant status Timing of abortion
NICE quality rating	**Checklist used:** Cohort studies
	Details of assessment 1.1 Adequately addressed 1.2 Poorly addressed 1.3 Well covered 1.4 Poorly addressed 1.5 33% 1.6 Poorly addressed 1.7 Adequately addressed 1.8 Not addressed 1.9 Not addressed 1.10 Well covered 1.11 Not addressed 1.12 Adequately addressed 1.13 Poorly addressed 1.14 Yes
Prevalence results	n/a
Prevalence quality rating	n/a

Factors results	**Immigrant status:** women who experienced serious emotional distress did not differ in terms of immigration status (native Swedes or immigrants) when compared with a control group of women who did not experience serious emotional distress (OR = 1.2; 95% CI, 0.5 to 3.0, p >0.05 in the <25 age group and OR = 1.1; 95% CI, 0.6 to 2.1, p >0.05 >25 group). **Education:** was inversely related to mean serious emotional distress in the under 25 group (p <0.05). That is, a lower level of education was significantly associated with higher serious emotional distress. However, education was not associated with emotional distress in the 25 and over age group. **Employment:** No significant effect on serious emotional distress. Relationship status: having a transient relationship with the father was associated with serious emotional distress, but only within the above 25 age group (OR = 0.7; 95% CI, 0.3 to 1.8, p >0.05 - <25 age group and OR = 0.2; 95% CI, 0.1 to 0.5, p <0.001 above 25 age group). **Religion:** being actively religious was associated with serious emotional distress (p <0.001). **Social support:** for both age groups (<25 and >25) poor social support from family and friends was associated with serious emotional distress (p <0.001). Poor gynaecologist support was significantly associated with serious emotional distress in younger women (OR = 3.9; 95% CI, 1.3 to 11.9 p <0.001) but not in those aged 25 and over (OR = 0.6; 95% CI, 0.2 to 1.8, p >0.05). **Quality of the relationship with the partner:** a poor relationship with a partner was significantly related to emotional distress in older women (OR = 2.0; 95% CI, 1.03 to 3.9, p <0.001), but not in those under 25 (OR = 1.1; 95% CI, 0.5 to 2.5, p >0.05). **Timing of abortion:** a second trimester abortion was associated with serious emotional distress within the under 25 age group (p <0.001) but not in the 25 and over age group (OR = 4.1; 95% CI, 0.5 to 31.8, p >0.05) partly due to the small sample size and wide confidence intervals. Negative attitudes towards abortion were significantly associated with serious emotional distress in both the under 25 age group (OR = 18.2; 95% CI, 3.8 to 88.1, p <0.001) and the over 25 age group (OR = 7.9; 95% CI, 3.4 to 18.1, p <0.001).
Factors quality rating	Very poor
Comparison results	n/a
Comparison quality rating	n/a

Study ID: STEINBERG2008-STUDY1	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: Yes
	Comparison: Yes
Study design	Cross-sectional
Country	US
Participant characteristics and numbers	**Abortion:** Women who took part in the National Study of Family Growth. Unintended first pregnancy resulting in abortion: N = 1167 First pregnancy resulting in Abortion N = 1236.
	Comparisons group(s): Women who took part in the National Study of Family Growth. Unintended first pregnancy resulting in delivery: N = 2315 First pregnancy resulting in delivery: N = 5458
Outcomes	Anxiety
Measurement and mode of administration	Experience of anxiety symptoms (based on DSM-IV criteria for generalised anxiety disorder [GAD]). Interview
Follow-up	Cross-sectional
Factors Assessed	Multiple pregnancy events
NICE quality rating	**Checklist used:** Prognostic studies
	Details of assessment 1.1 Yes 1.2 Unclear 1.3 Yes 1.4 Yes 1.5 Yes 1.6 Yes
Prevalence results	Unplanned first pregnancy: 20.2% (17.92 to 22.52) All first pregnancies: 19.98% (17.75 to 22.21)
Prevalence quality rating	Very good
Factors results	Despite the difference in anxiety rates not being significant when assessing the impact of multiple abortions alone without controlling for any confounding factors (unplanned pregnancy OR = 1.22; 95% CI, 0.92 to 1.62, p = 0.16 and all pregnancy OR = 1.24; 95% CI, 0.96 to 1.59, p = 0.10), when covariates were controlled for including pre-pregnancy anxiety, sociodemographics and the experience of rape there was a positive association between the number of abortions and post-abortion anxiety (unplanned pregnancy OR = 1.40; 95% CI, 1.00 to 1.95, p = 0.05 and all pregnancies OR = 1.34; 95% CI, 1.00 to 1.80, p = 0.05).
Factors quality rating	Very Good

Comparison results	OR 1.23 (0.96 to 1.56) p >0.05. 2 versus 0 abortion: OR 1.68 (1.22 to 2.31) p = 0.002. 1 versus 0 abortion: OR 1.29 (1.00 to 1.56) p = 0.05. The study adjusted for previous mental health problems in addition to other confounding variables such as experience of rape, subsequent births, and physical abuse and education level, within their analysis. The adjusted results indicated that women who underwent an abortion were not statistically significantly more likely to experience anxiety compared with those who delivered the pregnancy (OR = 1.24; 95% CI, 0.92 to 1.68, p = 0.15). Further analysis indicated that only women who reported two or more abortions had a higher rate of anxiety at follow-up (OR = 1.69; 95% CI, 1.16 to 2.47, p = 0.007) compared with women who delivered the pregnancy. There was no significant difference in anxiety outcomes for women reporting only one abortion (OR = 1.21; 95% CI, 0.91 to 1.61, p = 0.19).
Comparison quality rating	Very good

Study ID: STEINBERG2008-STUDY2	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: Yes
	Comparison: Yes
Study design	Cross-sectional
Country	US
Participant characteristics and numbers	**Abortion:** N = 273. Women who aborted their first pregnancy. Identified from the National Comorbidity Survey.
	Comparisons group(s): N = 1549. Women who delivered their first pregnancy. Identified from the National Comorbidity Survey.
Outcomes	DSM-III-R anxiety disorders
Measurement and mode of administration	Modified CIDI Interview
Follow-up	Cross-sectional
Factors Assessed	Multiple pregnancy events
NICE quality rating	**Checklist used:** Prognostic studies
	Details of assessment 1.1 Yes 1.2 Unclear 1.3 Yes 1.4 Yes 1.5 Yes 1.6 Yes
Prevalence results	GAD: 6.23% (3.36 to 91) Social anxiety: 12.09% (8.22 to 15.96) PTSD: 10.26% (6.66 to 13.86)
Prevalence quality rating	Very good

Factors results	Multiple abortions were associated with increased social anxiety (OR = 2.20; 95% CI, 1.24 to 3.88, p <0.01) but not PTSD (OR = 2.84; 95% CI, 0.93 to 11.90, p = 0.07) or GAD (exact OR not reported). However, within this analysis, there was no control for covariates including demographics, experience of rape or number of births, and the confidence intervals were wide. When controlling for these covariates, the positive association between social anxiety and multiple abortions was no longer significant (OR = 1.96; 95% CI, 0.83 to 4.62, p = 0.12).
Factors quality rating	Very good
Comparison results	GAD: OR 0.84 (0.45 to 1.88) p = 0.58 PTSD: OR 1.33 (0.67 to 2.73) p = 0.43 2 versus 0 abortion: OR 1.29 (0.43 to 3.84) p = 0.64 1 versus 0 abortion: OR 0.98 (0.54 to 1.78) p = 0.94 Social Anxiety: OR 0.87 (0.52 to 1.47) p = 0.60 2 versus 0 abortion: OR 1.65 (0.76 to 3.57) p = 0.20 1 versus 0 abortion: OR 0.84 (0.44 to1.63) p = 0.60
Comparison quality rating	Good

Study ID: STEINBERG2011A-STUDY1	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: No
	Comparison: Yes
Study design	Cross-sectional
Country	US
Participant characteristics and numbers	**Abortion:** N = 399 (unweighted) Women who completed the US National Comorbidity Survey. A nationally representative sample.
	Comparisons group(s): n/a
Outcomes	DSM-III-R psychiatric disorders
Measurement and mode of administration	University of Michigan-Composite International Diagnostic Interview (UM-CIDI). Clinical interview
Follow-up	Cross-sectional
Factors Assessed	n/a
NICE quality rating	**Checklist used:** Prognostic studies
	Details of assessment 1.1 Yes 1.2 Unclear 1.3 Yes 1.4 Yes 1.5 Yes 1.6 Yes

Prevalence results	Major depression with hierarchy: 7.9% (5.25 to 10.55) Major depression without hierarchy: 8.3% (5.59 to 11.01) Panic disorder: 1.9% (0.56 to 3.24) Panic attacks: 3.5% (1.7 to 5.3) Agoraphobia: 6.0% (3.67 to 8.33) Agoraphobia without panic disorder: 5.1% (2.94 to 7.26) PTSD: 4.5% (2.47 to 6.53) Alcohol dependence: 5.5% (3.26 to 7.74) Alcohol misuse without dependence: 0.3% (-0.24 to 0.84) Alcohol misuse with or without dependence: 4.0% (2.08 to 5.92) Drug dependence: 2.2% (0.76 to 3.64) Drug misuse without dependence: 0.1% (-0.21 to 0.41) Drug misuse: 1.8% (0.5 to 3.1) Bipolar I disorder: 0.6% (-0.16 to 1.36) New mania: 0 %
Prevalence quality rating	Fair
Factors results	n/a
Factors quality rating	n/a
Comparison results	n/a
Comparison quality rating	n/a

Study ID: STEINBERG2011A—STUDY2	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: Yes
	Comparison: Yes
Study design	Cross-sectional
Country	US
Participant characteristics and numbers	**Abortion:** Women who completed the US National Comorbidity Survey. A nationally representative sample. N = 303 (unweighted). Women who have had 1 abortion. N = 91 (unweighted). Women who have had 2 or more abortions.
	Comparisons group(s): N = 1,671 (unweighted). Women reporting a first pregnancy ending in a live birth.
Outcomes	Mood disorders Anxiety disorders Substance misuse
Measurement and mode of administration	Clinical interview
Follow-up	Cross-sectional
Factors Assessed	Multiple abortions
NICE quality rating	**Checklist used:** Prognostic studies

	Details of assessment 1.1 Yes 1.2 Unclear 1.3 Yes 1.4 Yes 1.5 Yes 1.6 Yes
Prevalence results	**Anxiety disorders:** 1 abortion: 17.1% (12.86 to 21.34) 2 or more abortions: 31.0 (21.5 to 40.5) **Substanceuse disorder**: 1 abortion: 5.2% (2.7 to 7.7) 2 or more abortions: 11.9% (5.25 to 18.55) **Mood disorders**: 1 abortion: 8.8% (5.61 to 11.99) 2 or more abortions: 11.9% (5.25 to 18.55)
Prevalence quality rating	Fair
Factors results	Multiple abortions were only significantly associated with increased rates of anxiety disorders and not mood disorders or substanceuse disorders when no risk factors were controlled for (mood disorders OR = 1.4; 95% CI, 0.5-3.9, p >0.05; anxiety disorders OR = 2.1; 95% CI, 1.2 to 3.6, p <0.05 and substanceuse disorders OR = 2.5; 95% CI, 1.0- 6.26, p <0.1). When prior risk factors such as previous mental health and violence were accounted for, the difference in anxiety disorders was no longer significant, although there was now a significant difference in substanceuse disorders (mood disorders OR = 0.9; 95% CI, 0.3 to 2.7, p >0.05; anxiety disorders OR = 1.4; 95% CI, 0.7 to 2.7, p >0.05 and substanceuse disorders OR = 2.8; 95% CI, 1.0 to 7.8, p <0.05). When all risk factors were taken into account, none of the differences in mental health rates in women who had one abortion or multiple abortions remained significant (mood disorders OR = 0.8; 95% CI, 0.3 to 2.7, p >0.05; anxiety disorders OR = 1.5; 95% CI, 0.8 to 2.9, p >0.05 and substanceuse disorders OR = 3.0; 95% CI, 0.9 to 9.7, p >0.05).
Factors quality rating	Good
Comparison results	**Anxiety disorders:** 1 abortion: OR = 1.0; 95% CI, 0.7 to 1.6, p >0.05 Multiple abortions: OR = 1.5; 95% CI, 0.8 to 2.8, p >0.05 **Mood disorders:** 1 abortion: OR = 0.8; 95% 0.3 to 2.7, p >0.05 Multiple abortions: OR = 1.2; 95% CI, 0.4 to 2.7, p >0.05 **Substanceuse disorders:** 1 abortion: OR = 1.2; 95% CI, 0.6 to 2.5, p >0.05 Multiple abortions: OR = 3.7; 95% CI, 1.2 to 11.7, p <0.05
Comparison quality rating	Good

Study ID: STEINBERG2011B	
Reviews	**Prevalence:** No
	Factors associated with mental health problems: No
	Comparison: Yes
Study design	Cross-sectional
Country	US
Participant characteristics and numbers	**Abortion:** Women who completed the US National Comorbidity Survey. A nationally representative sample. N = 218 women who aborted their first pregnancy.
	Comparisons group(s): N = 1,547 women who delivered their first pregnancy.
Outcomes	Depression Suicidal ideation
Measurement and mode of administration	Modified CIDI Interview
Follow-up	Cross-sectional
Factors Assessed	n/a
NICE quality rating	**Checklist used:** Prognostic studies
	Details of assessment 1.1 Yes 1.2 Unclear 1.3 Yes 1.4 Yes 1.5 Yes 1.6 Yes
Prevalence results	n/a
Prevalence quality rating	n/a
Factors results	n/a
Factors quality rating	n/a
Comparison results	**Depression:** Only pre-pregnancy mental health controlled for: OR = 1.18, 95% CIs 0.81 – 1.71, p>0.05) All factors controlled for: OR = 0.87, 95% CIs 0.54 – 1.37, p>0.05 **Suicidal Ideation:** Only pre-pregnancy mental health controlled for: OR = 1.86, 95% CIs 1.29 – 2.70, p<0.001 All factors controlled for: OR = 1.19, 95% CIs 0.70 – 2.02, p>0.05
Comparison quality rating	Good

Study ID: SULIMAN2007	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: No
	Comparison: No
Study design	Prospective cohort
Country	South Africa
Participant characteristics and numbers	**Abortion:** N = 155. Women attending a private abortion clinical and state hospital in South Africa
	Comparisons group(s): n/a
Outcomes	PTSD Depression
Measurement and mode of administration	CAPS -I BDI Clinician administered and self-report
Follow-up	3 months
Factors Assessed	n/a
NICE quality rating	**Checklist used:** Prognostic studies
	Details of assessment: 1.1 Well covered 1.2 Not applicable 1.3 Not reported 1.4 Adequately addressed 1.5 63.8% 1.6 Poorly addressed 1.7 Well covered 1.8 Not applicable 1.9 Not applicable 1.10 Well covered 1.11 Not addressed 1.12 Not addressed 1.13 Adequately addressed 1.14 No
Prevalence results	Depression: 20.0 % (9.52 to 30.48) PTSD: 18.2 % (8.09 to 28.31)
Prevalence quality rating	Very poor
Factors results	n/a
Factors quality rating	n/a
Comparison results	n/a
Comparison quality rating	n/a

Study ID: TAFT2008	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: No
	Comparison: No
Study design	Retrospective
Country	Australia
Participant characteristics and numbers	**Abortion:** N = 1,026. Longitudinal cohort study. Random population study.
	Comparisons group(s): n/a
Outcomes	Depression
Measurement and mode of administration	CES-D Self-administered
Follow-up	1 year 4 years
Factors Assessed	n/a
NICE quality rating	**Checklist used:** Cohort studies
	Details of assessment 1.1 Adequately addressed 1.2 Adequately addressed 1.3 Adequately addressed 1.4 Poorly addressed 1.5 35.5% 1.6 Adequately addressed 1.7 Well covered 1.8 Not addressed 1.9 Not addressed 1.10 Adequately addressed 1.11 Not addressed 1.12 Adequately addressed 1.13 Adequately addressed 1.14 Yes
Prevalence results	4+ years: 35.96% (31.98 to 39.94) Up to 4 years: 37.9% (33.5 to 42.3) Combined: 36.89% (33.99 to 39.89)
Prevalence quality rating	Fair
Factors results	n/a
Factors quality rating	n/a
Comparison results	n/a
Comparison quality rating	n/a

Study ID: WARREN2010	
Reviews	**Prevalence:** Yes
	Factors associated with mental health problems: No
	Comparison: Yes
Study design	Retrospective
Country	US
Participant characteristics and numbers	**Abortion:** N = 69. Women reporting an abortion, who completed the National Longitudinal Study of Adolescent Health.
	Comparisons group(s): N = 220. Women reporting a pregnancy ending in a live birth, who completed the National Longitudinal Study of Adolescent Health.
Outcomes	Depression
Measurement and mode of administration	CES-D Self-administration
Follow-up	1 year 5 years
Factors Assessed	n/a
NICE quality rating	**Checklist used:** Cohort studies
	Details of assessment 1.1 Adequately addressed 1.2 Adequately addressed 1.3 Well covered 1.4 Poorly addressed 1.5 Abortion 22% 1.6 Not addressed 1.7 Adequately addressed 1.8 Not addressed 1.9 Not addressed 1.10 Adequately addressed 1.11 Not addressed 1.12 Adequately addressed 1.13 Adequately addressed 1.14 Yes
Prevalence results	1 year: 14.1% (5.89 to 22.31) 5 years: 16.9% (8.06 to 25.74)
Prevalence quality rating	Fair
Factors results	n/a
Factors quality rating	n/a
Comparison results	1 year: OR = 0.75; 95% CI, 0.27 to 2.09, p >0.05 5 years: OR = 0.69; 95% CI, 0.24 to 2.01, p >0.05
Comparison quality rating	Good

APPENDIX 9
STUDY QUALITY TABLES

Study ID	Overall rating	Appropriate comparison Group	Validated MH tool	Control for previous MH problems	Confounder control	Representa-tiveness	Comprehen-sive explora-tion
BROEN2004 Prevalence	Very poor	n/a	+	+ (Weak)	+ (Adequate)	-	-
BROEN2005A Prevalence	Very poor	n/a	+	+ (Weak)	+ (Adequate)	-	-
BROEN2005B Factors	Very poor	n/a	+	+	+ (Thorough)	-	-
BROEN2006 Prevalence	Very poor	n/a	+	+ (Weak)	+ (Adequate)	-	-
BROEN2006 Factors	Very poor	n/a	+	+ (Weak)	+ (Adequate)	-	-
COLEMAN2002A Prevalence	Poor	n/a	+	+	+ (Weak)	+	-
COLEMAN2002A Factors	Poor	n/a	+	+	+ (Weak)	+	-
COLEMAN2002A Comparison	Poor	+	+	+	+ (Weak)	+	-
COLEMAN2009A Prevalence	Fair	n/a	+	+ (Weak)	+ (Thorough)	Not reported	-
COLEMAN2009B Prevalence	Very poor	n/a	-	+ (Weak)	+ (Adequate)	Not reported	-
COLEMAN2010 Prevalence	Very poor	n/a	+	+ (Weak)	+ (Thorough)	-	-
COLEMAN2010 Factors	Very poor	n/a	+	+ (weak)	+ (Thorough)	-	-
CONGLETON1993 Factors	Very poor	n/a	+	-	+ (Weak)	+	-
COUGLE2003 Prevalence	Fair	n/a	+	+ (Weak)	+ (Adequate)	+ (Good)	-
COUGLE2005 Prevalence	Fair	n/a	+	+ (Weak)	+ (Adequate)	Not reported	-
COUGLE2005 Factors	Fair	n/a	+	+ (Weak)	+ (Adequate)	Not reported	-
COUGLE2005 Comparison	Fair	+ (Good)	+	+ (Weak)	+ (Adequate)	Not reported	-
COYLE2010 Prevalence	Very poor	n/a	+	+ (Weak)	+ (Thorough)	-	-
COYLE2010 Factors	Very poor	n/a	+	+	+ (Thorough)	-	-
FERGUSSON2006 Comparison	Good	+	+	+	+ (Thorough)	+ (Good)	-
FERGUSSON2008 Comparison	Very good	+ (Good)	+	+	+ (Thorough)	+ (Good)	-

Study ID	Overall rating	Appropriate comparison Group	Validated MH tool	Control for previous MH problems	Confounder control	Representa-tiveness	Comprehen-sive explora-tion
FERGUSSON2009 Factors	Good	n/a	+	+	+ (Thorough)	+ (Good)	-
GILCHRIST1995 Factors	Good	n/a	+	+	+ (Thorough)	+	-
GILCHRIST1995 Comparison	Good	+ (Good)	+	+	+ (Thorough)	+	-
GISSLER1996 Prevalence	Very poor	n/a	+	-	+ (Weak)	+ (Good)	-
GISSLER2005 Prevalence	Very poor	n/a	+	-	+ (Weak)	+ (Good)	-
GISSLER2005 Factors	Very poor	n/a	+	-	+ (Weak)	+ (Good)	-
HAMAMA2010 Prevalence	Fair	n/a	+	+ (Weak)	+ (Thorough)	+ (Good)	-
MAJOR2000 Prevalence	Fair	n/a	+	+ (Weak)	+ (Adequate)	+	-
MAJOR2000 Factors	Fair	n/a	+	+ (Weak)	+ (Adequate)	+	-
MOTA2010 Prevalence	Fair	n/a	+	+ (Weak)	+ (Thorough)	+	-
Munk-Olsen2011 Prevalence	Good	n/a	+	+	+ (Adequate)	+ (Good)	-
Munk-Olsen2011 Factors	Good	n/a	+	+	+ (Adequate)	+ (Good)	-
Munk-Olsen2011 Comparison	Good	+	+	+	+ (Adequate)	+ (Good)	-
PEDERSEN2007 Prevalence	Fair	n/a	+	+ (Weak)	+ (Adequate)	+	-
PEDERSEN2007 Factors	Fair	n/a	+	+ (Weak)	+ (Adequate)	+	-
PEDERSEN2007 Comparison	Good	+	+	+	+ (Adequate)	+	-
PEDERSEN2008 Prevalence	Fair	n/a	+	+ (Weak)	+ (Adequate)	+	-
PEDERSEN2008 Factors	Fair	n/a	+	+ (Weak)	+ (Adequate)	+	-
PEDERSEN2008 Comparison	Good	+	+	+	+ (Adequate)	+	-
QUINTON2001 Factors	Poor	n/a	+	+ (Weak)	+ (Weak)	+	-
REARDON2002A Prevalence	Poor	n/a	+	+ (Weak)	+(Weak)	+	-

Study ID	Overall rating	Appropriate comparison Group	Validated MH tool	Control for previous MH problems	Confounder control	Representa-tiveness	Comprehen-sive explora-tion
REARDON2002A Factors	Poor	n/a	+	+ (Weak)	+ (Weak)	+	-
REARDON2002A Comparison	Poor	+	+	+ (Weak)	+ (Weak)	+	-
REARDON2002B Prevalence	Fair	n/a	+	+ (weak)	+ (Adequate)	+	-
REARDON2002B Factors	Fair	n/a	+	+ (weak)	+ (Adequate)	Not reported	-
REARDON2003A Prevalence	Poor	n/a	+	+ (Weak)	+ (Weak)	+	-
REARDON2003A Factors	Poor	n/a	+	+ (Weak)	+ (Weak)	+	-
REARDON2003A Comparison	Poor	+	+	+ (Weak)	+ (Weak)	+	-
REARDON2004 Prevalence	Fair	n/a	+	+ (Weak)	+ (Thorough)	+	-
REES2007 Prevalence	Fair	n/a	+	+ (Weak)	+ (Thorough)	+ (Good)	-
REES2007 Factors	Fair	n/a	+	+ (Weak)	+ (Thorough)	+ (Good)	-
RIZZARDO1992 Prevalence	Poor	n/a	+	+ (Weak)	+ (Weak)	+	-
RIZZARDO1992 Factors	Poor	n/a	+	+ (Weak)	+ (Weak)	+	-
RUE2004 Prevalence	Fair	n/a	+	+ (Weak)	+ (Thorough)	Not reported	-
RUE2004 Factors	Fair	n/a	+	+ (Weak)	+ (Thorough)	Not reported	-
RUSSO1997 Factors	Fair	n/a	+	+ (Weak)	+ (Adequate)	Not reported	-
RUSSO2001 Prevalence	Very poor	n/a	+	-	+ (Thorough)	Not reported	-
SCHMEIGE2005 Prevalence	Fair	n/a	+	+ (Weak)	+ (Thorough)	+	-
SCHMEIGE2005 Factors	Fair	n/a	+	+ (Weak)	+ (Thorough)	+	-
SÖDERBERG1998 Factors	Very poor	n/a	+	-	-	+	-
STEINBERG2008 – study 1 Prevalence	Fair	n/a	+	+ (Weak)	+ (Thorough)	+ (Good)	-

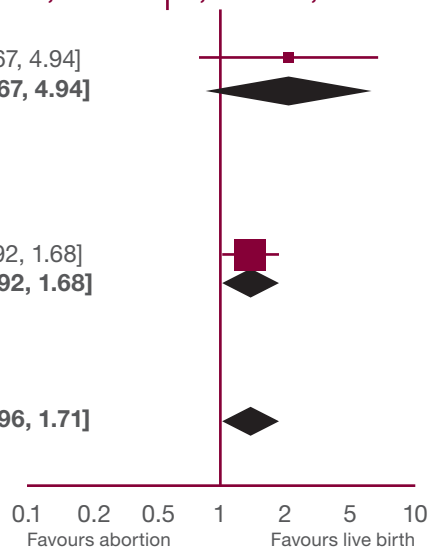
Study ID	Overall rating	Appropriate comparison Group	Validated MH tool	Control for previous MH problems	Confounder control	Representa-tiveness	Comprehen-sive explora-tion
STEINBERG2008 – study 1 Factors	Very good	n/a	+	+	+ (Thorough)	+ (Good)	-
STEINBERG2008 – study 1 Comparison	Very good	+ (Good)	+	+	+ (Thorough)	+ (Good)	-
STEINBERG2008 – study 2 Prevalence	Very good	n/a	+	+	+ (Thorough)	+ (Good)	-
STEINBERG2008 – study2 Factors	Very good	n/a	+	+	+ (Thorough)	+ (Good)	-
STEINBERG2008 – study 2 Comparison	Good	+	+	+	+ (Thorough)	+ (Good)	-
STEINBERG2011A – study 1 Prevalence	Fair	n/a	+	+ (Weak)	+ (Thorough)	+	-
STEINBERG2011A – study 2 Prevalence	Fair	n/a	+	+ (Weak)	+ (Thorough)	+	-
STEINBERG2011A – study 2 Factors	Good	n/a	+	+	+ (Thorough)	+	-
STEINBERG2011A – study 2 Comparison	Good	+	+	+	+ (Thorough)	+	-
STEINBERG2011B Comparison	Good	+	+	+	+ (Thorough)	+	-
TAFT2008 Prevalence	Fair	n/a	+	+ (Weak)	+ (Adequate)	+	-
WARREN2010 Prevalence	Fair	n/a	+	+ (Weak)	+ (Thorough)	+	-
WARREN2010 Comparison	Good	+	+	+	+ (Thorough)	+	-

APPENDIX 10
FOREST PLOTS

Anxiety disorders
Abortion versus delivery (all data)

Note. STEINBERG2008 adjusted for previous mental health problems in addition to other confounding variables

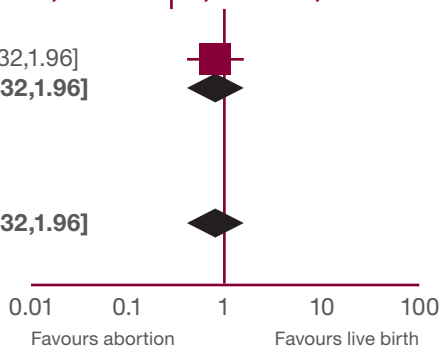
Study or Subgroup	Logs [odds ratio]	SE	Weight	Odds ratio IV, Random, 95% CI
1.1.1 unwanted pregnancy				
FERGUSSON2008	0.599	0.509	8.4%	1.82 [0.67, 4.94]
Subtotal (95% CI)			**8.4%**	**1.82 [0.67, 4.94]**
Heterogeneity: Not applicable				
Test for overall effect: Z = 1.18 (P = 0.24)				
1.1.2 unplanned pregnancy				
STEINBERG2008	0.215	0.215	91.6%	1.24 [0.92, 1.68]
Subtotal (95% CI)			**91.6%**	**1.24 [0.92, 1.68]**
Heterogeneity: Not applicable				
Test for overall effect: Z = 1.40 (P = 0.16)				
Total (95% CI)			**100.0%**	**1.28 [0.96, 1.71]**
Heterogeneity: Tau² = 0.00; Chi² = 0.52, df = 1 (P = 0.47); I² = 0%				
Test for overall effect: Z = 1.68 (P = 0.09)				
Test for subgroup differences: Chi² = 0.52, df = 1 (P = 0.47), I² = 0%				



Forest plot of comparison: 1 abortion versus delivery (all data), outcome: 1.1 Anxiety.

Major depression
Abortion versus delivery (all data)

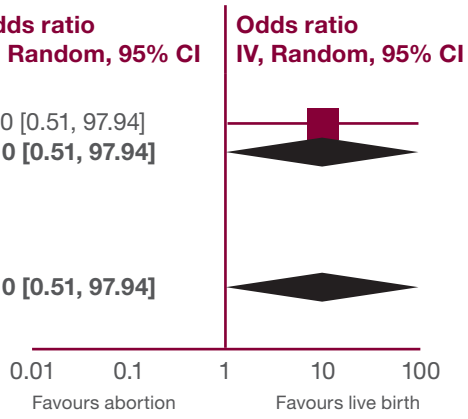
Study or Subgroup	Logs [odds ratio]	SE	Weight	Odds ratio IV, Random, 95% CI
1.2.1 unwanted pregnancy				
FERGUSSON2008	-0.23572233	0.46235002	100.0%	0.79 [0.32,1.96]
Subtotal (95% CI)			**100.0%**	**0.79 [0.32,1.96]**
Heterogeneity: Not applicable				
Test for overall effect: Z = 0.51 (P = 0.61)				
Total (95% CI)			**100.0%**	**0.79 [0.32,1.96]**
Heterogeneity: Not applicable				
Test for subgroup differences: Not applicable				



Forest plot of comparison: 1 abortion versus delivery (all data), outcome: 1.2 Depression.

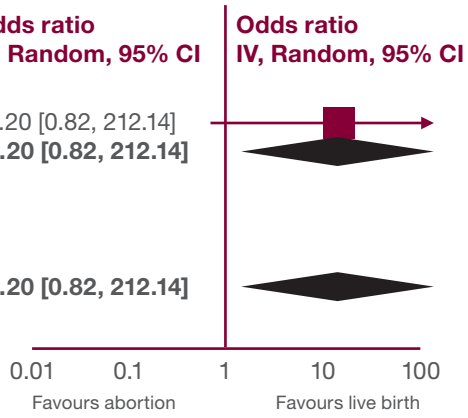
Alcohol and drug misuse
Abortion versus delivery (all data)

Study or Subgroup	Logs [odds ratio]	SE	Weight	Odds ratio IV, Random, 95% CI
1.4.1 unwanted pregnancy				
FERGUSSON2008	1.96	1.96	100.0%	7.10 [0.51, 97.94]
Subtotal (95% CI)			**100.0%**	**7.10 [0.51, 97.94]**
Heterogeneity: Not applicable				
Test for overall effect: Z = 1.46 (P = 0.14				
Total (95% CI)			**100.0%**	**7.10 [0.51, 97.94]**
Heterogeneity: Not applicable				
Test for overall effect: Z = 1.46 (P = 0.14)				
Test for subgroup differences: Not applicable				



Forest plot of comparison: 1 abortion versus delivery (all data), outcome: 1.3 Alcohol misuse.

Study or Subgroup	Logs [odds ratio]	SE	Weight	Odds ratio IV, Random, 95% CI
1.5.1 unwanted pregnancy				
FERGUSSON2008	2.58	1.417	100.0%	13.20 [0.82, 212.14]
Subtotal (95% CI)			**100.0%**	**13.20 [0.82, 212.14]**
Heterogeneity: Not applicable				
Test for overall effect: Z = 1.46 (P = 0.14)				
Total (95% CI)			**100.0%**	**13.20 [0.82, 212.14]**
Heterogeneity: Not applicable				
Test for overall effect: Z = 1.82 (P = 0.07)				
Test for subgroup differences: Not applicable				

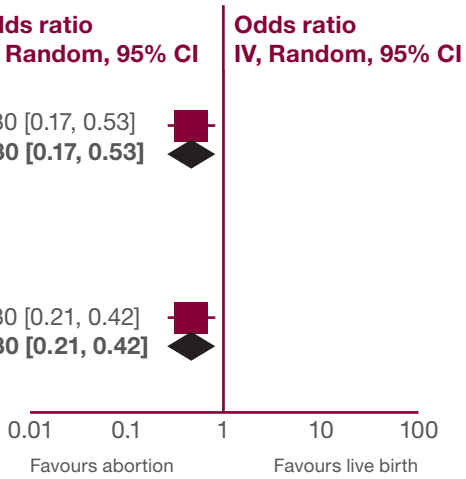


Forest plot of comparison: 1 abortion versus delivery (all data), outcome: 1.4 Drug misuse

Psychotic illness
Abortion versus delivery (all data)

Study or Subgroup	Logs [odds ratio]	SE	Weight	Odds ratio IV, Random, 95% CI
1.5.1 unwanted pregnancy				
GILCHRIST1995	-1.20397	0.29309456	100.0%	0.30 [0.17, 0.53]
Subtotal (95% CI)			**100.0%**	**0.30 [0.17, 0.53]**
Heterogeneity: Not applicable				
Test for overall effect: Z = 4.11 (P < 0.0001)				
1.5.2 unintended pregnancy				
GILCHRIST1995	-1.2039728	0.17682651	100.0%	0.30 [0.21, 0.42]
Subtotal (95% CI)			**100.0%**	**0.30 [0.21, 0.42]**
Heterogeneity: Not applicable				
Test for overall effect: Z = 6.81 (P < 0.00001)				

Test for subgroup differences: Chi² = 0.00, df = 1 (P = 1.00), I² = 0%

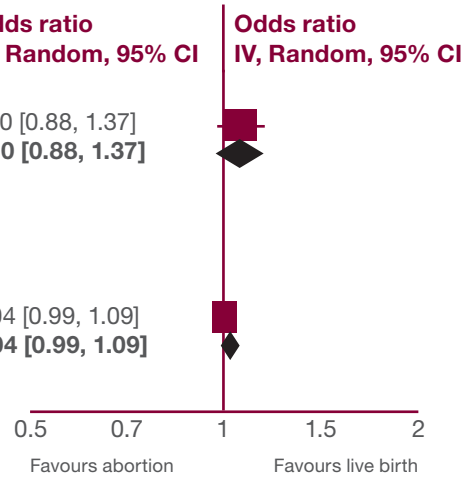


Forest plot of comparison: 1 abortion versus delivery (all data), outcome: 1.5 psychotic episode.

Non-psychotic illness
Abortion versus delivery (all data)

Study or Subgroup	Logs [odds ratio]	SE	Weight	Odds ratio IV, Random, 95% CI
1.6.1 unwanted pregnancy				
GILCHRIST1995	0.09531018	0.11341089	100.0%	1.10 [0.88, 1.37]
Subtotal (95% CI)			**100.0%**	**1.10 [0.88, 1.37]**
Heterogeneity: Not applicable				
Test for overall effect: Z = 0.84 (P = 0.40)				
1.6.2 unintended pregnancy				
GILCHRIST1995	0.03922071	0.02431427	100.0%	1.04 [0.99, 1.09]
Subtotal (95% CI)			**100.0%**	**1.04 [0.99, 1.09]**
Heterogeneity: Not applicable				
Test for overall effect: Z = 1.61 (P = 0.11)				

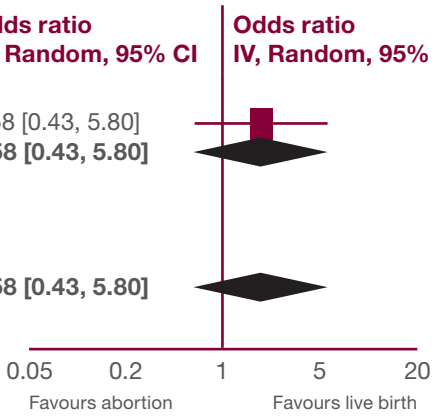
Test for subgroup differences: Chi² = 0.23, df = 1 (P = 0.63), I² = 0%



Forest plot of comparison: 1 abortion versus delivery (all data), outcome: 1.6 non-psychotic episode.

Suicidal ideation
Abortion versus delivery (all data)

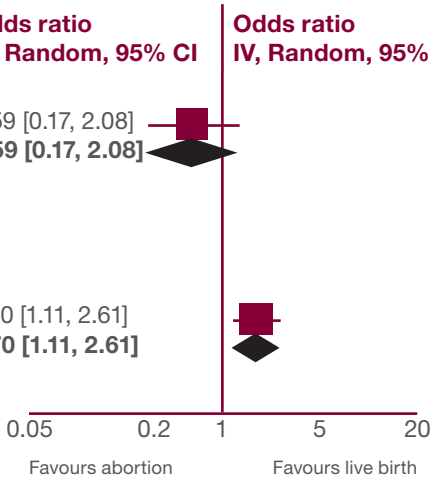
Study or Subgroup	Logs [odds ratio]	SE	Weight	Odds ratio IV, Random, 95% CI
1.7.1 unwanted pregnancy				
FERGUSSON2008	0.457	0.664	100.0%	1.58 [0.43, 5.80]
Subtotal (95% CI)			**100.0%**	**1.58 [0.43, 5.80]**
Heterogeneity: Not applicable				
Test for overall effect: Z = 0.69 (P = 0.49)				
Total (95% CI)			**100.0%**	**1.58 [0.43, 5.80]**
Heterogeneity: Not applicable				
Test for overall effect: Z = 0.69 (P = 0.49)				
Test for subgroup differences: Not applicable				



Forest plot of comparison: 1 abortion versus delivery (all data), outcome: 1.7 Suicidal ideation.

Self-harm
Abortion versus delivery (all data)

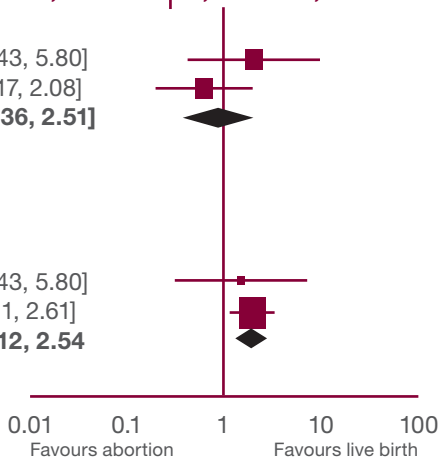
Study or Subgroup	Logs [odds ratio]	SE	Weight	Odds ratio IV, Random, 95% CI
1.8.1 unwanted pregnancy				
GILCHRIST1995	-0.53408249	0.645473	100.0%	0.59 [0.17, 2.08]
Subtotal (95% CI)			**100.0%**	**0.59 [0.17, 2.08]**
Heterogeneity: Not applicable				
Test for overall effect: Z = 0.83 (P = 0.41)				
1.8.2 unplanned pregnancy				
GILCHRIST1995	0.53062825	0.21944313	100.0%	1.70 [1.11, 2.61]
Subtotal (95% CI)			**100.0%**	**1.70 [1.11, 2.61]**
Heterogeneity: Not applicable				
Test for overall effect: Z = 2.42 (P = 0.02)				
Test for subgroup differences: $Chi^2 = 2.44$, df = 1 (P = 0.12), $I^2 = 59.0\%$				



Forest plot of comparison: 1 abortion versus delivery (all data), outcome: 1.8 self-harm.

Suicidal behaviours (including self-harm)
Abortion versus delivery (all data)

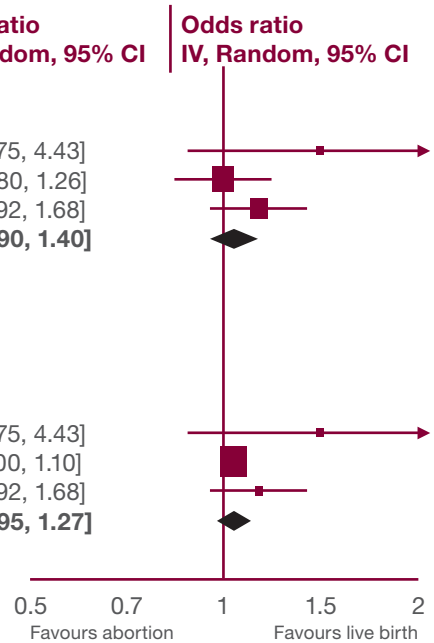
Study or Subgroup	Logs [odds ratio]	SE	Weight	Odds ratio IV, Random, 95% CI
1.9.1 unwanted only				
FERGUSSON2008	0.457	0.664	48.8%	1.58 [0.43, 5.80]
GILCHRIST1995	-0.53408249	0.645473	51.2%	0.59 [0.17, 2.08]
Subtotal (95% CI)			**100.0%**	**0.95 [0.36, 2.51]**
Heterogeneity: Tau² = 0.06; Chi² = 1.15, df = 1 (P = 0.28); I² = 13%				
Test for overall effect: Z = 0.10 (P = 0.92)				
1.9.2 unwanted/unplanned				
FERGUSSON2008	0.457	0.664	9.8%	1.58 [0.43, 5.80]
GILCHRIST1995	0.53062825	0.21944313	90.2%	1.70 [1.11, 2.61]
Subtotal (95% CI)			**100.0%**	**1.69 [1.12, 2.54**
Heterogeneity: Tau² = 0.00; Chi² = 0.01, df = 1 (P = 0.92); I² = 0%				
Test for overall effect: Z = 2.51 (P = 0.01)				
Test for subgroup differences: Chi² = 1.14, df = 1 (P = 0.29), I² = 12.4%				



Forest plot of comparison: 1 abortion versus delivery (all data), outcome: 1.9 Suicidal behaviours (including self-harm).

Any psychiatric condition
Abortion versus delivery (all data combined) – Any psychiatric condition

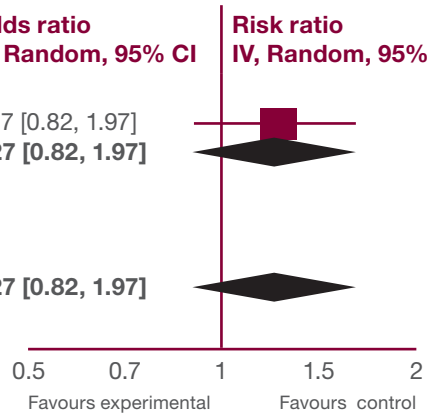
Study or Subgroup	Logs [odds ratio]	SE	Weight	Odds ratio IV, Random, 95% CI
1.10.1 Using all Gilchrist unwanted data				
FERGUSSON2008	0.5988365	0.45394255	5.7%	1.82 [0.75, 4.43]
GILCHRIST1995	0	0.11641606	56.1%	1.00 [0.80, 1.26]
STEINBERG2008	0.215	0.154	38.2%	1.24 [0.92, 1.68]
Subtotal (95% CI)			**100.0%**	**1.12 [0.90, 1.40]**
Heterogeneity: Tau² = 0.01; Chi² = 2.50, df = 2 (P = 0.29); I² = 20%				
Test for overall effect: Z = 1.05 (P = 0.29)				
1.10.2 Using Gilchrist unplanned data				
FERGUSSON2008	0.5988365	0.45394255	2.7%	1.82 [0.75, 4.43]
GILCHRIST1995	0.04632904	0.02431427	78.3%	1.05 [1.00, 1.10]
STEINBERG2008	0.215	0.154	19.0%	1.24 [0.92, 1.68]
Subtotal (95% CI)			**100.0%**	**1.10 [0.95, 1.27]**
Heterogeneity: Tau² = 0.01; Chi² = 2.63, df = 2 (P = 0.27); I² = 24%				
Test for overall effect: Z = 1.23 (P = 0.22)				
Test for subgroup differences: Chi² = 0.03, df = 1 (P = 0.86), I² = 0%				



Forest plot of comparison: 1 Abortion versus delivery (all data combined), outcome: 1.10 Any psychiatric condition

Abortion versus delivery (all data combined) – number of disorders

Study or Subgroup	Logs [odds ratio]	SE	Weight	Odds ratio IV, Random, 95% CI	Risk ratio IV, Random, 95% CI
1.11.1 unwanted pregnancy					
FERGUSSON2008	0.23572233	0.22458543	100.0%	1.27 [0.82, 1.97]	
Subtotal (95% CI)			**100.0%**	**1.27 [0.82, 1.97]**	
Heterogeneity: Not applicable					
Test for overall effect: Z = 1.05 (P = 0.29)					
Total (95% CI)			**100.0%**	**1.27 [0.82, 1.97]**	
Heterogeneity: Not applicable					
Test for overall effect: Z = 1.05 (P = 0.29)					



Test for subgroup differences: Not applicable

Forest plot of comparison: 1 Abortion versus delivery (all data combined), outcome: 1.11 Any psychiatric condition.

Abortion versus delivery – studies that did not account for whether the pregnancy was planned or wanted

Quality assessment							No. of patients		Effect	Quality
No. of studies	Design	Risk of bias	Inconsistency	Indirect-ness	Imprecision	Other considerations	Abortion	Delivery	Relative (95% CI)	
Any psychiatric treatment (Follow-up mean 1 years; assessed with: treatment records)										
1	observational studies	no serious risk of bias	no serious inconsistency	serious[1]	no serious imprecision	none	83,752	280,140	OR 2.25 (2.09 to 2.41)	⊕OOO VERY LOW
Psychiatric outpatient treatment (Follow-up mean 4 years; assessed with: Medical treatment record)										
1	observational studies	no serious risk of bias	no serious inconsistency	serious[1]	no serious imprecision	none	14,297	40,122	OR 1.17 (1.1 to 1.25)	⊕OOO VERY LOW
Inpatient psychiatric treatment (Follow-up 90 days to 4 years ; assessed with: Medical records)										
1	observational studies	serious2	no serious inconsistency	serious[1]	no serious imprecision	none	15,299[3]	41,442[3]	OR ranged from 1.5 to 2.6	⊕OOO VERY LOW
Any mental health diagnosis (Follow-up mean 5 years; assessed with: Clinical interview)										
1	observational studies	no serious risk of bias	no serious inconsistency	serious[1]	serious[4]	none	51	84	OR 1.81 (0.74 to 4.35)	⊕OOO VERY LOW
Depression (Follow-up mean 11 years; assessed with: Various)										
6	observational studies	serious5	no serious inconsistency	serious[1]	serious[4]	none	16,105	45,119	OR ranged from 0.52 to 2.9	⊕OOO VERY LOW
Depression psychosis (single episode) (Follow-up 4 years; assessed with: Medical records)										
26	observational studies	no serious risk of bias	no serious inconsistency	serious[1]	serious[4]	none	15,299[3]	41,442[3]	OR ranged from 1.08 to 1.9	⊕OOO VERY LOW
Depression psychosis (recurrent) (Follow-up 4 years; assessed with: Medical treatment claims)										

Quality assessment							No. of patients		Effect	Quality
No. of studies	Design	Risk of bias	Inconsistency	Indirect-ness	Imprecision	Other considerations	Abortion	Delivery	Relative (95% CI)	
26	observational studies	no serious risk of bias	no serious inconsistency	serious[1]	serious[4]	none	15,299[3]	41,442[3]	OR ranged from 1 to 2.1	⊕OOO VERY LOW
Neurotic depression (inpatient/outpatient treatment) (Follow-up 4 years; assessed with: Medical records)										
26	observational studies	no serious risk of bias	no serious inconsistency	serious[1]	serious[4]	none	15,299[3]	41442[3]	OR ranged from 1.4 to 1.7	⊕OOO VERY LOW
Anxiety (assessed with: Clinical interview)										
2	observational studies	serious[7]	no serious inconsistency	serious[1]	serious[4]	none	16,200	48807	OR ranged from 0.84 to 1.5	⊕OOO VERY LOW
PTSD (assessed with: Clinical diagnosis)										
1	observational studies	serious[7]	no serious inconsistency	serious[1]	serious[4]	none	273	1549	OR 1.33 (0.67 to 2.73)	⊕OOO VERY LOW
Suicide (assessed with: Medical records and death certificates)										
1	observational studies	no serious risk of bias	no serious inconsistency	serious[1]	no serious imprecision	none	17,472	41956	RR 3.12 (1.25 to 7.78)	⊕OOO VERY LOW
Suicide ideation (Follow-up mean 8 years)										
1	observational studies	no serious risk of bias	no serious inconsistency	serious[1]	serious[4]	none	74	131	OR 1.19 (0.17 to 2.02)	⊕OOO VERY LOW
Alcohol problems and drug use (Follow-up mean 11 years; assessed with: AUDIT)										
1	observational studies	serious[5]	no serious inconsistency	serious[1]	no serious imprecision	none	76	183	OR ranged from 7.83 to 20	⊕OOO VERY LOW
Drug or alcohol abuse (Follow-up 4 years; assessed with: Medical records[8])										

Quality assessment							No. of patients		Effect	Quality
No. of studies	Design	Risk of bias	Inconsistency	Indirect-ness	Imprecision	Other considerations	Abortion	Delivery	Relative (95% CI)	
1	observational studies	no serious risk of bias	no serious inconsistency	serious[1]	serious[4,9]	none	142,973	40,122[3]	OR 1.16 (1 to 1.36)	⊕OOO VERY LOW
Bipolar disorder (inpatient/outpatient treatment) (Follow-up 4 years; assessed with: Medical records)										
26	observational studies	no serious risk of bias	no serious inconsistency	serious[1]	no serious imprecision	none	15,299[3]	41,442[3]	OR ranged from 1.95 to 3	⊕OOO VERY LOW
Schizophrenia and related disorders (inpatient/outpatient treatment) (Follow-up 4 years; assessed with: Medical records)										
26	observational studies	no serious risk of bias	no serious inconsistency	serious[1]	no serious imprecision	none	15,299[3]	41,442[3]	OR ranged from 1.2 to 1.97	⊕OOO VERY LOW
Non-organic psychoses (inpatient/outpatient treatment) (Follow-up 4 years; assessed with: Medical records)										
26	observational studies	no serious risk of bias	no serious inconsistency	serious[1]	no serious imprecision	none	15,299[3]	41,442[3]	OR ranged from 1.2 to 1.33	⊕OOO VERY LOW

1 Comparison group did not control for pregnancy intention.
2 Adjusted odds ratios not presented for the total 4-year follow-up period (data reported for first year only).
3 4-year follow-up.
4 Confidence interval includes both appreciable benefit and appreciable harm.
5 Retrospective reporting.
6 Studies used data from the same source.
7 Cross-sectional design using retrospective reporting.
8 Controlling for a number of factors including age and number of pregnancies.
9 Confidence interval includes both no effect and appreciable harm.

Abortion versus delivery of an unwanted or unplanned pregnancy

Quality assessment							No. of patients		Effect	Quality
No. of studies	Design	Risk of bias	Inconsistency	Indirect-ness	Imprecision	Other con-siderations	Abortion	Delivery (all data)	Relative (95% CI)	
Anxiety - Unwanted / unplanned pregnancy										
2	observational studies	serious[1]	no serious inconsistency	serious[2]	serious[3]	None	1,284	2,367	OR 1.28 (0.96 to 1.71)	⊕OOO VERY LOW
Depression - Unwanted pregnancy										
1	observational studies	no serious risk of bias	no serious inconsistency	no serious indirect-ness	serious[4]	None	117	52	OR 0.79 (0.32 to 1.96)	⊕OOO VERY LOW
Alcohol misuse - Unwanted pregnancy										
1	observational studies	no serious risk of bias	no serious inconsistency	no serious indirect-ness	serious[4,5]	None	117	52	OR 7.1 (0.51 to 97.94)	⊕OOO VERY LOW
Drug misuse - Unwanted pregnancy										
1	observational studies	no serious risk of bias	no serious inconsistency	no serious indirect-ness	serious[4]	none	117	52	OR 13.2 (0.82 to 212.14)	⊕OOO VERY LOW
Psychotic episode - unwanted pregnancy										
1	observational studies	no serious risk of bias	no serious inconsistency	no serious indirect-ness	serious[5]	none	Non-estimable	Non-es-timable	OR 0.3 (0.17 to 0.53)	⊕OOO VERY LOW
Psychotic episode - unintended pregnancy										
1	observational studies	no serious risk of bias	no serious inconsistency	serious[2]	no serious imprecision	none	Non-estimable	Non-es-timable	OR 0.3 (0.21 to 0.42)	⊕OOO VERY LOW
Non-psychotic episode - unwanted pregnancy										
1	observational studies	no serious risk of bias	no serious inconsistency	no serious indirect-ness	serious[5]	none	Non-estimable	Non-es-timable	OR 1.1 (0.88 to 1.37)	⊕OOO VERY LOW

Quality assessment							No. of patients		Effect	Quality
No. of studies	Design	Risk of bias	Inconsistency	Indirect-ness	Imprecision	Other con-siderations	Abortion	Delivery (all data)	Relative (95% CI)	
Non-psychotic episode - unintended pregnancy										
1	observational studies	no serious risk of bias	no serious inconsistency	serious[2]	no serious imprecision	none	Non-estimable	Non-estimable	OR 1.04 (0.99 to 1.09)	⊕OOO VERY LOW
Suicidal ideation - Unwanted pregnancy										
1	observational studies	no serious risk of bias	no serious inconsistency	no serious indirect-ness	serious[4]	none	117	52	OR 1.58 (0.43 to 5.8)	⊕OOO VERY LOW
Self-harm - unwanted pregnancy										
1	observational studies	no serious risk of bias	no serious inconsistency	no serious indirect-ness	serious[4]	none	Non-estimable	Non-estimable	OR 0.59 (0.17 to 2.08)	⊕OOO VERY LOW
Self-harm - unplanned pregnancy										
1	observational studies	no serious risk of bias	no serious inconsistency	serious[2]	no serious imprecision	none	Non-estimable	Non-estimable	OR 1.7 (1.11 to 2.61)	⊕OOO VERY LOW
Suicidal behaviours (including self-harm) - unwanted only										
2	observational studies	no serious risk of bias	no serious inconsistency	no serious indirect-ness	serious[4]	none	Non-estimable	Non-estimable	OR 0.95 (0.36 to 2.51)	⊕OOO VERY LOW
Suicidal behaviours (including self-harm) - unwanted/unplanned										
2	observational studies	no serious risk of bias	no serious inconsistency	serious[2]	no serious imprecision	none	Non-estimable	Non-estimable	OR 1.69 (1.12 to 2.54)	⊕OOO VERY LOW
Any psychiatric condition (composite score) - Using all Gilchrist unwanted data										
3	observational studies	serious[1]	no serious inconsistency	serious[2]	serious[3]	none	Non-estimable	Non-estimable	OR 1.12 (0.9 to 1.4)	⊕OOO VERY LOW
Any psychiatric condition (composite score) - Using Gilchrist unplanned data										
3	observational studies	serious[1]	no serious inconsistency	serious[2]	no serious imprecision	none	Non-estimable	Non-estimable	OR 1.1 (0.95 to 1.27)	⊕OOO VERY LOW

1 Includes a cross-sectional study with retrospective reporting. 2 Includes an unplanned comparison group. 3 Confidence interval includes both no effect and appreciable harm.
4 Confidence interval includes both appreciable benefit and appreciable harm. 5 Very small number of events across groups.

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ABBREVIATIONS

APA	American Psychological Association
AoMRC	Academy of Medical Royal Colleges
AUDIT	The Alcohol Use Disorders Identification Test
CES-D	Centre for Epidemiologic Studies – Depression scale
CI	confidence interval
CIDI	Composite International Diagnostic Interview
CIDI (-SF)	Composite International Diagnostic Interview (– Short Form)
CINAHL	Cumulative Index to Nursing and Allied Health Literature
DISC	Diagnosis Interview Schedule for Children
DSM (-III, -R, -IV)	Diagnostic and Statistical Manual of Mental Disorders of the American Psychiatric Association (-3rd edition, -revised, -4th edition)
EMBASE	Excerpta Medica Database
GAD	generalised anxiety disorder
GP	general practitioner
GRADE	Grading of Recommendations Assessment, Development and Evaluation
GSI	Global Severity Index
HADS	Hospital Anxiety and Depression Scale
HMSO	Her Majesty's Stationary Office
ICD (-8, -9)	International Classification of Diseases (-8th revision, -9th revision)
IES	Impact of Event Scale
IRR	incidence rate ratios
MEDLINE	Medical Literature Analysis and Retrieval System Online
MH	Mental Health
N/n	Number of participants
NCCMH	National Collaborating Centre for Mental Health
NICE	National Institute for Health and Clinical Excellence
OR	odds ratio

p	probability
PsycINFO	Psychological Information Database
PCL-C	PTSD Checklist – Civilian Version
PTSD	post-traumatic stress disorder
RCPsych	Royal College of Psychiatrists
RCOG	Royal College of Obstetricians and Gynaecologists
RR	relative risk, risk ratio
SCL-90	Symptoms Checklist-90
SE	standard error
SIGN	Scottish Intercollegiate Guidelines Network
SMD	standard mean difference
UM-CIDI	University of Michigan – Composite International Diagnostic Interview

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