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Factors influencing repeated teenage pregnancy: a review and meta-analysis

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Condensation: Evidence suggest a link between poor obstetric outcomes, depression, school discontinuation, increased partner support and non-use of contraceptives and greater risk of repeated pregnancy among adolescents.

Short title: Factors influencing repeated teenage pregnancy

ABSTRACT

Objective: Existing evidence of predictors of repeated teenage pregnancy (RTP) has not been rigorously assessed. This systematic review provides a comprehensive evaluation of protective and risk factors associated with RTP through a meta-analytical consensus.

Data sources: Pubmed, EMBASE, CINAHL, ProQuest, PsychINFO, ScienceDirect, Scopus and Web of Science databases, from 1997 to 2015; and reference list of other relevant research papers and related reviews.

Study eligibility criteria: Eligibility criteria included 1) epidemiological studies which analysed factors associated with repeated pregnancy or birth among adolescents under 20 years of age who were nulliparous or experienced at least one pregnancy; 2) experimental studies with an observational component adjusted for the intervention.

Study appraisal and synthesis methods: We performed narrative synthesis of study characteristics, participant characteristics, study results and quality assessment. We also conducted random-effects and quality-effects meta-analyses with meta-regression to obtain pooled odds ratios (PORs) of identified factors, and determine sources of between-study heterogeneity.

Results: Twenty six eligible epidemiologic studies mostly from USA (n=24) showed over 47 factors with no evidence of publication bias for each meta-analysis. Use of contraception [pooled odds ratio (POR)=0.60, 95% confidence interval (95%CI)=0.35-1.02] particularly long-acting reversible contraceptives (POR=0.19, 95%CI=0.08-0.45) considerably reduced RTP risk. Among studies concerning contraception, the number of follow-up visits (adjusted

coefficient=0.72, p=0.102) and country of study (unadjusted coefficient= 2.57, permuted p=0.071) explained between-study heterogeneity. Education-related factors, including higher level of education (POR=0.74, 95%CI=0.60-0.91) and school continuation (POR=0.53, 95%CI=0.33-0.84), were found to be protective. Conversely, depression (POR=1.46, 95%CI=1.14-1.87), history of abortion (POR=1.66, 95%CI=1.08-2.54) and relationship factors, such as partner support, increased the RTP risk.

Conclusions: Contraceptive use, educational factors, depression and history of abortion are the highly influential predictors of RTP. However, there is a lack of epidemiological studies in low- and middle-income countries to measure the extent and characteristics of RTP across more varied settings.

Keywords: Adolescent; factors; meta-analysis; repeated teenage pregnancy; review; teenage pregnancy

INTRODUCTION

Teenage mothers have an elevated risk of repeated pregnancy (RTP) within two years of their first pregnancy.[1] Considering the impact of teenage pregnancy and childbirth on maternal deaths [2] and the debilitating effects on neonatal and child health outcomes, especially in low- and middle-income countries, [3-5] RTP leads to higher risk of preterm births [6], mental health issues [7] and developmental problems [8] among children. Compared to the first pregnancy (or teen pregnancy in general), RTP leads to higher risk of preterm births, mental health issues and developmental problems among children. Compared to the first pregnancy, RTP reflects not only the reproductive health status of adolescents but also the capacity of health systems to address the needs (i.e. education, social welfare) of adolescents after their first pregnancy. With these immense effects across life course, identifying the causes of RTP is essential to develop appropriate prevention strategies to reduce its occurrence.

The only systematic study which has exclusively reviewed RTP risk factors was conducted by Rigsby, et al. [9] in 1998. Rigsby, et al. [9] examined 20 studies from 1966-1997, and found 31 RTP predictors grouped according to family structure, psychological, educational, and obstetric and family planning characteristics. The review mainly identified studies with case-control or cross-sectional designs but did not perform a meta-analytic approach to produce aggregate estimates of risk factors, explore heterogeneity among study estimates, and include studies conducted in countries other than the USA. Knowing the high RTP rates among developing countries, [10-12] there is a need to contextualise RTP factors in this type of setting. RTP predictors may differ between developed and underdeveloped countries due to the unique socio-cultural characteristics of the latter. The influence of religion and community might affect service delivery and demand generation of family planning services to prevent repeated pregnancies.

Studies published after the 1998 review have suggested that mental health problems, [13,14], attitude to family planning, [5,15-18] romantic relationships, [10] intimate partner violence, [5,17] family support, [5] living arrangements, [16,19] income and education [5,20] [1,16] play a role in determining high RTP risk. On the other hand, there have been inconsistent findings as to the role of sexual behaviour, [21-23] self-esteem, [22,24-26] marital status, [16,17,27] parental monitoring, [28,29] race and religious affiliation. [14,26,27,30-32]

The complex nature of different RTP factors from individual to societal level can be structured through socio-ecological framework, [33] which has been commonly applied to better understand the broad literature on (first) teen pregnancy determinants.[34] A comprehensive up-to-date review adopting a quantitative approach is necessary to obtain a clearer synthesis of RTP factors and broaden the search to low- and middle-income countries in Asia-Pacific and African regions. In this paper, we reviewed and quantitatively synthesised various predictors of RTP from the current literature and analysed it using the socio-ecological framework. We used a rigorous approach to pool estimates from each study to identify if a factor has a protective, risk or null effect. We examined between-study heterogeneity of RTP risks as a function of study characteristics since heterogeneity may reflect methodological diversity [35] and direct future research to improve their methodology and design. Through these steps, modifiable and non-modifiable characteristics of RTP can be identified while targeting various risks and embanking on protective factors to facilitate the development of evidence-based programs.

METHODS

Search strategy

We searched eight electronic databases including EMBASE, CINAHL, ProQuest, PsychINFO, PubMed, ScienceDirect, Scopus and Web of Science, using different key terms (i.e. factors, predictors, determinants, reduce, prevent, repeat, subsequent, multiple, second, young, teen, adolescent, pregnancy, birth, childbearing, and gravid) for studies published in English from 1997 to 2015 (the detailed search strategy and list of citations per database are available upon request). To widen the scope of our search strategy, we included grey literature, complete thesis documents, and reference list from other research papers and related reviews.

Screening and Selection

We followed the PRISMA guidelines [36] during the screening process while the MOOSE guidelines [37] were followed for the reporting of this review (refer to **Appendix 1** for the MOOSE checklist). After removing duplicates from the initial pool of searched articles, respective titles and abstract were screened for relevance following a detailed full-text screening. We included studies (1) with observational designs (i.e. cohort, case-control, cross-sectional), (2) aimed at identifying the different predictors of repeated pregnancy or birth, (3) among adolescents between 10 to 19 years old who were nulliparous or experienced at least one pregnancy. We avoided using an *a priori* list to saturate all documented factors. Nested observational studies (i.e. nested in experimental studies) with an analysis adjusted for any intervention were also included. Studies on repeated miscarriage or abortion, and adolescents with pre-existing conditions such as HIV and other infectious diseases were excluded. Those which included adolescents above 19 were considered if estimates from the teenage years could be obtained.

Data Extraction and Quality Assessment

Three reviewers (JCM, KSB, and CCC) independently abstracted data from all the articles while all (JCM, KSB, CCC and RA) cross-checked the study characteristics, participant information, results and identified limitations from each study. Risk of bias within each study were evaluated using The National Institutes of Health's tool for observational studies. [38] Quality score of each article was calculated by adding the number of criteria met as dictated by the assessment tool.

Predictors assessed in each study were examined and extracted together with their respective odds ratio (OR) and 95% confidence intervals (CI). Only those included in the final (i.e., adjusted) model of each study, except for intervention-related factors (in the case of experimental studies), were ascertained for our meta-analysis. If the predictors in the final models were not mentioned, all factors analysed were assumed to be in the final model. For studies which have assessed predictors at more than one time point, [14,22,25,39,40] we considered only the most recent OR since predictors with close temporality are more likely to have a higher impact on RTP. [17,41]

For studies without reported ORs, we used the Practical Meta-analysis Effect Size Calculator, [42,43] EpiGearXL, [44] and a spreadsheet converter by DeCoseter [45] to carefully derive ORs from available data such as means, chi-square and point-biserial statistics. A p-value of 0.10 was assumed for studies which did not report any p-value, [46] and 0.04 for studies which reported a p-value of "<0.05". For categorical predictors, those with more than two categories were dichotomised since studies used different measures to operationalise a particular predictor. For example, some studies measured education as the highest educational attainment (i.e. primary, secondary, tertiary education) while others only used secondary education as the highest educational attainment (i.e. being a high school graduate or not). In this case, it was

therefore necessary to pool the effects by collapsing secondary and tertiary education to achieve a single definition for this predictor (i.e. the effect of being at least a high school graduate) (see **Appendix 2** for the definition of each predictor).

Data analyses

Only those predictors assessed by at least two studies were considered for meta-analysis and arranged from protective factors to risk factors using the socio-ecologic framework. This framework includes five different components: individual factors, interpersonal factors (i.e. family, peers, relationship), community factors, multiple factors and family planning factors (i.e. which is considered to have cross-links with other components). [23,33] Separate meta-analysis, utilising random-effects modelling [35,47,48] was performed for each predictor identified, and the extent of heterogeneity was calculated using I^2 statistic and Cochran's Q at a 95% level of error. [49] Quality-effects meta-analysis was also done to examine how the quality of each study changed the pooled estimate compared to the results from random-effects meta-analysis. This analysis incorporates the quality score of each study in calculating the study weight, which is a robust and innovative technique to help minimize the estimator variance and account for subjectivity in quality assessment. [50] Publication bias was measured using the Egger's and Begg's tests. [48,49]

To further assess between-study heterogeneity, meta-regression was conducted for predictors which were included in at least eight studies, since a smaller number of studies may lead to unreliable results. [35,51,52] Year of publication (before 2001, 2001-2010, After 2010), country (USA, Brazil/Australia), setting (community-based, institution-based), design (cohort, case-control, cross-sectional), number of follow-ups (none, 1-2, 3-4, at least 5), quality score (continuous), type of outcome [non-rapid RTP (pregnancy or birth occurred more than 24 months after the first pregnancy), rapid RTP (pregnancy or birth occurred within 24 months

after the first pregnancy)], type of predictors (categorical, continuous) and type of analyses (adjusted, unadjusted) were the methodological aspects considered as moderators for analyses in the meta-regression. The number of follow-ups excluded the baseline data collection. Derived estimates were considered unadjusted except for adjusted regression coefficients.

The residual maximum likelihood algorithm available in Stata (version 13) was used for the univariate random-effects meta-regression. This method maximizes the log likelihood of the residual (i.e., between-study variance) and approximates residual heterogeneity which is the study variance not explained by the moderators by assuming that the true effects follow a normal distribution. [35,48,51,53] Moreover, it also accounts for the degrees of freedom of categorical variables which prevents underestimation of regression coefficients. [48,54-56] The Knapp-Hartung variance estimator was applied to calculate p-values of each moderator while preventing false-positive results [57]. Because of the small number of studies, multiplicity adjustments with 10,000 permutations were also done for univariate analysis to reduce the standard error while estimating the variance during meta-regression. [54] Only moderators with p-values less than or equal to 0.20 in the initial model underwent multiplicity adjustment.

Although only univariate analysis is commonly performed when the number of studies is small, we conducted multivariate analysis with multiplicity adjustment to observe if any moderators strongly predicted the pooled estimates after adjustments, [35,48] using a backward stepwise approach. [58] Only moderators significant at the 0.10 level were included in this final model. Subgroup analyses were undertaken among significant moderators during univariate meta-regression to better visualise the differences among the pooled estimates.

RESULTS

Eligible studies

A total of 4,397 articles were identified via our search strategy (see **Appendix 3**). After removing duplicates, the titles and abstracts of 2,874 studies were initially screened for relevance, resulting in the selection of 105 articles which subsequently underwent full-text eligibility screening using the inclusion criteria (refer to **Figure 1**). Only 19 studies were deemed relevant and retained while the other papers were excluded due to non-relatedness, issues regarding the analysis of the predictor and outcome variables, and study design. In total, twenty six studies [13-15,17,21-32,39,40,45,59-66] were included in the analyses, with seven of these obtained via reference list of related studies.

Study characteristics and results

As shown in **Table 1**, most of the studies (n=24) found were conducted in the USA except for Lewis [23] and de Fatima, et al. [64] which were from Australia and Brazil respectively. More than half (n=15) consisted of an institution-based sample, while the remaining 11 studies recruited participants from a community setting. Out of the 26 articles, 21 implemented a longitudinal cohort design, while three had cross-sectional designs and two were based on case-control designs. The number of follow-ups ranged from one up to 84 in the entire study duration. Nine of the 21 cohort studies followed-up adolescents for 24 months. The duration of the remaining studies varied between six months to a maximum of nine years.

Selected studies recruited adolescents during their first pregnancy or at most 18 weeks postpartum, with participants drawn from low-income or disadvantaged communities or from minority groups with disproportionately high teen pregnancy rate. Some studies had restrictive criteria such as receiving prenatal care (n=2), completed birth records (n=2), attending/ attended school (n=2), and unmarried (n=1). There were a total of 168,796

adolescents from all the studies, with individual studies ranging in size from 80 [39] to 146,206 [32] participants, and with an average response rate of 74.5%

A total of 92 variables were identified from the 26 eligible studies screened. Use of contraception (n=8), school continuation (n=8), age (n=10), age during first pregnancy (n=10) and race (n=10) were commonly assessed predictors. Evidence consistently showed that use of contraception, such as condoms, pills and subdermal implants, decreased the risk of RTP. Conversely, few studies confirmed the protective effect of school continuation after first pregnancy, and the negative effect of younger age and belonging to a minority group (i.e. indigenous peoples, African-Americans and Hispanics). Others had also demonstrated that adolescents with a history of abortion or miscarriage (n=6), a high depression score (n=5), and an experience of physical/sexual abuse (n=5) showed elevated risk of RTP.

Despite the negative impact of different mental health and behavioural issues, few studies investigated the association of these factors on RTP. [14,31,60] One study showed that aggression doubled the risk of RTP after multivariate analysis. Another study also found an association of suicidal ideation and psychiatric history with RTP. Contraceptive behaviour, in terms of consistency and reasons for non-use, was only examined by a single study which found non-use associated with three times the odds of RTP.

Predictors such as education, family planning and demographic characteristics were measured using a study-specific questionnaire while other variables were obtained through the use of validated scales such as Beck's depression inventory, Rosenberg's scale for self-esteem, and Rotter's measure for locus of control (see **Appendix 4**). Most studies assessed the occurrence of pregnancy (n=20), birth (n=5) or both (n=1). Out of 20 studies, 15 measured rapid repeated pregnancy and five non-rapid repeated pregnancy. Four studies measured either rapid or non-rapid repeated birth while only one considered both rapid and non-rapid repeated birth.

There was an average quality score of 9.5 ranging from 7 to 13. Approximately half of the studies (n=11) achieved an above average score. Specific component scores showed that most studies failed to justify their sample size, maintained at least 80% retention/ response rate (n=19), measured their exposure variables more than once across time (n=6), and allowed for at least 24 months for RTP to occur (n=7). A few studies had a relatively small sample deemed inadequate to represent the relevant general population. Some longitudinal studies had high attrition rates. As to the data analysis performed, six studies conducted univariate analysis with no adjusting for confounders, while others presented adjusted estimates.

Meta-analyses of individual RTP factors

Out of 92 factors, 47 analysed by at least two studies were included in the meta-analysis (see **Figure 2**). Meta-analyses of the identified family planning factors mostly revealed a protective influence on RTP. Use of long-acting reversible contraceptives (LARC) such as intrauterine device and implants reduced RTP risk by at least 80% (CI = 0.08-0.45). However, a borderline association was observed on contraceptive use in general (OR=0.60, CI=0.35-1.02).

Among the 22 individual factors, we found that discontinuation of attending school after the first pregnancy showed the strongest effect of 1.89 (CI=1.19-3.01). In addition, adolescents' obstetric history (i.e. multi parity and history of abortion/miscarriage) was found to increase RTP risk by 66%. Mental/behavioural-related predictors such as depressive symptoms and delinquent behaviour also influenced the odds of subsequent pregnancy. Characteristics of adolescent's partner were amongst the most important interpersonal factors for RTP occurrence. Partner-related predictors included wider age difference between adolescents and their partner, and perceived support from partners. Being married was not found to be linked to greater odds of RTP, whereas living with a partner increased RTP risk (OR=1.85; CI=1.38-

2.48). Among the six community factors, only religious involvement (OR=1.19, CI=1.06-1.34) was associated with RTP.

Use of contraception, level of education, school drop-out, history of abortion/miscarriage and depression consistently showed an association both in narrative synthesis and meta-analyses. However, age, race and experience of physical/sexual abuse which seemed to be associated with RTP in narrative synthesis were found unrelated in meta-analysis.

Results from quality-effects meta-analysis (see **Appendix 6**) had a negligible impact on the direction and magnitude of the pooled estimates of all identified predictors from random-effects modelling except for the history of abortion/miscarriage. Further analysis on this predictor by excluding a study[63] with a low quality score due to low retention rate and statistical power and issues on temporality and analysis, improved the pooled OR from 1.44 (CI=0.90-2.30) to 1.34 (1.10-1.64). Excluding this study in random-effects analysis showed similar improvement from 1.66 to 1.37 (CI=1.12-1.67).

Almost 43% (n=20) of the factors analysed showed a low level of heterogeneity (see **Appendix 5**). Although this could be related to the small number of studies included for each factor, six predictors had at least five studies in the meta-analysis [i.e. alcohol use (I^2=0.00%), drug use (I^2=0.00%), smoking (I^2=0.00%), support from adolescent's mother (I^2=7.50%), depression (I^2=8.20%), and received insurance or subsidy (I^2=31.90%)]. No publication bias was detected across the 47 meta-analyses done.

Meta-regression and subgroup analyses

Only five factors, including age (n=10), age at conception (n=10), use of contraception (n=8), race (n=10) and school drop-out (n=8), qualified and underwent meta-regression (see **Table 2**). Age, race, and school drop-out were not included in multivariate meta-regression because the nine moderators did not produce significant effects in the univariate analysis with or without multiplicity adjustments. Among the moderators analysed, only two (number of

follow-ups and country type) were found to explain the heterogeneity among studies which considered the use of contraception. Increasing the number of follow-ups (Adjusted coefficient=0.72, CI=0.46-1.11, p-value=0.102) improved the positive effect of contraceptive use as did the exclusion of USA studies (Unadjusted coefficient= 0.39, CI=0.11-1.41, permuted p-value=0.071). Subgroup analyses (see **Table 3**) further showed that more numerous follow-ups and the exclusion of non-USA studies reduced heterogeneity and improved the protective effect of contraception. Sensitivity analysis also showed similar findings upon removal of the Brazilian study by de Fatima, et al. [64] (refer to **Appendix 7**). Although the type of predictor (permuted p-value=0.072) and outcome variable (permuted p-value=0.065) affected the effect estimate of age at first pregnancy in the univariate model, these effect was no longer seen after multivariate analysis. Findings from the subgroup and sensitivity analyses have also supported this results since no relevant changes in pooled OR and heterogeneity were observed.

Despite the small number of moderators (i.e. year of publication, number of follow-up, and country), the multivariate meta-regression model of the use of contraception had explained 68.65% of the existing study heterogeneity among 8 studies. On other hand, the multivariate model of the age during first pregnancy with two moderators explained 31.39%.

COMMENT

Main findings

In this study, we set out to identify factors affecting RTP using a systematic approach to aggregate the existing evidence. We identified a total of three protective and 12 risk factors of RTP primarily from cohort studies. Contraceptive use, particularly LARCs, and higher educational attainment were considered as strong protective factors. On the other hand, dropping-out of school, depression, obstetric history (i.e. history of abortion/miscarriage, multi parity, a first planned pregnancy), partner-related factors (i.e. wide age difference, increased partner support, living with a partner), being acquainted with other teen mothers, and increased religious involvement were found to increase RTP risk. This review also highlighted a lack of evidence on issues associated with RTP in developing countries. This is of concern if one considers that these countries have very high RTP rates ranging from 28%-60%-60% [10-12] when compared to 20% in the USA. [67]

Comparison with existing literature

Our review supports findings from earlier reviews [9,68] especially on the use of contraceptive implants as an example of LARC postpartum. The Meade, Ickovics [68] review suggested similar results, such that RTP is linked to previous miscarriage and being friends with pregnant teenagers. Our work is consistent with findings from Rigsby, et al. where school drop-out was an important RTP risk factor. Our findings did not support other findings of an association with age, income, smoking, and substance abuse, low socio-economic status and low educational level of parents, for which relationships were no longer seen after meta-analysis [5,9,68]. These discrepancies are possibly due to an increased methodological rigor in our study as previous analysis were purely based on narrative synthesis [9].

Implications

The pooled estimates we obtained emphasize the nature and magnitude of influence of each RTP factor. Despite the lack of studies from developing countries, our key findings could be relevant to specific issues such as contraception, education, abortion and mental health, which are of high concern in these countries.

Use of contraceptives particularly LARC, such as contraceptive subdermal implants and intra-uterine devices, during immediate postpartum showed the strongest protective effect against RTP. This could be due to the fact that continuous use of sub-dermal implants, unlike oral contraceptives [69] and condoms, [68] dramatically reduces the risk of non-compliance [17,61] and can highly prevent another pregnancy for up to three years. Moreover, implants are considered more accessible [70] especially in low-resource settings because frequent examinations and regular re-supply are unnecessary. Our findings also suggest the importance of frequent follow-up on accurate evaluation and consistent use of contraceptives for a longer period of time, since short-acting reversible contraceptives are still commonly used especially in developing countries. [71,72] Although contraception may show promising results to reduce RTP, the issue of reproductive coercion should be acknowledged and considered in evaluating contraceptive programs for adolescent mothers. This suggests the need for relevant counselling among service providers and health workers to draw attention to ethical issues around voluntary uptake of contraception.

While proper family planning practices are encouraged, exploring contraceptive behaviour through other RTP factors (e.g. consistency of contraceptive use, reasons for non-use) would facilitate designing promotion strategies particularly in countries with unique cultural complexities. However, most of the studies reviewed did not consider the possible mediating effect of family planning despite some evidence suggesting the cross-linking influence of family planning attitude in different levels (i.e. individual, interpersonal, community). [33,73] Performing a mediation analysis would allow one to measure the total effects of other

exposure variables, which account for the direct and indirect effects of the exposure variables through the family planning characteristics.

Educational status, particularly continuous school attendance and attaining at least secondary education, showed a protective role against RTP. It has been argued that being involved in studying may help adolescent mothers to identify new career goals.[9] This suggests that a supportive school environment, with specific school curricula as well as "peer education" initiatives [74-76] for first time mothers/ pregnant adolescents may encourage school retention and ultimately the development of alternative goals and opportunities.

Increased partner support was a risk factor for RTP in this study. This is a counter-intuitive finding which deserve additional research attention. Partner-related characteristics such as intimate partner violence and marital status may be at play because of the strong yet borderline significant relationship of physical/sexual abuse and the conflicting effects of being married versus living together respectively found in this review. This may also be related to not plan a pregnancy because of a partner's desire to have another child. This may be supported by a study which found that partners wanting another child doubled the risk of an intended RTP.[27] This are however a speculative interpretations. More observational studies with repeated follow-up designs are needed to clarify these findings and exploring the nature of support given by the partner in family planning.

Adolescents with a history of abortion and depression were found to be at higher risk for RTP. Abortion may lead to wanting another pregnancy to cope with a sense of loss [63], while depression, which is prevalent among teen mothers [77] and may partly result from unintended pregnancy, [78] may lead to risky sexual practices and poor contraceptive use [13]. These findings suggest the need for psychological interventions for adolescents when depressive symptoms and emotional distress are identified. This aspect of postpartum care can be encouraged

especially among adolescent mothers with low socio-economic status wherein mental health intervention is often neglected and hardly accessible. [79]

One of the aim of this review was to identify much needed evidence on RTP in low- and middle-income countries. We found no published studies of RTP in Asia-Pacific and Africa where adolescent fertility is high [80] and family planning services are often inaccessible. [81] Cross-sectional investigations utilising existing national survey data are urgently needed to ascertain the extent of global risk associated with RTP. Local studies, due to the distinct socio-cultural characteristics of developing countries, may show the role of specific factors which were found to have null effect (i.e. religion, race/ethnicity, income/ socio-economic class, and sexual behaviour) and not well analysed in our review due to lack of studies (i.e. aggression, history of psychiatric illness, suicidal ideation, and contraceptive behaviour). Studies based in these settings would make an important contribution towards a generalizable evidence necessary in formulating RTP interventions and strategies and improve adolescent reproductive health globally.

Strengths and limitations

This meta-analytic review provides the first comprehensive evaluation of risk and protective factors for RTP. We identified an extensive and up-to-date pool of studies beyond those analysed in the systematic review undertaken by Rigsby, et al. in 1998. We mostly reviewed cohort studies, which made the pooled estimates more reliable and increase our confidence towards assumptions of causal inference.

Ours was not only the first study to perform meta-analysis on this topic, but also to undertake multiple meta-analyses by pooling estimates for each of the 47 factors. In addition, we also assessed the magnitude and sources of heterogeneity through meta-regression while employing permutations during the univariate analysis to prevent Type I Error. This series of analyses and subsequent subgroup analyses showed how the different study characteristics

affected the between-study heterogeneity, specifically the effect of the number of follow-ups on the effect size of contraceptive use.

In spite of our study's novelty, results from this review cannot be generalised to low and middle-income countries since most of the studies we found were conducted in the USA. Although we identified four Latin American studies with an eligible abstract, these studies have no available in English-translated full-text. This limitation was also noted in previous aggregate studies. [9,68] In addition, the 26 studies we found only allowed us to pool a maximum of 10 studies per factor, which had led to the further reduction of studies per level of each moderator during meta-regression. This may result in insufficient power to detect an association despite the consistency of results of meta-regression with subgroup analysis. Also we have may had insufficient power to detect an effect for factors such as use of LARC, parity, planned first pregnancy and presence of multiple risk factors because of the small number of studies pooled.

In conclusion, our review has found protective role of contraceptives, especially LARC, and continuation of education until tertiary level. Depression, partner's support and abortion as risk factors suggest a need for postpartum psychosocial interventions and partners' involvement in family planning counselling. Lastly and importantly, this review has shown epidemiological studies in developing countries, where RTP are highly prevalent, are sorely needed to establish essential local evidence for policy and program development at the national and international level.

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REFERENCES

1. Stevens-Simon C, Kelly L, Singer D, Nelligan D. Reasons for first teen pregnancies predict the rate of subsequent teen conceptions. *Pediatrics.* 1998;101(1):E8.
2. United Nations Secretary-General. *Global Strategy for Women's, Children's and Adolescent's Health 2016-2030.* United Nations;2015.
3. Klerman LV. Risk of poor pregnancy outcomes: Is it higher among multiparous teenage mothers? *Journal of Adolescent Health.* 2006;38(6):761-764.
4. Klerman LV. Another Chance: Preventing Additional Births to Teen Mothers. *The National Campaign to Prevent Teen Pregnancy.* 2004.
5. Rowlands S. Social predictors of repeat adolescent pregnancy and focussed strategies. *Best Practice & Research Clinical Obstetrics & Gynaecology.* 2010;24(5):605-616.
6. Partington SN, Steber DL, Blair KA, Cisler RA. Second Births to Teenage Mothers: Risk Factors For Low Birth Weight and Preterm Birth. *Perspectives on sexual and reproductive health.* 2009;41(2):101-109.
7. Hoffman SD, Maynard RA. *Kids Having Kids: Economic Costs & Social Consequences of Teen Pregnancy.* The urban institute; 2008.
8. Savio Beers LA. Approaching the adolescent-headed family: a review of teen parenting. *Curr Probl Pediatr Adolesc Health Care.* 2009;39(9):216-233.
9. Rigsby DC, Macones GA, Driscoll DA. Risk factors for rapid repeat pregnancy among adolescent mothers: a review of the literature. *Journal Of Pediatric And Adolescent Gynecology.* 1998;11(3):115-126.
10. Molina RC, Roca CG, Zamorano JS, Araya EG. Family planning and adolescent pregnancy. *Best Practice & Research Clinical Obstetrics & Gynaecology.* 2010;24(2):209-222.
11. Colón M, Martínez R, Tulla M, Pérez J, Santaella Y, Laras L. Psychosocial factors associated with failure to use contraception among adolescents with repeat pregnancies in Puerto Rico. *Bol Asoc Med P R.* 2014;106(1):12-16.
12. da Silva KS, Rozenberg R, Bonan C, Costa Chuva VC, da Costa SF, de Souza Mendes Gomes MA. Repeated pregnancy among adolescents and social vulnerability in Rio de Janeiro (RJ, Brazil): data analysis of Information System on Live Births. *Ciencia & Saude Coletiva.* 2011;16(5):2485-2493.
13. Barnet B, Liu J, Devoe M. Double jeopardy: depressive symptoms and rapid subsequent pregnancy in adolescent mothers. *Arch Pediatr Adolesc Med.* 2008;162(3):246-252.
14. Pfitzner MA, Hoff C, McElligott K. Predictors of Repeat Pregnancy in a Program for Pregnant Teens. *J. PEDIATR. ADOLESC. GYNECOL.* 2003;16(2):77-81.
15. Richio LJ. Repeat teen birth: does delivery mode make a difference? *Am J Obstet Gynecol.* 2010;203(5):453-453.e455.
16. Farber N. *Adolescent Pregnancy : Policy and Prevention Services.* New York, NY, USA: Springer Publishing Company; 2009.
17. Raneri LG, Wiemann CM. Social ecological predictors of repeat adolescent pregnancy. *Perspect. Sex. Reprod. Health.* 2007;39(1):39-47.
18. Stevens-Simon C, Kelly L. Correlates and consequences of early removal of levonorgestrel implants among teenaged mothers. *Archives of Pediatrics & Adolescent Medicine.* 1998;152(9):893-898.
19. Zeck W, Bjelic-Radisic V, Haas J, Greimel E. Impact of Adolescent Pregnancy on the Future Life of Young Mothers in Terms of Social, Familial, and Educational Changes. *Journal of Adolescent Health.* 2007;41(4):380-388.
20. Klein JD. Adolescent Pregnancy: Current Trends and Issues. *Pediatrics.* 2005;116(1):281-286.
21. Gillmore MR, Lewis SM, Lohr MJ, Spencer MS, White RD. Repeat pregnancies among adolescent mothers. *J. Marriage Fam.* 1997;59(3):536-550.

22. Montgomery AE. *The distinction between first and higher-order pregnancies among low-income adolescents*. US, ProQuest Information & Learning; 2010.
23. Lewis LN, Doherty, Dorota A., Hickey, Martha, Skinner, S. Rachel. Predictors of sexual intercourse and rapid-repeat pregnancy among teenage mothers: an Australian prospective longitudinal study. *The Medical journal of Australia.* 2010;193(6):338-342.
24. Sims K, Luster TOM. Factors Related to Early Subsequent Pregnancies and Second Births among Adolescent Mothers in a Family Support Program. *J. Fam. Issues.* 2002;23(8):1006-1031.
25. Black MM, Bentley ME, Papas MA, et al. Delaying Second Births Among Adolescent Mothers: A Randomized, Controlled Trial of a Home-Based Mentoring Program. *PEDIATRICS.* 2006;118(4):e1087-e1099.
26. Davis TM. An Examination of Repeat Pregnancies Using Problem Behavior Theory: Is it Really Problematic? *J. Youth Stud.* 2002;5(3):337-351.
27. Boardman LA, Allsworth J, Phipps MG, Lapane KL. Risk Factors for Unintended Versus Intended Rapid Repeat Pregnancies among Adolescents. *J. ADOLESC. HEALTH.* 2006;39(4):e1-e8.
28. Manlove J, Mariner C, Papillo AR. Subsequent Fertility among Teen Mothers: Longitudinal Analyses of Recent National Data. *J. Marriage Fam.* 2000;62(2):430-448.
29. Crosby RA, DiClemente RJ, Wingood GM, et al. Low parental monitoring predicts subsequent pregnancy among African-American adolescent females. *J Pediatr Adolesc Gynecol.* 2002;15(1):43-46.
30. Sangalang BB, Barth RP, Painter JS. First-birth outcomes and timing of second births: A statewide case management program for adolescent mothers. *Health and Social Work.* 2006;31(1):54-63.
31. Crittenden CP, Boris NW, Rice JC, Taylor CA, Olds DL. The role of mental health factors, behavioral factors, and past experiences in the prediction of rapid repeat pregnancy in adolescence. *J. ADOLESC. HEALTH.* 2009;44(1):25-32.
32. Patel D, Piotrowski ZH, Lulla RR. Multiple births among adolescent women in Illinois. *Journal of Reproductive Medicine.* 1997;42(12):779-784.
33. Family Planning and Contraceptive Research. Postpartum Adolescent Birth Control Study. http://familyplanning.uchicago.edu/research/studies-by-topic/postpartum-abcs/. Accessed July 03, 2015, 2015.
34. DiClemente RJ, Santelli JS, Crosby RA. *Adolescent health: understanding and preventing risk behaviors.* San Francisco, Calif: Jossey-Bass; 2009.
35. Higgins J, Green S, Ebooks C. *Cochrane handbook for systematic reviews of interventions.* Hoboken, NJ; Chichester, England: Wiley-Blackwell; 2008.
36. Liberati A, Altman DG, Tetzlaff J, et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate healthcare interventions: explanation and elaboration. *BMJ (Clinical research ed.).* 2009;339:b2700.
37. Stroup DF, Berlin JA, Morton SC, et al. Meta-analysis of observational studies in epidemiology: a proposal for reporting. Meta-analysis Of Observational Studies in Epidemiology (MOOSE) group. *Jama.* 2000;283(15):2008-2012.
38. National Heart LaBI. Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies. *Systematic Evidence Reviews and Clinical Practice Guidelines.* 2014.
39. Coard SI, Nitz K, Felice ME. Repeat pregnancy among urban adolescents: sociodemographic, family, and health factors. *Adolescence.* 2000;35(137):193-200.
40. Gray S, Sheeder J, O'Brien R, Stevens-Simon C. Having the Best Intentions is Necessary but not Sufficient: What would Increase the Efficacy of Home Visiting for Preventing Second Teen Pregnancies? *Prevention Science.* 2006;7(4):389-395.
41. Hanna B. Negotiating motherhood: The struggles of teenage mothers. *Journal of Advanced Nursing.* 2001;34(4):456-464.

42. Wilson DB. Practical Meta-Analysis Effect Size Calculator. Vol 20162001.
43. Lipsey MW, Wilson DB. *Practical meta-analysis.* Vol 49. Thousand Oaks, Calif: Sage Publications; 2001.
44. Barendregt JJ, Veerman JL. Categorical versus continuous risk factors and the calculation of potential impact fractions. *Journal of Epidemiology and Community Health.* 2010;64(3):209-212.
45. DeCoseter J. Converting effect sizes. 2012.
46. Gardener H, Spiegelman D, Buka SL. Prenatal risk factors for autism: comprehensive meta-analysis. *The British Journal of Psychiatry.* 2009;195(1):7-14.
47. DerSimonian R, Laird N. Meta-analysis in clinical trials. *Controlled clinical trials.* 1986;7(3):177-188.
48. Sterne JAC, Newton HJ, Cox NJ. *Meta-analysis in Stata: an updated collection from the Stata journal.* Vol 1st. College Station, Tex: Stata Press; 2009.
49. Doi SAR, Williams GM. *Methods of clinical epidemiology.* New York; Berlin: Springer; 2013.
50. Doi SA, Barendregt JJ, Khan S, Thalib L, Williams GM. Advances in the meta-analysis of heterogeneous clinical trials II: The quality effects model. *Contemporary Clinical Trials.* 2015.
51. Borenstein M. *Introduction to meta-analysis.* Hoboken;Chichester, West Sussex, U.K;: John Wiley & Sons; 2009.
52. Fu R, Gartlehner G, Grant M, et al. Conducting quantitative synthesis when comparing medical interventions: AHRQ and the Effective Health Care Program. *Journal of clinical epidemiology.* 2011;64(11):1187-1197.
53. Thompson SG, Higgins JPT. How should meta-regression analyses be undertaken and interpreted? *Statistics in medicine.* 2002;21(11):1559-1573.
54. Higgins JPT, Thompson SG. Controlling the risk of spurious findings from meta-regression. *Statistics in medicine.* 2004;23(11):1663-1682.
55. Moreno SG, Sutton AJ, Thompson JR, Ades AE, Abrams KR, Cooper NJ. A generalized weighting regression-derived meta-analysis estimator robust to small-study effects and heterogeneity. *Statistics in medicine.* 2012;31(14):1407-1417.
56. Thompson SG, Sharp SJ. Explaining heterogeneity in meta-analysis: A comparison of methods. *Statistics in medicine.* 1999;18(20):2693-2708.
57. Knapp G, Hartung J. Improved tests for a random effects meta-regression with a single covariate. *Statistics in medicine.* 2003;22(17):2693-2710.
58. Gagnier JJ, Moher D, Boon H, Bombardier C, Beyene J. An empirical study using permutation-based resampling in meta-regression. *Systematic Reviews.* 2012;1:18-18.
59. Tocce KM, Sheeder JL, Teal SB. Rapid repeat pregnancy in adolescents: Do immediate postpartum contraceptive implants make a difference? *AM. J. OBSTET. GYNECOL.* 2012;206(6):481-e487.
60. Stevens-Simon C, Kelly L, Singer D, Nelligan D. Reasons For First Teen Pregnancies Predict the Rate of Subsequent Teen Conceptions. *PEDIATRICS.* 1998;101(1):e8-e8.
61. Stevens-Simon C, Kelly L, Kulick R. A village would be nice but ..It takes a long-acting contraceptive to prevent repeat adolescent pregnancies. *AM. J. PREV. MED.* 2001;21(1):60-65.
62. Milbrook N. *Factors contributing to subsequent pregnancies among teen parents in child welfare*. US, ProQuest Information & Learning; 2013.
63. Jacoby M, Gorenflo D, Black E, Wunderlich C. Rapid repeat pregnancy and experiences of interpersonal violence among low-income adolescents. *AM. J. PREV. MED.* 1999;16(4):318-321.
64. de Fátima Rato Padina M, de Souza e Silva R, Mitsuhiro SS, et al. Repeat pregnancies among adolescents in a tertiary hospital in Brazil. *Journal of Reproductive and Infant Psychology.* 2012;30(2):193-200.

65. Damle LF, Gohari AC, McEvoy AK, Desale SY, Gomez-Lobo V. Early initiation of postpartum contraception: does it decrease rapid repeat pregnancy in adolescents? *J. PEDIATR. ADOLESC. GYNECOL.* 2015;28(1):57-62.
66. Bennett IM, Frasso R, Bellamy SL, Wortham S, Gross KS. Pre-teen literacy and subsequent teenage childbearing in a US population. *Contraception.* 2013;87(4):459-464.
67. Gavin L, Warner L, O'Neil ME, et al. Vital Signs: Repeat Births Among Teens - United States, 2007-2010. *Mmwr-Morbid Mortal W.* 2013;62(13):249-255.
68. Meade CS, Ickovics JR. Systematic review of sexual risk among pregnant and mothering teens in the USA: pregnancy as an opportunity for integrated prevention of STD and repeat pregnancy. *Social Science & Medicine.* 2005;60(4):661-678.
69. Templeman CL, Cook V, Goldsmith LJ, Powell J, Hertweck SP. Postpartum contraceptive use among adolescent mothers. *Obstetrics and gynecology.* 2000;95(5):770-776.
70. Bahamondes L. Interventions Subdermal implantable contraceptives versus other forms of reversible contraceptives or other implants as effective methods of preventing pregnancy: RHL commentary. 2008. http://apps.who.int/rhl/fertility/contraception/CD001326_bahamondesl_com/en/. Accessed June 03, 2016.
71. Seiber EE, Bertrand JT, Sullivan TM. Changes in Contraceptive Method Mix in Developing Countries. *International Family Planning Perspectives.* 2007;33(3):117-123.
72. Suzanne Scoggins KD, Nina Miller, Erika Studt, and Lauren Wolkoff. FP2020 Commitment to Action Measurement Annex. 2015. http://progress.familyplanning2020.org/uploads/15/02/1_FP2020_Measurement_Annex_2014-2015_spreads.compressed.pdf.
73. Lewis CM, Faulkner M, Scarborough M, Berkeley B. Preventing Subsequent Births for Low-Income Adolescent Mothers: An Exploratory Investigation of Mediating Factors in Intensive Case Management. *American Journal of Public Health.* 2012;102(10):1862-1865.
74. Corcoran J, Pillai VK. Effectiveness of secondary pregnancy prevention programs: A meta-analysis. *Res Social Work Prac.* 2007;17(1):5-18.
75. Chandra-Mouli V, Camacho AV, Michaud P-A. WHO Guidelines on Preventing Early Pregnancy and Poor Reproductive Outcomes Among Adolescents in Developing Countries. *Journal of adolescent health.* 2013;52(5):517.
76. Pinzon JL, Jones VF, Blythe MJ, et al. Care of adolescent parents and their children. *Pediatrics.* 2012;130(6):e1743-e1756.
77. Abajobir AA, Maravilla JC, Alati R, Najman JM. A systematic review and meta-analysis of the association between unintended pregnancy and perinatal depression. *Journal of Affective Disorders.* 2016;192:56-63.
78. Baldwin MK, Edelman AB. The Effect of Long-Acting Reversible Contraception on Rapid Repeat Pregnancy in Adolescents: A Review. *J. ADOLESC. HEALTH.* 2013;52(4):S47-S53.
79. LePlatte D, Rosenblum KL, Stanton E, Miller N, Muzik M. Mental health in primary care for adolescent parents. *Mental Health in Family Medicine.* 2012;9(1):39-45.
80. UNFPA, UNESCO and WHO. *Sexual and reproductive health of young people in Asia and the Pacific: A review of issues, policies and programmes.* Bangkok, Thailand2015.
81. International planned parenthood federation. Facts on the Sexual and Reproductive Health of Adolescent Women in the Developing World. 2010. https://www.guttmacher.org/sites/default/files/pdfs/pubs/FB-Adolescents-SRH.pdf. Accessed June 03, 2016.

Table 1. Study characteristics and results

Authors (Year)	Location (Setting)	Design (# ff, l ff)	Inclusion criteria (Final sample size, Response/retention rate)	Outcomes (Definition)	Significant predictors (Effect sizes)	Key findings	Qi
Barnet, et al. (2008)	USA (CB)	Ch (2, 24m)	Pregnant adolescents, aged 12-18 years with low income at community-based prenatal care sites with guardian consent in case living in a foster care (245, 75%)	RRP (Occurrence of repeated pregnancy by 2y postpartum)	**Mental health status:** Depressive symptoms (AHR)	Depressive symptoms has a significantly increased the chance of rapid repeat pregnancy. It was also found that demographic characteristics and other proximal and distal indicators had no confounding effects on this relationship. Condom use and being in school had similar effect on repeated pregnancy.	**12**
Bennett, et al. (2013)	USA (CB)	Ch (2, 7y)	Seventh grader from the public school system whom data are linked to birth record who have live births before 20 years of age (12,339, 93%)	RB (Second birth before 20 years old)	**Education:** 7th grade reading skill level (chi2)	Having an above literacy level as well as being a white American or Asian were the protective factors for repeated pregnancy.	**9**
Black, et al. (2006)	USA (IB)	Ch from an experimental study (3, 24m)	Under 18 years old at delivery of the first child, black race, no indication of cocaine and heroin use in the medical chart, no chronic illness that would interfere parenting or adolescent development; infants of the mother is term and of normal birthweight with no congenital problems, chronic illness or	RRB (Second birth 24m after the delivery of the first child)	**Personality:** Positive life events (AOR)	During baseline, it was found that older adolescent mother has higher tendency to have another pregnancy. Upon assessment of the factors during 24th month follow-up, having positive life events during the past year significantly was associated with having another infant.	**12**

Authors (Year)	Location (Setting)	Design (# ff, l ff)	Inclusion criteria (Final sample size, Response/retention rate)	Outcomes (Definition)	Significant predictors (Effect sizes)	Key findings	Qi
			disabilities (149, 82.32%)				
Boardman, et al. (2006)	USA (CB)	CS (na)	At most 30 years women who experienced at least one pregnancy as an adolescent (aged 19 years or younger), or interviewed at least 24m since the resolution of pregnancy (1,117, 15%)	Intended or unintended RRP(Intended or unintended second pregnancy experienced by adolescent within 24m of the resolution of the first pregnancy which could have ended in miscarriage, elective abortion, ectopic pregnancy, preterm or term stillbirth, or preterm or term live birth)	**Sexual behaviour:** First pregnancy intended by teen, Age at first conception **Obstetric history:** Prior poor obstetric outcome **Parent relationship and support:** Did not live in 2-parent household as teen **Partner relationship and support:** Second pregnancy intended by partner, Married at second conception **Community involvement:** Religion in which raised (AOR)	Absence of religious affiliation or being a Roman Catholic when raised, living in a two-parent household, good obstetric outcomes and unintended first pregnancy on the side of the teenager and her partner decreased likelihood of intended rapid repeat pregnancy. Having a younger age (below 15 years old), raised as Roman Catholic, living in a two-parent household, and being married at time of second conception, good obstetrical outcome and intact family dynamics also had similar relationship with unintended rapid repeat pregnancy.	**13**
Coard, et al. (2000)	USA (IB)	Ch (2, 24m)	First-time adolescent mother between 1-16 weeks postpartum (80, 82.5%)	RRP (Repeated pregnancy within 1y or between 1y-2y postpartum)	**Socio-demographic:** Age (r) **Obstetric history:** Number of lifetime miscarriage (r) **Contraceptive use:** Current contraceptive use, Current contraceptive method (chi2)	It was found that 34% of adolescent mothers experienced repeat pregnancy at 24 months. Contraceptive use, maternal age, history of miscarriages and postpartum contraceptive use significantly predicted the occurrence repeat pregnancy.	**9**
Crittenden, et al. (2009)	USA (IB)	Ch (2, 24m)	Aged 19 years or younger, with less than 29 weeks gestation, had no previous live births, had at least two	RRP (Occurrence of pregnancy within 24m of the previous pregnancy)	**Personality:** Attitude towards aggression, Perceived self-efficacy to not be aggressive **Socio-demographic:** Age at first period	Age at first period, level of education, drug use, aggression and depression were significant during the full main effects model. However,	**10**

Authors (Year)	Location (Setting)	Design (# ff, l ff)	Inclusion criteria (Final sample size, Response/retention rate)	Outcomes (Definition)	Significant predictors (Effect sizes)	Key findings	Qi
			sociodemographic risk characteristics (unmarried, 12 years of education, or unemployed) and received no nurse home visitation services (354, 99%)		(AOR)	only aggression proxies and age at first period were significant after stepwise modeling.	
Crosby, et al. (2002)	USA (IB)	Ch (1, 6m)	African-American, aged between 14 and 18 years during enrolment, sexually active in the previous six months, and provided written informed consent (410, 78.6%)	RRP (Occurrence of another pregnancy after 6m postpartum of the first pregnancy)	**Parent relationship and support:** Perceived parental monitoring (AOR)	Perceived less parental monitoring predicted adolescent pregnancy.	**9**
Damle, et al. (2015)	USA (IB)	Ch (every clinical visit, 24m)	First-time adolescent mothers at most 19 years old who received prenatal care and delivered their first child, excludes who had preterm deliveries (340, 80%)	RRP (Another pregnancy within 2y after the first child)	**Parenting behaviour:** Attended postpartum visit within 8 weeks **Contraceptive use:** Contraception not initiated prior to discharge postpartum, LARC initiation by 8 weeks postpartum (AOR)	One in every three teen mothers had another pregnancy within two years with a mean interception interval of 10 months. Early initiation of contraceptives and more postpartum follow-ups can diminish the chance for these mothers to be pregnant again.	**9**
Davis (2002)	USA (CB)	Ch (5, 6y)	Under 19 never being married prior to event of the next pregnancy (278, nd)	RP (Occurrence of another pregnancy among unwed adolescent mothers)	**Personality:** Educational aspirations **Sexual behaviour** Age at birth of first birth **Parent relationship and support** Kin co-residence	Adolescent mother who are 16 years old or younger, with low educational expectations and those living with mother's kin were more likely to have second child within 2 years than the younger teens.	**8**

Authors (Year)	Location (Setting)	Design (# ff, l ff)	Inclusion criteria (Final sample size, Response/retention rate)	Outcomes (Definition)	Significant predictors (Effect sizes)	Key findings	Qi
					(AOR)		
De Fatima, et al. (2012)	Brazil (IB)	CS (na)	Pregnant teenagers in hospital obstetric center (245, 75%)	RP (Having two or more pregnancies)	**Sexual behaviour:** Age at first pregnancy **Parenting Behaviour:** Prenatal examinations **Partner relationship and support:** Living with partner **Education:** Years of education **Socio-economic status:** Monthly income **Contraceptive use:** Contraceptive method (AOR)	Socio-demographic advantages and prenatal health services utilization are found to be protective factors for repeat pregnancies. Surprisingly, contraceptives use predicts repeat pregnancies as is living with partner.	**7**
Gillmore, et al. (1997)	USA (IB)	Ch (5, 18m)	At least 17 years old, not married, and pregnant but planned to carry their pregnancy until term (170, 71%)	RRP (Another pregnancy that occurs within 18m after the first birth)	**Sexual behaviour:** Age at birth of first child, Frequency of intercourse **Partner relationship and support:** Length of relationship **Friend characteristics:** Best friend ever pregnant **Contraceptive use:** Use of contraception (AOR)	Contraceptive use and frequency of intercourse were only the significant proximate determinants of repeated teenage pregnancy regardless of racial disparities.	**9**
Gray, et al. (2006)	USA (IB)	Ch (3, 24m)	Indigent and primiparous adolescent below 20 years of age (111, nd)	RRP (Become pregnant again either between 0m-6m, 7m-12m, 13m-24m)	**Race:** Race **Contraceptive use:** Early use of contraception **Intention to have another pregnancy:** Prenatal contraceptive plan (chi2)	Teenagers who are in school or high school graduate and who have a contraceptive postpartum plan were less likely to have another pregnancy within 6 months, and between 7-12 months. Being married increased the risk instead.	**9**
Jacoby, et al.	USA (IB)	CC (2, 18m)	Received prenatal care between	RRP (Pregnancy 12m or	**Obstetric history:** Spontaneous abortion	Only physical violence, sexual violence and	**5**

Authors (Year)	Location (Setting)	Design (# ff, l ff)	Inclusion criteria (Final sample size, Response/retention rate)	Outcomes (Definition)	Significant predictors (Effect sizes)	Key findings	Qi
(1999)			13-21 years old (100, nd)	24m after the previous pregnancy)	**Experience of abuse:** Any form of physical or sexual violence during study period (OR)	spontaneous abortion had increased association with rapid repeat pregnancy in 12 and 18 months.	
Lewis, et al. (2010)	Australia (IB)	Ch (9, 24m)	Nulliparous English speaking teenagers at most 18 years of age who has an appointment with the adolescent antenatal clinic, but does not surrendered first infant into an adoption or social services (109, 74%)	RRP (Teen mothers who experiences a pregnancy within 2y of a first teen birth)	**Sexual behaviour:** Ongoing sexual intercourse over 3 months **S/Race:** Indigenous Australian **Contraceptive use:** Contraception **Intention to have another pregnancy:** Intends to become pregnant (AOR)	Current use of long acting contraceptives reduce the incidence of rapid repeat pregnancy by 73%. Those using oral contraceptives had similar effect as those who are not using. Other factors such as being sexually active, intending to become pregnant again and being an indigenous Australian significantly amplified the odds by 3-8 folds.	**13**
Manlove, et al. (2000)	USA (CB)	Ch (3, 6y)	Students enrolled in 8th grade last 1988 (564, nd)	RB and RRB (Second birth at the 24th month assessment or at any time since the birth of the first child among teenagers)	**Sexual behaviour:** Age at first birth **Partner relationship and support:** Father of child helped with care **Education and employment:** Enrolled in gifted class, Educational achievement after first birth, Employed or enrolled after first birth (AOR)	Low socioeconomic status and not being in a nuclear family increased risk of rapid subsequent pregnancy. Black American and with poor educational status/ condition were also at high risk Paternal involvement in child care as well as mother's involvement in any community activities had lowered the chance for the mother to have another pregnancy.	**11**
Milbrook (2013)	USA (CB)	Ch (every m, 7y)	Adolescents having least one pregnancy before 20 (100, nd)	RP (Number of pregnancy before age of 21 from enrolment)	**Sexual behaviour:** Age at birth of first child **Community involvement:** Placement change, Case manager change	Less stable placements, case management relationships, school placements and number of children had positive relationship with number	**7**

Authors (Year)	Location (Setting)	Design (# ff, l ff)	Inclusion criteria (Final sample size, Response/retention rate)	Outcomes (Definition)	Significant predictors (Effect sizes)	Key findings	Qi
					(ASB)	of pregnancies; thus, add the risk of repeated teen pregnancy. Regression analyses of these three factors explained 22.1% of outcome variance.	
Montgomery (2010)	USA (CB)	Ch (4, 9y)	Adolescents aged 9-19 years living in the 13 most impoverished place in Alabama, reported gender consistently over time, and participated in at least 3 consecutive data collection (135, nd)	RRP (Reporting of one pregnancy with an additional pregnancy within 2y after the first)	**Problem behaviour:** Suspension or expulsion **Socio-demographic:** Age **Sexual behaviour:** Boy having sex proves he is a man, Frequency and recency of sexual intercourse **Community Involvement:** Involved in organized activities (AOR)	Age, frequency and recency of sex after first pregnancy, as well as being suspended or expelled from school were the most positive prominent predictors of repeat pregnancy among adolescents. Adolescents who had repeat pregnancy tend to be 2 years older. Adolescent mothers who believe that boy having sex proves manhood had 5 times chance of another conception. Unlike the first pregnancy, pregnancy intention, number of sexual partners and having discussion with parents about sex were found as non-significant predictors.	**11**
Patel, et al. (1997)	USA (CB)	CS (na)	Adolescent less than 20 years old with pregnancy resulting in a singleton or multiple livebirths in Illinois, but excludes adolescents with low birth weight infants or preterm births (146,206, nd)	RP (Teenagers with at least 1 live birth from multiple gestation)	**Socio-demographic:** Maternal age **Obstetric history:** Parity **Race:** Race (chi2)	Occurrence of repeat pregnancy was significantly related to race and parity. White Americans had longer birth intervals compared to whites. An increase in parity also increase chance for another pregnancy among below 20.	**7**

Authors (Year)	Location (Setting)	Design (# ff, l ff)	Inclusion criteria (Final sample size, Response/retention rate)	Outcomes (Definition)	Significant predictors (Effect sizes)	Key findings	Qi
Pfitzner, et al. (2003)	USA (IB)	CC (1, 24m)	Teenagers who entered and exited the teen program between 1985 and 2000 (1,107, 60.22%)	RP (Teenagers who experienced a repeat pregnancy)	**Socio-demographic:** Maternal age at entry, Maternal age at exit (F) **Mental health status:** Suicidality, Significant Psychiatric history (chi2) **Parenting behaviour:** Placed child for adoption (chi2) **Obstetric history:** Pregnancy outcome (chi2) **Sexual behavior:** Maternal age at delivery (F) **Partner relationship and support:** Relationship at conception, Paternal ethnicity, Relationship which father of baby at exit (chi2) **Community involvement:** Time in program (F), Exit reason (chi2) **Education and employment:** Last grade completed (F) **S/Race:** Maternal ethnicity (chi2)	Repeaters tend to be younger upon enrolment also older upon exiting the study. They also had psychiatric history with frequent attempt of suicide. They were less likely to place their child for adoption yet more likely to be in committed relationship Being a Hispanic or having Hispanic partner increased that chance of the teenager to be a repeater as well as not being enrolled in school.	**8**
Raneri and Wiemann (2007)	USA (IB)	Ch (8, 4y)	Teens who considered themselves as Black, Mexican, or White, planned to retain custody of the child, could read and write English or Spanish, fifth-grade level in either, and had no major psychiatric disorder (581, 62.34%)	RRP (Subsequent pregnancy or birth on one or more surveys within 24m)	**Partner relationship and support:** Age of father of first child, Not in a relationship with father of first child 3 months after delivery, Hit by boyfriend/husband within 3 months after delivery **Peer characteristics:** At least half of friends were teenage mothers at delivery **Education:** Enrolled in school	Almost half of the first adolescent mothers had another pregnancy. Among the individual predictors, having a plan to have another child within five years and not using a long acting contraceptive within three months of delivery increased the odds of repeat pregnancy. Among dyad-level predictors were not, being in a relationship with the father of the first child	**12**

Authors (Year)	Location (Setting)	Design (# ff, l ff)	Inclusion criteria (Final sample size, Response/retention rate)	Outcomes (Definition)	Significant predictors (Effect sizes)	Key findings	Qi
					Contraceptive use: Not given long-acting contraceptive within 3 months after delivery **Intention to have another pregnancy:** Intention to have pregnancy (AOR)	three months after delivery, being more than three years younger than the first child's father, and experiencing intimate partner violence within three months after delivery also has similar relationship. Not being in school three months postpartum and having many friends who were adolescent parents also heightened the risk unlike other peer/community level determinants.	
Richio, et al. (2010)	USA (CB)	Ch (1, 24m)	Teens aged at most 19 having first singleton births having birth records (899, nd)	RRB (Repeat births within 2y after first birth)	None	There was no significant difference between the rate of repeat pregnancy among those with history of spontaneous vaginal delivery and caesarean delivery.	**8**
Sangalang, et al. (2006)	USA (CB)	Ch (2, 4y)	Adolescent singleton mothers aged between 12-19 years who have complete birth records in North Carolina registry (2,250, nd)	RB (Occurrence of second birth)	**Race:** Race (ARR)	Race specifically not being a white American raised the risk of second birth among 12-16 years old mothers.	**11**
Sims and Luster (2002)	USA (CB)	Ch (2, 24m)	Below 20 years old who are currently pregnant at the time of enrolment (99, 69.70%)	RRP (Occurrence of pregnancy at the 24th m of assessment at any time since the birth of the first child)	**Mental Health Status:** Personal resources **Personality:** Locus of control (AOR)	Personal resources of the adolescent in terms of support and motivation lowered the risk of having another pregnancy (OR=0.41, 95%CI=0.22-0.74) and birth (OR=0.30; 95%CI=0.15-0.61). Only 52% of mothers living with their partner did another pregnancy	**10**

Authors (Year)	Location (Setting)	Design (# ff, l ff)	Inclusion criteria (Final sample size, Response/retention rate)	Outcomes (Definition)	Significant predictors (Effect sizes)	Key findings	Qi
				RRB (Occurrence of birth at the 24th m of assessment at any time since the birth of the first child)		compared to 62% among those who don't. An increase in locus of control heightened the odds of repeated births by 50%. All other variables were not significant predictors.	
Steven-Simon, et al. (1998)	USA (IB)	Ch (3, 18m)	Poor and nulliparous pregnant adolescents, excludes those pregnancy which are result of rape (165, 83%)	RRP (Occurrence of another within 18m of study)	**Education:** School drop-out **Contraceptive use:** Inconsistent contraceptive use "harder-to-modify" explanation (AOR)	School-drop outs and inconsistent use of contraceptives with "harder-to-modify" explanation increased the odds of having a repeated conception.	**7**
Stevens-Simon, et al. (2001)	USA (IB)	Ch (3, 24m)	Poor and nulliparous pregnant adolescents (286, 76%)	RRP (Another pregnancy 24m from the first delivery)	**Physical/Mental Health:** Number of risk factors present **Contraceptive use:** Use of Norplant, Use of Depo-Provera during the puerperium (ARR)	Failure to use Norplant and Depo-Provera, as well as having more than nine risk factors of repeat pregnancy had positive association with repeat pregnancy.	**9**
Tocce, et al. (2012)	USA (IB)	Ch (2, 3.5m)	Poor and nulliparous pregnant adolescents, does not include those with contraindication to etonogestrel as well stillbirths (357, 90.15%)	RRP (Repeat pregnancy 12m after delivery	**Obstetric history:** Primiparity **Contraceptive use:** Not receiving Immediate Postpartum Implantation insertion (AOR)	There is a significant 8 fold risk for repeat pregnancy among those who are not using contraceptive implants.	**12**

Design: CC, case-control; Ch, cohort; CS, cross-sectional

Setting: CB, community-based; IB, institution-based

Outcomes: RB, non-rapid repeated birth; RP, non-rapid repeated pregnancy; RRB, rapid repeated birth; RRP, rapid repeated pregnancy; m, months; y, years; na, not applicable; nd, no data; # ff, number of follow-up; l ff, length of follow-up

Effect size: AHR-adjusted hazard ratio; AOR, adjusted odds ratio; ARR, adjusted relative risk; ASB, adjusted standardized beta; chi2, chi-square coefficient; F, F statistic; OR, Odds ratio; r, Correlation coefficient; t, t statistic

Qi, Quality score

Table 2. Random-effects meta-regression of selected factors of repeated teenage pregnancy

Factors[a]	Moderators[b]	Univariate Analysis[c]		Multivariate Analysis[d]		
		Exp (B) (95% CI)	p-value (p*)	Exp (B) (95% CI)	p-value (p*)	R^2
Age during first conception	Type of predictor Continuous *(Ref. Categorical)*	0.46 (0.17-1.27)	0.115 (0.072)	0.55 (0.15-1.95)	0.297 (0.487)	31.39%
	Outcome variable Rapid RTP *(Ref. Non-Rapid RTP)*	1.24 (0.87-1.76)	0.195 (0.065)	1.31 (0.48-3.59)	0.549 (0.570)	
School drop-out	Number of follow-up points	0.71 (0.43-1.18)	0.149 (0.201)	-	-	
	Type of predictor Continuous *(Ref. Categorical)*	0.32 (0.63-1.60)	0.134 (0.249)	-	-	
	Country USA *(Ref. Brazil/ Australia)*	0.29 (0.09-0.85-)	0.036 (0.125)	-	-	
Use of contraception	Year of publication	1.80 (0.80-4.03)	0.127 (0.109)	1.29 (0.59-2.79)	0.417 (0.689)	68.65%
	Number of follow-up points	0.65 (0.42-1.03)	0.061 (0.032)	0.72 (0.46-1.11)	0.102 (0.248)	

Factors[a]	Moderators[b]	Univariate Analysis[c]		Multivariate Analysis[d]		
		Exp (B) (95% CI)	p-value (p*)	Exp (B) (95% CI)	p-value (p*)	R^2
	Country USA *(Ref. Brazil/ Australia)*	0.39 (0.11-1.41)	0.122 (0.071)	0.55 (0.16-1.79)	0.232 (0.439)	
	Design Cohort *(Ref. Non-cohort)*	0.18 (0.07-0.45)	0.004 (0.128)	-	-	
	Outcome variable Rapid RTP *(Ref. Non-Rapid RTP)*	0.18 (0.07-0.45)	0.004 (0.128)	-	-	

Exp(B), regression coefficient; SE, standard error; p*, permuted p-value; R^2, Proportion of between-study heterogeneity explained

[a] List of factors which underwent meta-regression for moderator analysis; age of the teenager and race did not have significant moderators in the initial model; [b] Moderators which has a p-value of at least 0.20 in univariate analysis; [c] Univariate analysis with multiplicity adjustments using 10,000 permutations; [d] Multivariate analysis with multiplicity adjustment using moderators which have a p-value of at least 0.10

Table 3. Subgroup analysis of age during pregnancy and use of contraception: Random-effects and quality-effects model

Subgroups[a]	n	Pooled Estimate						Heterogeneity		
		Random-effect model			Quality-effects model					
		OR	LCI	HCI	OR	LCI	HCI	Q	p	I^2
A. Age during first pregnancy										
Type of predictor										
Continuous	8	0.90	0.79	1.03	1.03	0.86	1.23	60.74	<0.001	88%
Categorical	2	1.80	1.20	2.69	1.67	1.08	2.56	1.55	0.21	35%
Outcome										
Non-Rapid RTP	5	0.78	0.57	1.07	1.03	0.59	1.82	51.78	<0.001	92%
Rapid RTP	5	1.36	0.95	1.94	1.11	0.64	1.91	22.60	<0.001	82%
OVERALL	**10**	**0.99**	**0.87**	**1.13**	**1.06**	**0.88**	**1.27**	**7.71**	**<0.001**	**88%**
B. Use of Contraception										
Country										
USA	6	0.49	0.35	0.69	0.51	0.36	0.73	12.15	0.03	59%
Brazil/Australia	2	1.17	0.21	6.43	1.08	0.20	5.97	21.92	<0.001	95%
Number of follow-up										
None	1	2.76	1.81	4.22	2.76	1.81	4.22	-	-	-

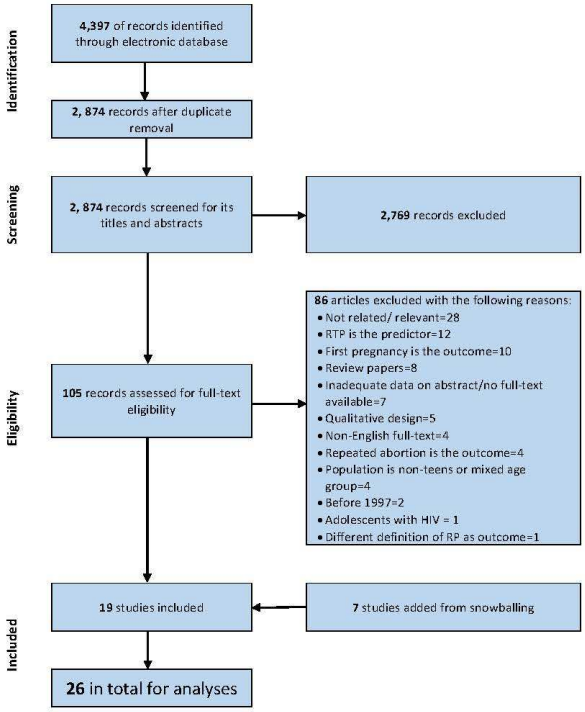
Subgroups[a]	n	Pooled Estimate						Heterogeneity		
		Random-effect model			Quality-effects model					
		OR	LCI	HCI	OR	LCI	HCI	Q	p	I^2
1-2	3	0.58	0.32	1.04	0.84	0.32	2.18	38.87	<0.001	92%
3-4	1	0.36	0.16	0.80	0.36	0.16	0.80	-	-	-
5 and above	3	0.43	0.33	0.57	0.44	0.33	0.48	0.21	0.90	0%
Year of publication										
Before 2001	2	0.40	0.29	0.56	0.40	0.29	0.56	0.75	0.39	0%
2001-2010	4	0.59	0.40	0.86	0.60	0.40	0.89	6.67	0.08	55%
After 2010	2	1.08	0.17	7.00	1.26	0.19	8.43	25.22	<0.001	96%
OVERALL	**8**	**0.60**	**0.35**	**1.02**	**0.61**	**0.34**	**1.08**	**62.49**	**<0.001**	**89%**

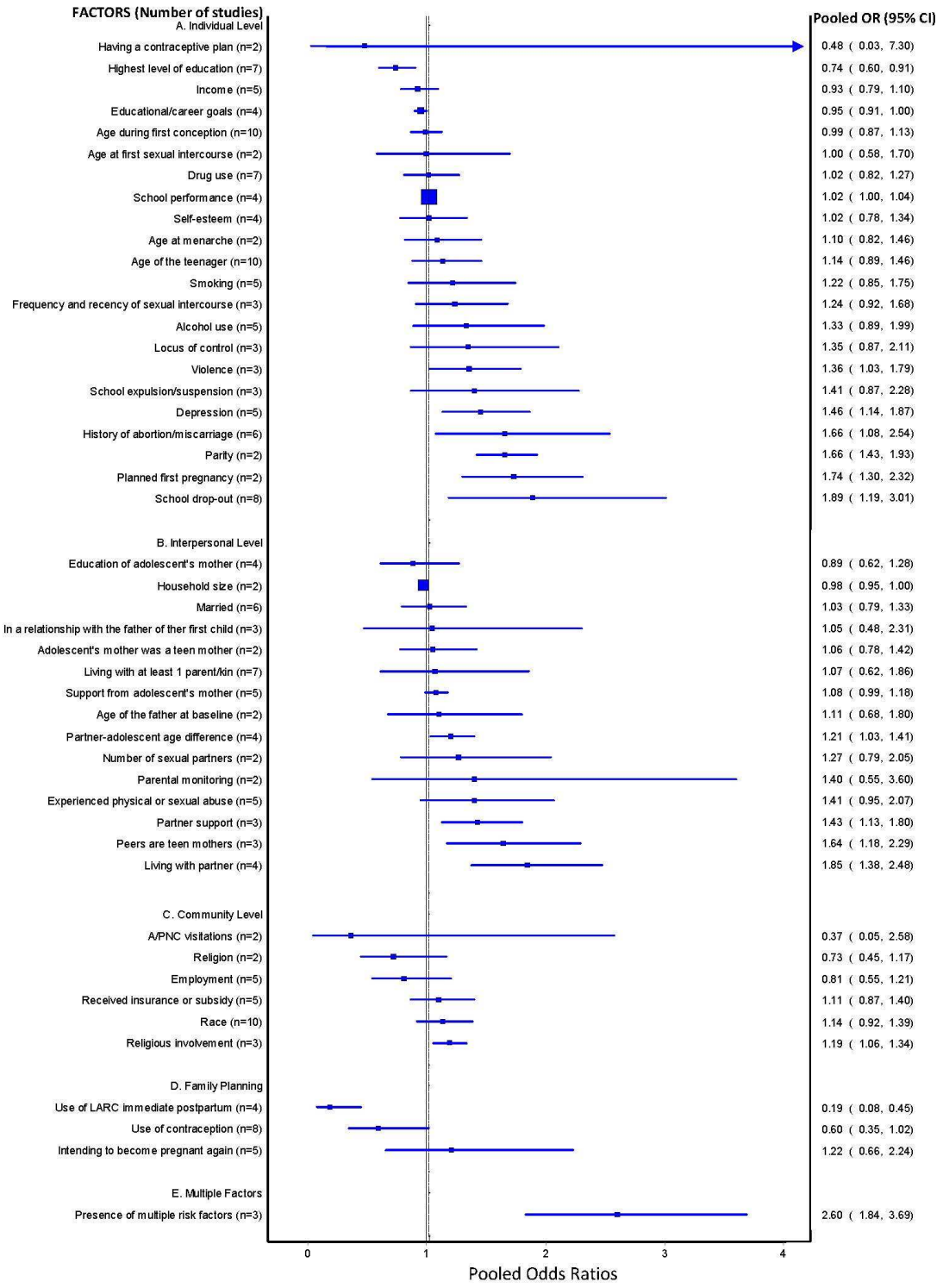
n, number of studies; OR, odds ratio; LCI, lower 95% confidence interval; HCI, lower 95% confidence interval; p, p-value

[a] Moderators analysed in multivariate meta-regression

Figure 1. Study selection

Figure 2. Meta-analyses of factors of repeated teenage pregnancies and births (A total of 47 factors were arranged from risk factors to protective factors using socio-ecologic framework. The rectangles represents the pooled odds ratio of each factor while the horizontal line represents its respective 95% confidence interval. The x-axis of the forest plot labelled as pooled odds ratios.)


Identification
Screening
Eligibility
Included
4,397 of records identified through electronic database
2, 874 records after duplicate removal
2, 874 records screened for its titles and abstracts
2,769 records excluded
105 records assessed for full-text eligibility
86 articles excluded with the following reasons:
• Not related/ relevant=28
• RTP is the predictor=12
• First pregnancy is the outcome=10
• Review papers=8
• Inadequate data on abstract/no full-text available=7
• Qualitative design=5
• Non-English full-text=4
• Repeated abortion is the outcome=4
• Population is non-teens or mixed age group=4
• Before 1997=2
• Adolescents with HIV = 1
• Different definition of RP as outcome=1
19 studies included
7 studies added from snowballing
26 in total for analyses



APPENDICES

Appendix 1. MOOSE Checklist for Meta-analyses of Observational Studies

Appendix 2. Definitions of the 47 predictors used during meta-analysis

Appendix 3. Complete search strategy

Appendix 4. Assessed predictors and outcomes

Appendix 5. Meta-analyses of factors associated with repeated teenage pregnancies and births using random-effects model: Pooled odd ratios and level of heterogeneity (n=47 factors)

Appendix 6. Comparison of random effects and quality effects meta-analyses 47 factors associated with repeated teenage pregnancies and births: Pooled odd ratios and level of heterogeneity

Appendix 7. Sensitivity analyses of age during pregnancy and use of contraception

Appendix 1. MOOSE Checklist for Meta-analyses of Observational Studies

Item No	Recommendation	Reported on Page No
Reporting of background should include		
1	Problem definition	5-6
2	Hypothesis statement	6
3	Description of study outcome(s)	7
4	Type of exposure or intervention used	7
5	Type of study designs used	7
6	Study population	7
Reporting of search strategy should include		
7	Qualifications of searchers (eg, librarians and investigators)	8
8	Search strategy, including time period included in the synthesis and key words	7
9	Effort to include all available studies, including contact with authors	7
10	Databases and registries searched	7
11	Search software used, name and version, including special features used (eg, explosion)	7
12	Use of hand searching (eg, reference lists of obtained articles)	7
13	List of citations located and those excluded, including justification	7
14	Method of addressing articles published in languages other than English	7
15	Method of handling abstracts and unpublished studies	7
16	Description of any contact with authors	7
Reporting of methods should include		
17	Description of relevance or appropriateness of studies assembled for assessing the hypothesis to be tested	7
18	Rationale for the selection and coding of data (eg, sound clinical principles or convenience)	7-8
19	Documentation of how data were classified and coded (eg, multiple raters, blinding and interrater reliability)	8
20	Assessment of confounding (eg, comparability of cases and controls in studies where appropriate)	8
21	Assessment of study quality, including blinding of quality assessors, stratification or regression on possible predictors of study results	8
22	Assessment of heterogeneity	8-10
23	Description of statistical methods (eg, complete description of fixed or random effects models, justification of whether the chosen models account for predictors of study results, dose-response models, or cumulative meta-analysis) in sufficient detail to be replicated	8-10
24	Provision of appropriate tables and graphics	8-10
Reporting of results should include		
25	Graphic summarizing individual study estimates and overall estimate	12-13
26	Table giving descriptive information for each study included	11-12; Appendix
27	Results of sensitivity testing (eg, subgroup analysis)	14-16
28	Indication of statistical uncertainty of findings	14-16
Reporting of discussion should include		
29	Quantitative assessment of bias (eg, publication bias)	13; Appendix

Item No	Recommendation	Reported on Page No
30	Justification for exclusion (e.g., exclusion of non-English language citations)	11, 18
31	Assessment of quality of included studies	12, 19
Reporting of conclusions should include		
32	Consideration of alternative explanations for observed results	16-19
33	Generalization of the conclusions (ie, appropriate for the data presented and within the domain of the literature review)	17-19, 20
34	Guidelines for future research	17-19, 20
35	Disclosure of funding source	1

From: *Stroup DF, Berlin JA, Morton SC, et al, for the Meta-analysis Of Observational Studies in Epidemiology (MOOSE) Group. Meta-analysis of Observational Studies in Epidemiology. A Proposal for Reporting. JAMA. 2000;283(15):2008-2012. doi: 10.1001/jama.283.15.2008.*

Transcribed from the original paper within the NEUROSURGERY® Editorial Office, Atlanta, GA, United Sates. August 2012.

Appendix 2. Definitions of the 47 predictors used during meta-analysis

Predictor	Definition	Reference Group
A/PNC visitations	Visited the facility during prenatal or postnatal period	Did not visit the facility
Adolescent's mother was a teen mother	The biological mother of the adolescent was a teen parent	The biological mother of the adolescent was NOT a teen parent
Age at first sexual intercourse	Age during first sexual intercourse in years	NA
Age at menarche	Age during first menstruation in years	NA
Age during first conception	Age during first conception/pregnancy in years	NA
Age of the father at baseline	Age of the partner of the adolescent in years during the baseline data collection	NA
Age of the teenager	Age of the teenager in years	NA
Alcohol use	Drank any alcohol before the repeat pregnancy	Did not drink any alcohol before the repeat pregnancy
Depression	Depression score using a scale	
Drug use	Ever used illegal drugs	Never used illegal drugs
Education of adolescent's mother	More than high school	Less than high school
Educational/career goals	Has career or educational plan	Has no educational plan
Employment	Employed	Unemployed
Experienced physical or sexual abuse	Experienced physical or sexual abuse	Has not experienced physical or sexual abuse
Frequency and recency of sexual intercourse	Number of times of intercourse in the past month	NA
Having a contraceptive plan	Having a plan for contraception/family planning	No plan for contraception
Highest level of education	At least a high school graduate	Did not graduate high school
History of abortion/miscarriage	Have experienced abortion or miscarriage	Never experienced depression or miscarriage
Household size	Number of members in the household	NA
In a relationship with the father of their first child	Being in a relationship (dating, married, cohabitating) with the father of the first child	Not in a relationship with the father of the first child
Income	Gross income of the household where the adolescent is from	NA
Intending to become pregnant again	Intending to be pregnant again	Not intending to be pregnant again
Living with at least 1 parent/kin	Living with the parents or at least 1 kin	Not living with parent or kin
Living with partner	Living with the partner in same household	Not living with the partner in same household
Locus of control	Locus of control score which comprises internal and external control	NA

Predictor	Definition	Reference Group
Married	Married	Not married
Number of sexual partners	More than one sexual partner	No or having only 1 sexual partner
Parental monitoring	Perceived of the adolescents that they are being monitored by their parents	NA
Parity	Having more than 1 child	Has only 1 child
Partner support	Having a supportive partner in terms of emotional support and childcare support	Not supportive
Partner-adolescent age difference	Difference between the age of the adolescent and her current partner (per year)	NA
Peers are teen mothers	Have peers who are also teenage mother	Have no peers who are teen mothers
Planned first pregnancy	Their first pregnancy is planned or intended	Their first pregnancy is not planned
Presence of multiple risk factors	Has at least 6 risk factors	Has less than 6 risk factors
Race	Being part of minority (Black, Hispanic or indigenous)	Being a White or majority class
Received insurance or subsidy	Has medical insurance or receiving cash incentive	Not receiving any insurance or incentive
Religion	Being a Roman Catholic	Being a non-Roman Catholic
Religious involvement	Frequent attendance to religious event	Not attending or occasional attendance to religious event
School drop-out	Stopped studying/attending school	Still attending school
School expulsion/suspension	Ever had school problems/suspension or expelled	Never had problems in school related to violence, etc.
School performance	At least average performance in school courses (e.g. math, reading)	Below average performance
Self-esteem	Self-esteem score using as scale	NA
Smoking	Currently smoking	Not smoking
Support from adolescent's mother	Score calculated using the positive social support (e.g. child care) received by the adolescent from their mother	
Use of contraception	Using any type of contraception	Not using any type of contraception
Use of LARC immediate postpartum	Using long acting reversible contraceptives (e.g. implants, IUD)	Not using any contraceptives or using non-LARC
Violence	Been arrested, jailed or involved in fighting/hitting other or any violent behaviour	Did not exhibit violent behavior

*NA-Not applicable because continuous variable

Appendix 3. Complete search strategy

EMBASE

No.	Query	Results
#7	'factors' OR 'factor' OR 'determinants' OR 'determinant' OR 'predictor' OR 'predictors' OR 'risks' OR 'risk' OR 'cause' OR 'causes' OR 'reasons' OR 'origin' OR 'correlates' AND ('teen pregnancy' OR 'teenage pregnancy'/exp OR 'teenage pregnancy' OR 'adolescent pregnancy'/exp OR 'adolescent pregnancy' OR 'teen birth' OR 'teenage birth' OR 'adolescent birth' OR 'teen pregnancies' OR 'teenage pregnancies' OR 'adolescent pregnancies' OR 'teen births' OR 'teenage births' OR 'adolescent births' OR 'teen childbearing' OR 'teenage childbearing' OR 'adolescent childbearing' OR 'teen conception' OR 'teenage conception' OR 'adolescent conception') AND ('repeat' OR 'repeated' OR 'repeats' OR 'subsequent' OR 'multiple' OR 'second' OR 'secondary' OR 'recurrent' OR 'recurrence' OR 'succeeding' OR 'next') NOT (outcome* OR cancer OR program*)	468
#6	'factors' OR 'factor' OR 'determinants' OR 'determinant' OR 'predictor' OR 'predictors' OR 'risks' OR 'risk' OR 'cause' OR 'causes' OR 'reasons' OR 'origin' OR 'correlates' AND ('teen pregnancy' OR 'teenage pregnancy'/exp OR 'teenage pregnancy' OR 'adolescent pregnancy'/exp OR 'adolescent pregnancy' OR 'teen birth' OR 'teenage birth' OR 'adolescent birth' OR 'teen pregnancies' OR 'teenage pregnancies' OR 'adolescent pregnancies' OR 'teen births' OR 'teenage births' OR 'adolescent births' OR 'teen childbearing' OR 'teenage childbearing' OR 'adolescent childbearing' OR 'teen conception' OR 'teenage conception' OR 'adolescent conception') AND ('repeat' OR 'repeated' OR 'repeats' OR 'subsequent' OR 'multiple' OR 'second' OR 'secondary' OR 'recurrent' OR 'recurrence' OR 'succeeding' OR 'next')	1003
#5	'teen pregnancy' OR 'teenage pregnancy'/exp OR 'teenage pregnancy' OR 'adolescent pregnancy'/exp OR 'adolescent pregnancy' OR 'teen birth' OR 'teenage birth' OR 'adolescent birth' OR 'teen pregnancies' OR 'teenage pregnancies' OR 'adolescent pregnancies' OR 'teen births' OR 'teenage births' OR 'adolescent births' OR 'teen childbearing' OR 'teenage childbearing' OR 'adolescent childbearing' OR 'teen conception' OR 'teenage conception' OR 'adolescent conception' AND ('repeat' OR 'repeated' OR 'repeats' OR 'subsequent' OR 'multiple' OR 'second' OR 'secondary' OR 'recurrent' OR 'recurrence' OR 'succeeding' OR 'next')	1460
#4	outcome* OR cancer OR program*	5626255
#3	'factors' OR 'factor' OR 'determinants' OR 'determinant' OR 'predictor' OR 'predictors' OR 'risks' OR 'risk' OR 'cause' OR 'causes' OR 'reasons' OR 'origin' OR 'correlates'	6876610
#2	'repeat' OR 'repeated' OR 'repeats' OR 'subsequent' OR 'multiple' OR 'second' OR 'secondary' OR 'recurrent' OR 'recurrence' OR 'succeeding' OR 'next'	4254243
#1	'teen pregnancy' OR 'teenage pregnancy'/exp OR 'teenage pregnancy' OR 'adolescent pregnancy'/exp OR 'adolescent pregnancy' OR 'teen birth' OR 'teenage birth' OR 'adolescent birth' OR 'teen pregnancies' OR 'teenage pregnancies' OR 'adolescent pregnancies' OR 'teen births' OR 'teenage births' OR 'adolescent births' OR 'teen childbearing' OR 'teenage childbearing' OR 'adolescent childbearing' OR 'teen conception' OR 'teenage conception' OR 'adolescent conception'	9040

CINAHL

#	Query	Results
S10	S7 NOT (outcome* OR cancer OR program*)	637
S9	'teenage pregnancy'/exp OR 'teenage pregnancy' OR 'teenage birth' OR 'teenage pregnancies' OR 'teenage births' OR 'adolescent birth' OR 'adolescent births' OR 'adolescent pregnancies' OR 'adolescent pregnancy'/exp OR 'adolescent pregnancy' AND ('factors' OR 'factor' OR 'predictor' OR 'predictors' OR 'risks' OR 'risk' OR 'determinants' OR 'determinant' OR 'cause' OR 'causes' OR 'reasons' OR 'reason') AND ('repeat' OR 'repeated' OR 'repeats' OR 'subsequent' OR 'multiple' OR 'secondary' OR 'second' OR 'next' OR 'recurrent' OR 'recurrence' OR 'another')	7,674
S8	S7 NOT S5	1,357
S7	S4 AND S6	1,357
S6	S2 AND S3	1,662
S5	outcome* OR cancer OR program*	871
S4	"factors" OR "factor" OR "determinants" OR "determinant" OR "predictor" OR "predictors" OR "risks" OR "risk" OR "cause" OR "causes" OR "reasons" OR "origin" OR "correlates"	7,173,031
S3	"Repeat" OR "repeated" OR "repeats" OR "subsequent" OR "multiple" OR "second" OR "secondary" OR "recurrent" OR "recurrence" OR "succeeding" OR "next"	3,806,608
S2	"teen pregnancy" OR "teenage pregnancy" OR "adolescent pregnancy" OR "teen birth" OR "teenage birth" OR "adolescent birth" OR "teen pregnancies" OR "teenage pregnancies" OR "adolescent pregnancies" OR "teen births" OR "teenage births" OR "adolescent births" OR "teen childbearing" OR "teenage childbearing" OR "adolescent childbearing" OR "teen conception" OR "teenage conception" OR "adolescent conception"	8,511
S1	'teenage pregnancy'/exp OR 'teenage pregnancy' OR 'teenage birth' OR 'teenage pregnancies' OR 'teenage births' OR 'adolescent birth' OR 'adolescent births' OR 'adolescent pregnancies' OR 'adolescent pregnancy'/exp OR 'adolescent pregnancy'	8,732

PubMed

September 21, 2015

Search	Query	Items found
#47	Search ((((((((((((repeat) OR repeated) OR subsequent) OR "secondary") OR "second") OR recurrent) OR reccurrence) OR next)) AND ((((((((((pregnancy) OR pregnancies) OR birth) OR births) OR childbearing) OR conception)) AND ((((((((((teen) OR teenage) OR teens) OR adolescent) OR adolescents) OR young) OR "young mother") OR "young mothers") OR "young moms") OR "young mom"))) OR (((((((((repeat) OR repeated) OR subsequent) OR multiple) OR another) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND (((((((("teenage pregnancy") OR "teenage birth") OR "teenage pregnancies") OR "teenage births") OR "adolesent birth") OR "adolescent births") OR "adolescent pregnancies") OR "adolescent pregnancy") AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat])))))) AND (((((((factors) OR predictors) OR determinants) OR causes) OR reasons) OR risks) OR origins) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))))) NOT outcomes Sort by: [relevance]	13204
#46	Search ((((((((((((((repeat) OR repeated) OR subsequent) OR "secondary") OR "second") OR recurrent) OR reccurrence) OR next)) AND ((((((((((pregnancy) OR pregnancies) OR birth) OR births) OR childbearing) OR conception)) AND ((((((((((teen) OR teenage) OR teens) OR adolescent) OR adolescents) OR young) OR "young mother") OR "young mothers") OR "young moms") OR "young mom"))) OR (((((((((repeat) OR repeated) OR subsequent) OR multiple) OR another) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND (((((((("teenage pregnancy") OR "teenage birth") OR "teenage pregnancies") OR "teenage births") OR "adolesent birth") OR "adolescent births") OR "adolescent pregnancies") OR "adolescent pregnancy") AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))))) AND (((((((factors) OR predictors) OR determinants) OR causes) OR reasons) OR risks) OR origins) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat])))) NOT outcomes)	13204
#37	Search ((((((((((repeat) OR repeated) OR subsequent) OR secondary) OR second) OR recurrent) OR reccurrence) OR next)) AND ((((((((((pregnancy) OR pregnancies) OR birth) OR births) OR childbearing) OR conception)) AND ((((((((((teen) OR teenage) OR teens) OR adolescent) OR adolescents) OR young) OR "young mother") OR "young mothers") OR "young moms") OR "young mom"))) OR (((((((((repeat) OR repeated) OR subsequent) OR multiple) OR another) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND (((((((("teenage pregnancy") OR "teenage birth") OR "teenage pregnancies") OR "teenage births") OR "adolesent birth") OR "adolescent births") OR "adolescent pregnancies") OR "adolescent pregnancy") AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))))) AND (((((((factors) OR predictors) OR determinants) OR causes) OR reasons) OR risks) OR origins) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat])) Sort by: [relevance]	15329
#45	Search ((((((((((((((repeat) OR repeated) OR subsequent) OR secondary) OR second) OR recurrent) OR reccurrence) OR next)) AND ((((((((((pregnancy) OR pregnancies) OR birth) OR births) OR childbearing) OR conception)) AND ((((((((((teen) OR teenage) OR teens) OR adolescent) OR adolescents) OR young) OR "young mother") OR "young mothers") OR "young moms") OR "young mom"))) OR (((((((((repeat) OR repeated) OR subsequent) OR multiple) OR another) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND (((((((("teenage pregnancy") OR "teenage birth") OR "teenage pregnancies") OR "teenage births") OR "adolesent birth") OR	0

Search	Query	Items found
	"adolescent births") OR "adolescent pregnancies") OR "adolescent pregnancy") AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))))) AND ((((((((factors) OR predictors) OR determinants) OR causes) OR reasons) OR risks) OR origins) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat])))) NOT outcomes) [Tiab]) Schema: all Sort by: [relevance]	
#44	Search ((((((((((((repeat) OR repeated) OR subsequent) OR secondary) OR second) OR recurrent) OR reccurrence) OR next)) AND ((((((((((pregnancy) OR pregnancies) OR birth) OR births) OR childbearing) OR conception)) AND ((((((((((teen) OR teenage) OR teens) OR adolescent) OR adolescents) OR young) OR "young mother") OR "young mothers") OR "young moms") OR "young mom"))) OR (((((((((repeat) OR repeated) OR subsequent) OR multiple) OR another) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND (((((((("teenage pregnancy") OR "teenage birth") OR "teenage pregnancies") OR "teenage births") OR "adolesent birth") OR "adolescent births") OR "adolescent pregnancies") OR "adolescent pregnancy") AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))))) AND ((((((((factors) OR predictors) OR determinants) OR causes) OR reasons) OR risks) OR origins) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat])))) NOT outcomes) [Tiab]) Sort by: [relevance]	0
#43	Search ((((((((((repeat[All Fields] OR repeated[All Fields]) OR subsequent[All Fields]) OR ("secondary"[Subheading] OR "secondary"[All Fields] OR "neoplasm metastasis"[MeSH Terms] OR ("neoplasm"[All Fields] AND "metastasis"[All Fields]) OR "neoplasm metastasis"[All Fields])) OR second[All Fields]) OR recurrent[All Fields]) OR reccurrence[All Fields]) OR next[All Fields]) AND ((((((((("pregnancy"[MeSH Terms] OR "pregnancy"[All Fields]) OR ("pregnancy"[MeSH Terms] OR "pregnancy"[All Fields] OR "pregnancies"[All Fields])) OR ("parturition"[MeSH Terms] OR "parturition"[All Fields] OR "birth"[All Fields])) OR ("parturition"[MeSH Terms] OR "parturition"[All Fields] OR "births"[All Fields])) OR childbearing[All Fields]) OR ("fertilization"[MeSH Terms] OR "fertilization"[All Fields] OR "conception"[All Fields])) AND ((((((((((("adolescent"[MeSH Terms] OR "adolescent"[All Fields] OR "teen"[All Fields]) OR ("adolescent"[MeSH Terms] OR "adolescent"[All Fields] OR "teenage"[All Fields])) OR ("adolescent"[MeSH Terms] OR "adolescent"[All Fields] OR "teens"[All Fields])) OR ("adolescent"[MeSH Terms] OR "adolescent"[All Fields])) OR ("adolescent"[MeSH Terms] OR "adolescent"[All Fields] OR "adolescents"[All Fields])) OR young[All Fields]) OR "young mother"[All Fields]) OR "young mothers"[All Fields]) OR (young[All Fields] AND moms[All Fields])) OR (young[All Fields] AND mom[All Fields]))) OR ((((((repeat[All Fields] OR repeated[All Fields]) OR subsequent[All Fields]) OR multiple[All Fields]) AND ("1980/01/01"[PDAT] : "3000/12/31"[PDAT])) AND ((((((((("teenage pregnancy"[All Fields] OR "teenage birth"[All Fields]) OR "teenage pregnancies"[All Fields]) OR "teenage births"[All Fields]) OR (adolesent[All Fields] AND ("parturition"[MeSH Terms] OR "parturition"[All Fields] OR "birth"[All Fields]))) OR "adolescent births"[All Fields]) OR "adolescent pregnancies"[All Fields]) OR "adolescent pregnancy"[All Fields]) AND ("1980/01/01"[PDAT] : "3000/12/31"[PDAT])))) AND ("1980/01/01"[PDAT] : "3000/12/31"[PDAT]))))) AND (((((((factors[All Fields] OR predictors[All Fields]) OR determinants[All Fields]) OR ("etiology"[Subheading] OR "etiology"[All Fields] OR "causes"[All Fields] OR "causality"[MeSH Terms] OR "causality"[All Fields])) OR reasons[All Fields]) OR ("risk"[MeSH Terms] OR "risk"[All Fields] OR "risks"[All Fields])) OR ("Origins"[Journal] OR "origins"[All Fields])) AND ("1980/01/01"[PDAT] : "3000/12/31"[PDAT]))) NOT outcomes[All Fields] [Tiab])	0
#42	Search (((((((((repeat[All Fields] OR repeated[All Fields]) OR subsequent[All Fields]) OR ("secondary"[Subheading] OR "secondary"[All	13281

Search	Query	Items found
	Fields] OR "neoplasm metastasis"[MeSH Terms] OR ("neoplasm"[All Fields] AND "metastasis"[All Fields]) OR "neoplasm metastasis"[All Fields])) OR second[All Fields]) OR recurrent[All Fields]) OR reccurrence[All Fields]) OR next[All Fields]) AND (((((((("pregnancy"[MeSH Terms] OR "pregnancy"[All Fields]) OR ("pregnancy"[MeSH Terms] OR "pregnancy"[All Fields] OR "pregnancies"[All Fields])) OR ("parturition"[MeSH Terms] OR "parturition"[All Fields] OR "birth"[All Fields])) OR ("parturition"[MeSH Terms] OR "parturition"[All Fields] OR "births"[All Fields])) OR childbearing[All Fields]) OR ("fertilization"[MeSH Terms] OR "fertilization"[All Fields] OR "conception"[All Fields])) AND ((((((((("adolescent"[MeSH Terms] OR "adolescent"[All Fields] OR "teen"[All Fields]) OR ("adolescent"[MeSH Terms] OR "adolescent"[All Fields] OR "teenage"[All Fields])) OR ("adolescent"[MeSH Terms] OR "adolescent"[All Fields] OR "teens"[All Fields])) OR ("adolescent"[MeSH Terms] OR "adolescent"[All Fields])) OR ("adolescent"[MeSH Terms] OR "adolescent"[All Fields] OR "adolescents"[All Fields])) OR young[All Fields]) OR "young mother"[All Fields]) OR "young mothers"[All Fields]) OR (young[All Fields] AND moms[All Fields])) OR (young[All Fields] AND mom[All Fields]))) OR ((((((repeat[All Fields] OR repeated[All Fields]) OR subsequent[All Fields]) OR multiple[All Fields]) AND ("1980/01/01"[PDAT] : "3000/12/31"[PDAT])) AND (((((((("teenage pregnancy"[All Fields] OR "teenage birth"[All Fields]) OR "teenage pregnancies"[All Fields]) OR "teenage births"[All Fields]) OR (adolesent[All Fields] AND ("parturition"[MeSH Terms] OR "parturition"[All Fields] OR "birth"[All Fields]))) OR "adolescent births"[All Fields]) OR "adolescent pregnancies"[All Fields]) OR "adolescent pregnancy"[All Fields]) AND ("1980/01/01"[PDAT] : "3000/12/31"[PDAT]))) AND ("1980/01/01"[PDAT] : "3000/12/31"[PDAT])))) AND (((((((factors[All Fields] OR predictors[All Fields]) OR determinants[All Fields]) OR ("etiology"[Subheading] OR "etiology"[All Fields] OR "causes"[All Fields] OR "causality"[MeSH Terms] OR "causality"[All Fields])) OR reasons[All Fields]) OR ("risk"[MeSH Terms] OR "risk"[All Fields] OR "risks"[All Fields])) OR ("Origins"[Journal] OR "origins"[All Fields])) AND ("1980/01/01"[PDAT] : "3000/12/31"[PDAT]))) NOT outcomes[All Fields] Sort by: [relevance]	
#39	Search ((((((((((((repeat) OR repeated) OR subsequent) OR secondary) OR second) OR recurrent) OR reccurrence) OR next)) AND ((((((((((pregnancy) OR pregnancies) OR birth) OR births) OR childbearing) OR conception)) AND ((((((((((teen) OR teenage) OR teens) OR adolescent) OR adolescents) OR young) OR "young mother") OR "young mothers") OR "young moms") OR "young mom"))) OR (((((((((repeat) OR repeated) OR subsequent) OR multiple) OR another) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND (((((((((("teenage pregnancy") OR "teenage birth") OR "teenage pregnancies") OR "teenage births") OR "adolesent birth") OR "adolescent births") OR "adolescent pregnancies") OR "adolescent pregnancy") AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))))) AND (((((((factors) OR predictors) OR determinants) OR causes) OR reasons) OR risks) OR origins) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat])))) NOT outcomes Sort by: [relevance]	13281
#41	Search ((((((((((((((repeat) OR repeated) OR subsequent) OR secondary) OR second) OR recurrent) OR reccurrence) OR next)) AND ((((((((((pregnancy) OR pregnancies) OR birth) OR births) OR childbearing) OR conception)) AND ((((((((((teen) OR teenage) OR teens) OR adolescent) OR adolescents) OR young) OR "young mother") OR "young mothers") OR "young moms") OR "young mom"))) OR (((((((((repeat) OR repeated) OR subsequent) OR multiple) OR another) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND	0

Search	Query	Items found
	(((((((("teenage pregnancy") OR "teenage birth") OR "teenage pregnancies") OR "teenage births") OR "adolesent birth") OR "adolescent births") OR "adolescent pregnancies") OR "adolescent pregnancy") AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))))) AND ((((((((factors) OR predictors) OR determinants) OR causes) OR reasons) OR risks) OR origins) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat])))) NOT outcomes)) AND [tiab]	
#40	Search ((((((((((repeat) OR repeated) OR subsequent) OR secondary) OR second) OR recurrent) OR reccurrence) OR next)) AND ((((((((((pregnancy) OR pregnancies) OR birth) OR births) OR childbearing) OR conception)) AND ((((((((((teen) OR teenage) OR teens) OR adolescent) OR adolescents) OR young) OR "young mother") OR "young mothers") OR "young moms") OR "young mom"))) OR (((((((((repeat) OR repeated) OR subsequent) OR multiple) OR another) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND (((((((("teenage pregnancy") OR "teenage birth") OR "teenage pregnancies") OR "teenage births") OR "adolesent birth") OR "adolescent births") OR "adolescent pregnancies") OR "adolescent pregnancy") AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))))) AND ((((((((factors) OR predictors) OR determinants) OR causes) OR reasons) OR risks) OR origins) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat])))) NOT outcomes Filters: Abstract Sort by: [relevance]	13131
#38	Search ((((((((((repeat) OR repeated) OR subsequent) OR secondary) OR second) OR recurrent) OR reccurrence) OR next)) AND ((((((((((pregnancy) OR pregnancies) OR birth) OR births) OR childbearing) OR conception)) AND ((((((((((teen) OR teenage) OR teens) OR adolescent) OR adolescents) OR young) OR "young mother") OR "young mothers") OR "young moms") OR "young mom"))) OR (((((((((repeat) OR repeated) OR subsequent) OR multiple) OR another) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND (((((((("teenage pregnancy") OR "teenage birth") OR "teenage pregnancies") OR "teenage births") OR "adolesent birth") OR "adolescent births") OR "adolescent pregnancies") OR "adolescent pregnancy") AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))))) AND ((((((((factors) OR predictors) OR determinants) OR causes) OR reasons) OR risks) OR origins) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat])))) OR outcomes	533371
#36	Search (((((((((repeat) OR repeated) OR subsequent) OR secondary) OR second) OR recurrent) OR reccurrence) OR next)) AND ((((((((((pregnancy) OR pregnancies) OR birth) OR births) OR childbearing) OR conception)) AND ((((((((((teen) OR teenage) OR teens) OR adolescent) OR adolescents) OR young) OR "young mother") OR "young mothers") OR "young moms") OR "young mom"))) OR (((((((((repeat) OR repeated) OR subsequent) OR multiple) OR another) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND (((((((("teenage pregnancy") OR "teenage birth") OR "teenage pregnancies") OR "teenage births") OR "adolesent birth") OR "adolescent births") OR "adolescent pregnancies") OR "adolescent pregnancy") AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat])))	21812
#35	Search (((((((repeat) OR repeated) OR subsequent) OR secondary) OR second) OR recurrent) OR reccurrence) OR next	2530798
#34	Search (((((((((pregnancy) OR pregnancies) OR birth) OR births) OR childbearing) OR conception)) AND ((((((((((teen) OR teenage) OR teens) OR adolescent) OR adolescents) OR young) OR "young mother") OR "young mothers") OR "young moms") OR "young mom"))) OR (((((((((repeat) OR repeated) OR subsequent) OR multiple) OR another) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND	133634

Search	Query	Items found
	(((((((("teenage pregnancy") OR "teenage birth") OR "teenage pregnancies") OR "teenage births") OR "adolesent birth") OR "adolescent births") OR "adolescent pregnancies") OR "adolescent pregnancy") AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))	
#33	Search (((((((pregnancy) OR pregnancies) OR birth) OR births) OR childbearing) OR conception)) AND ((((((((((teen) OR teenage) OR teens) OR adolescent) OR adolescents) OR young) OR "young mother") OR "young mothers") OR "young moms") OR "young mom")	133634
#32	Search (((((pregnancy) OR pregnancies) OR birth) OR births) OR childbearing) OR conception	1028886
#31	Search (((((((((teen) OR teenage) OR teens) OR adolescent) OR adolescents) OR young) OR "young mother") OR "young mothers") OR "young moms") OR "young mom"	2226854
#30	Search (((((((((factors) OR predictors) OR determinants) OR causes) OR reasons) OR risks) OR origins) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND ((((((((((mother*) OR mom) OR parent*)) OR moms)) AND ((((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*))) OR ((((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*))) AND ((((((((((((child) OR children) OR kids) OR kid) OR deliver*) OR birth*) OR infant*) OR baby) OR babies) OR offspring*)) OR ((((((pregnant) OR pregnancy) OR gravid*) OR conception*) OR childbearing) OR pregnancies))) AND ((((((((((((repeat*) OR subsequen*) OR secondary) OR second) OR multiple) OR many) OR several) OR another) OR recurrence) OR recurrent) OR again) OR succeed*) OR later) OR next)))	174718
#29	Search ((((((((((mother*) OR mom) OR parent*)) OR moms)) AND ((((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*))) OR ((((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*))) AND ((((((((((((child) OR children) OR kids) OR kid) OR deliver*) OR birth*) OR infant*) OR baby) OR babies) OR offspring*)) OR ((((((pregnant) OR pregnancy) OR gravid*) OR conception*) OR childbearing) OR pregnancies))) AND ((((((((((((repeat*) OR subsequen*) OR secondary) OR second) OR multiple) OR many) OR several) OR another) OR recurrence) OR recurrent) OR again) OR succeed*) OR later) OR next))	270301
#14	Search ((((((((mother*) OR mom) OR parent*)) OR moms)) AND ((((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*))) OR ((((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*)	2450512
#16	Search ((((((((((((child) OR children) OR kids) OR kid) OR deliver*) OR birth*) OR infant*) OR baby) OR babies) OR offspring*)) OR ((((((pregnant) OR pregnancy) OR gravid*) OR conception*) OR childbearing) OR pregnancies))) AND ((((((((((((repeat*) OR subsequen*) OR secondary) OR second) OR multiple) OR many) OR several) OR another) OR recurrence) OR recurrent) OR again) OR succeed*) OR later) OR next)	807748
#28	Search ((((((factors) OR predictors) OR determinants) OR causes) OR reasons) OR risks) OR origins Filters: Publication date from 1980/01/01	9059518

Search	Query	Items found
#24	Search (((((((repeat) OR repeated) OR subsequent) OR multiple) OR another) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND (((((((((("teenage pregnancy") OR "teenage birth") OR "teenage pregnancies") OR "teenage births") OR "adolesent birth") OR "adolescent births") OR "adolescent pregnancies") OR "adolescent pregnancy") AND ("1980/01/01"[PDat] : "3000/12/31"[PDat])) Filters: Publication date from 1980/01/01	467
#27	Search ((((((((((repeat) OR repeated) OR subsequent) OR multiple) OR another) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND (((((((((("teenage pregnancy") OR "teenage birth") OR "teenage pregnancies") OR "teenage births") OR "adolesent birth") OR "adolescent births") OR "adolescent pregnancies") OR "adolescent pregnancy") AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND (factors OR predictors OR determinants) Filters: Publication date from 1980/01/01	353
#26	Search ((((((((((repeat) OR repeated) OR subsequent) OR multiple) OR another) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND (((((((((("teenage pregnancy") OR "teenage birth") OR "teenage pregnancies") OR "teenage births") OR "adolesent birth") OR "adolescent births") OR "adolescent pregnancies") OR "adolescent pregnancy") AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) OR ((((((((((((((((((child) OR children) OR kids) OR kid) OR deliver*) OR birth*) OR infant*) OR baby) OR babies) OR offspring*)) OR ((((((pregnant) OR pregnancy) OR gravid*) OR conception*) OR childbearing) OR pregnancies))) AND ((((((((((((repeat*) OR subsequen*) OR secondary) OR second) OR multiple) OR many) OR several) OR another) OR recurrence) OR recurrent) OR again) OR succeed*) OR later) OR next))) AND (((((((((mother*) OR mom) OR parent*)) OR moms)) AND (((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*))) OR (((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*)))) AND ((((((((((((factor*) OR predictor*) OR risk) OR cause*) OR reason*) OR dynamic*) OR influence*) OR origin*) OR basis) OR bases)) OR risks)) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat])) Filters: Publication date from 1980/01/01	152444
#25	Search ((((((((((repeat) OR repeated) OR subsequent) OR multiple) OR another) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND (((((((((("teenage pregnancy") OR "teenage birth") OR "teenage pregnancies") OR "teenage births") OR "adolesent birth") OR "adolescent births") OR "adolescent pregnancies") OR "adolescent pregnancy") AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND ((((((((((((((((((child) OR children) OR kids) OR kid) OR deliver*) OR birth*) OR infant*) OR baby) OR babies) OR offspring*)) OR ((((((pregnant) OR pregnancy) OR gravid*) OR conception*) OR childbearing) OR pregnancies))) AND ((((((((((((repeat*) OR subsequen*) OR secondary) OR second) OR multiple) OR many) OR several) OR another) OR recurrence) OR recurrent) OR again) OR succeed*) OR later) OR next))) AND (((((((((mother*) OR mom) OR parent*)) OR moms)) AND (((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*))) OR (((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*)))) AND ((((((((((((factor*) OR predictor*) OR risk) OR cause*) OR reason*) OR dynamic*) OR influence*) OR origin*) OR basis) OR bases)) OR risks)) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat])) Filters: Publication date from 1980/01/01	421

Search	Query	Items found
#23	Search ((((repeat) OR repeated) OR subsequent) OR multiple) OR another Filters: Publication date from 1980/01/01	1593631
#21	Search (((((("teenage pregnancy") OR "teenage birth") OR "teenage pregnancies") OR "teenage births") OR "adolesent birth") OR "adolescent births") OR "adolescent pregnancies") OR "adolescent pregnancy" Filters: Publication date from 1980/01/01	3531
#22	Search ((((((((((((((((((child) OR children) OR kids) OR kid) OR deliver*) OR birth*) OR infant*) OR baby) OR babies) OR offspring*)) OR ((((((pregnant) OR pregnancy) OR gravid*) OR conception*) OR childbearing) OR pregnancies))) AND ((((((((((((repeat*) OR subsequen*) OR secondary) OR second) OR multiple) OR many) OR several) OR another) OR recurrence) OR recurrent) OR again) OR succeed*) OR later) OR next))) AND (((((((((mother*) OR mom) OR parent*)) OR moms)) AND ((((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*))) OR ((((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*)))) AND ((((((((((factor*) OR predictor*) OR risk) OR cause*) OR reason*) OR dynamic*) OR influence*) OR origin*) OR basis) OR bases)) OR risks)) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND (((((((("teenage pregnancy") OR "teenage birth") OR "teenage pregnancies") OR "teenage births") OR "adolesent birth") OR "adolescent births") OR "adolescent pregnancies") OR "adolescent pregnancy") AND ("1980/01/01"[PDat] : "3000/12/31"[PDat])) Filters: Publication date from 1980/01/01	1152
#20	Search ((((((((((((((((((child) OR children) OR kids) OR kid) OR delivery) OR birth*) OR infant*) OR baby) OR babies) OR offspring)) OR ((((((pregnant) OR pregnancy) OR gravid) OR conception*) OR childbearing) OR pregnancies))) AND ((((((((((((repeat*) OR subsequen*) OR secondary) OR second) OR multiple) OR many) OR several) OR another) OR recurrence) OR recurrent) OR again) OR succeed*) OR later) OR next))) AND (((((((((mother*) OR mom) OR parent*)) OR moms)) AND ((((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*))) OR ((((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*)))) AND ((((((((((factor*) OR predictor*) OR risk) OR cause*) OR reason*) OR dynamic*) OR influence*) OR origin*) OR basis) OR bases)) OR risks)) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat])) Filters: Publication date from 1980/01/01 Sort by: [relevance]	150717
#19	Search ((((((((((((((((((child) OR children) OR kids) OR kid) OR deliver*) OR birth*) OR infant*) OR baby) OR babies) OR offspring*)) OR ((((((pregnant) OR pregnancy) OR gravid*) OR conception*) OR childbearing) OR pregnancies))) AND ((((((((((((repeat*) OR subsequen*) OR secondary) OR second) OR multiple) OR many) OR several) OR another) OR recurrence) OR recurrent) OR again) OR succeed*) OR later) OR next))) AND (((((((((mother*) OR mom) OR parent*)) OR moms)) AND ((((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*))) OR ((((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*)))) AND ((((((((((factor*) OR predictor*) OR risk) OR cause*) OR reason*) OR dynamic*) OR influence*) OR origin*) OR basis) OR bases)) OR risks) Filters: Publication date from 1980/01/01 Sort by: [relevance]	152398
#18	Search ((((((((((((((((((child) OR children) OR kids) OR kid) OR deliver*) OR birth*) OR infant*) OR baby) OR babies) OR offspring*)) OR ((((((pregnant) OR pregnancy) OR gravid*) OR conception*) OR childbearing) OR pregnancies))) AND ((((((((((((repeat*) OR	159011

Search	Query	Items found
	subsequen*) OR secondary) OR second) OR multiple) OR many) OR several) OR another) OR recurrence) OR recurrent) OR again) OR succeed*) OR later) OR next))) AND (((((((((mother*) OR mom) OR parent*)) OR moms)) AND ((((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*))) OR ((((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*)))) AND ((((((((((((factor*) OR predictor*) OR risk) OR cause*) OR reason*) OR dynamic*) OR influence*) OR origin*) OR basis) OR bases)) OR risks) Sort by: [relevance]	
#17	Search ((((((((((((((child) OR children) OR kids) OR kid) OR deliver*) OR birth*) OR infant*) OR baby) OR babies) OR offspring*)) OR ((((((pregnant) OR pregnancy) OR gravid*) OR conception*) OR childbearing) OR pregnancies))) AND ((((((((((((((repeat*) OR subsequen*) OR secondary) OR second) OR multiple) OR many) OR several) OR another) OR recurrence) OR recurrent) OR again) OR succeed*) OR later) OR next))) AND (((((((((mother*) OR mom) OR parent*)) OR moms)) AND ((((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*))) OR ((((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*))	270301
#15	Search ((((((((((child) OR children) OR kids) OR kid) OR deliver*) OR birth*) OR infant*) OR baby) OR babies) OR offspring*)) OR ((((((pregnant) OR pregnancy) OR gravid*) OR conception*) OR childbearing) OR pregnancies)	3583139
#13	Search ((((((mother*) OR mom) OR parent*)) OR moms)) AND ((((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*)	138835
#12	Search ((((mother*) OR mom) OR parent*)) OR moms Sort by: [relevance]	542042
#11	Search ((((((((((factor*) OR predictor*) OR risk) OR cause*) OR reason*) OR dynamic*) OR influence*) OR origin*) OR basis) OR bases)) OR risks	8251640
#9	Search ((((((((((((((factor*) OR predictor*) OR risk*) OR cause*) OR reason*) OR dynamic*) OR influence*) OR origin*) OR basis) OR bases)) AND (((((((mother*) OR mom*) OR parent*)) AND ((((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*))) OR ((((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*))) AND ((((((((((((((repeat*) OR subsequen*) OR secondary) OR second) OR multiple) OR many) OR several) OR another) OR recurrence) OR recurrent) OR again) OR succeed*) OR later) OR next)) AND ((((((pregnant) OR pregnancy) OR gravid*) OR conception*) OR childbearing) OR pregnancies)) AND ((((((((((child) OR children) OR kids) OR kid) OR deliver*) OR birth*) OR infant*) OR baby) OR babies) OR offspring*) Sort by: [relevance]	16434
#8	Search (((((((((child) OR children) OR kids) OR kid) OR deliver*) OR birth*) OR infant*) OR baby) OR babies) OR offspring*	3081902
#7	Search (((((pregnant) OR pregnancy) OR gravid*) OR conception*) OR childbearing) OR pregnancies	853166
#6	Search ((((((((((((repeat*) OR subsequen*) OR secondary) OR second) OR multiple) OR many) OR several) OR another) OR recurrence) OR recurrent) OR again) OR succeed*) OR later) OR next	4758129
#5	Search ((((((mother*) OR mom*) OR parent*)) AND ((((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under	2450512

Search	Query	Items found
	twenty") OR "young adult") OR Minor*))) OR (((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*)	
#4	Search ((((mother*) OR mom*) OR parent*)) AND (((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*)	146648
#3	Search ((mother*) OR mom*) OR parent*	615928
#2	Search (((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*	2450512
#1	Search (((((((((factor*) OR predictor*) OR risk*) OR cause*) OR reason*) OR dynamic*) OR influence*) OR origin*) OR basis) OR bases	8197876

September 25, 2015

Search	Query	Items found
#27	Search ((((((repeat* [tiab]) OR subsequent [tiab]) OR [multiple]) OR second* [tiab]) OR recurren* [tiab])) AND (((((((pregnant OR pregnancy OR conception OR childbearing OR pregnancies OR birth OR births))) AND (((repeat*) OR subsequen*) OR secondary) OR second) OR multiple) OR many) OR several) OR another) OR recurrence) OR recurrent) OR again) OR succeed*) OR later) OR next))) AND (((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*))) AND ((((mother*) OR mom OR moms) OR parent*))))) OR (((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*))))) AND (Â outcome*Â ORÂ cancerÂ ORÂ program*Â))	707038
#26	Search ((((repeat* [tiab]) OR subsequent [tiab]) OR [multiple]) OR second* [tiab]) OR recurren* [tiab]	3142320
#25	Search causes of back pain Sort by: [relevance]	22564
#24	Search (((((pregnant OR pregnancy OR conception OR childbearing OR pregnancies OR birth OR births))) AND (((repeat*) OR subsequen*) OR secondary) OR second) OR multiple) OR many) OR several) OR another) OR recurrence) OR recurrent) OR again) OR succeed*) OR later) OR next))) AND (((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*))) AND ((((mother*) OR mom OR moms) OR parent*))))) OR (((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*))) [Tiab])	11
#23	Search (((((pregnant OR pregnancy OR conception OR childbearing OR pregnancies OR birth OR births))) AND (((repeat*) OR subsequen*) OR secondary) OR second) OR multiple) OR many) OR several) OR another) OR recurrence) OR recurrent) OR again) OR succeed*) OR later) OR next))) AND (((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*))) AND ((((mother*) OR mom OR moms) OR parent*))))) OR (((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*))) [Tiab})	11
#22	Search ((((((pregnant OR pregnancy OR conception OR childbearing OR pregnancies OR birth OR births))) AND (((repeat*) OR	707038

Search	Query	Items found
	subsequen*) OR secondary) OR second) OR multiple) OR many) OR several) OR another) OR recurrence) OR recurrent) OR again) OR succeed*) OR later) OR next))) AND (((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*))) AND ((((mother*) OR mom OR moms) OR parent*))))) OR (((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*))))) AND (Â outcome*Â ORÂ cancerÂ ORÂ program*Â)	
#21	Search (((((pregnant OR pregnancy OR conception OR childbearing OR pregnancies OR birth OR births))) AND (((repeat*) OR subsequen*) OR secondary) OR second) OR multiple) OR many) OR several) OR another) OR recurrence) OR recurrent) OR again) OR succeed*) OR later) OR next))) AND (((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*))) AND ((((mother*) OR mom OR moms) OR parent*))))) OR (((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*))) [tiab])	11
#20	Search ((((pregnant OR pregnancy OR conception OR childbearing OR pregnancies OR birth OR births))) AND (((repeat*) OR subsequen*) OR secondary) OR second) OR multiple) OR many) OR several) OR another) OR recurrence) OR recurrent) OR again) OR succeed*) OR later) OR next))) AND (((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*))) AND ((((mother*) OR mom OR moms) OR parent*))))) OR (((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*)))	2452015
#19	Search (pregnant OR pregnancy OR conception OR childbearing OR pregnancies OR birth OR births)	1043780
#18	Search ((repeat*) OR subsequen*) OR secondary) OR second) OR multiple) OR many) OR several) OR another) OR recurrence) OR recurrent) OR again) OR succeed*) OR later) OR next)	4761258
#17	Search ((((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*))) AND ((((mother*) OR mom OR moms) OR parent*))))) OR (((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*))	2452015
#16	Search ((((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*))) AND ((((mother*) OR mom OR moms) OR parent*)))	138930
#15	Search (((mother*) OR mom OR moms) OR parent*))	542325
#14	Search ((mother*) OR mom*) OR parent*)	616262
#13	Search ((teen*) OR adolescen*) OR young) OR youth) OR "under 20") OR "under twenty") OR "young adult") OR Minor*)	2452015
#9	Search (((((("factors" OR "factor" OR "determinants" OR "determinant" OR "predictor" OR "predictors" OR "risks" OR "risk" OR "cause" OR "causes" OR "reasons" OR "origin" OR "correlates"))) AND ((((("Repeat" OR "repeated" OR "repeats" OR "subsequent" OR "multiple" OR "second" OR "secondary" OR "recurrent" OR "recurrence" OR "succeeding" OR "next"))) AND (((("teen pregnancy" OR "teenage pregnancy" OR "adolescent pregnancy") OR ("teen birth" OR "teenage birth" OR "adolescent birth") OR ("teen pregnancies" OR "teenage pregnancies" OR "adolescent pregnancies") OR ("teen births" OR "teenage births" OR "adolescent births")	567

Search	Query	Items found
	OR ("teen childbearing" OR "teenage childbearing" OR "adolescent childbearing") OR ("teen conception" OR "teenage conception" OR "adolescent conception")))))) NOT (Â outcome*Â ORÂ cancerÂ ORÂ program*Â)	
#8	Search ((("factors" OR "factor" OR "determinants" OR "determinant" OR "predictor" OR "predictors" OR "risks" OR "risk" OR "cause" OR "causes" OR "reasons" OR "origin" OR "correlates"))) AND ((((("Repeat" OR "repeated" OR "repeats" OR "subsequent" OR "multiple" OR "second" OR "secondary" OR "recurrent" OR "recurrence" OR "succeeding" OR "next"))) AND ((("teen pregnancy" OR "teenage pregnancy" OR "adolescent pregnancy") OR ("teen birth" OR "teenage birth" OR "adolescent birth") OR ("teen pregnancies" OR "teenage pregnancies" OR "adolescent pregnancies") OR ("teen births" OR "teenage births" OR "adolescent births") OR ("teen childbearing" OR "teenage childbearing" OR "adolescent childbearing") OR ("teen conception" OR "teenage conception" OR "adolescent conception"))))	1287
#7	Search ((("Repeat" OR "repeated" OR "repeats" OR "subsequent" OR "multiple" OR "second" OR "secondary" OR "recurrent" OR "recurrence" OR "succeeding" OR "next"))) AND ((("teen pregnancy" OR "teenage pregnancy" OR "adolescent pregnancy") OR ("teen birth" OR "teenage birth" OR "adolescent birth") OR ("teen pregnancies" OR "teenage pregnancies" OR "adolescent pregnancies") OR ("teen births" OR "teenage births" OR "adolescent births") OR ("teen childbearing" OR "teenage childbearing" OR "adolescent childbearing") OR ("teen conception" OR "teenage conception" OR "adolescent conception")))	1685
#6	Search (Â outcome*Â ORÂ cancerÂ ORÂ program*Â)	5192896
#5	Search ("factors" OR "factor" OR "determinants" OR "determinant" OR "predictor" OR "predictors" OR "risks" OR "risk" OR "cause" OR "causes" OR "reasons" OR "origin" OR "correlates")	6334875
#4	Search ("Repeat" OR "repeated" OR "repeats" OR "subsequent" OR "multiple" OR "second" OR "secondary" OR "recurrent" OR "recurrence" OR "succeeding" OR "next")	3478021
#3	Search (("teen pregnancy" OR "teenage pregnancy" OR "adolescent pregnancy") OR ("teen birth" OR "teenage birth" OR "adolescent birth") OR ("teen pregnancies" OR "teenage pregnancies" OR "adolescent pregnancies") OR ("teen births" OR "teenage births" OR "adolescent births") OR ("teen childbearing" OR "teenage childbearing" OR "adolescent childbearing") OR ("teen conception" OR "teenage conception" OR "adolescent conception"))	7107
#2	Search ((((((((((repeat) OR repeated) OR subsequent) OR secondary) OR second) OR recurrent) OR reccurrence) OR next)) AND ((((((((((pregnancy) OR pregnancies) OR birth) OR births) OR childbearing) OR conception)) AND ((((((((((teen) OR teenage) OR teens) OR adolescent) OR adolescents) OR young) OR "young mother") OR "young mothers") OR "young moms") OR "young mom"))) OR (((((((((repeat) OR repeated) OR subsequent) OR multiple) OR another) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND (((((((("teenage pregnancy") OR "teenage birth") OR "teenage pregnancies") OR "teenage births") OR "adolesent birth") OR "adolescent births") OR "adolescent pregnancies") OR "adolescent pregnancy") AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat])))))) AND ((((((((factors) OR predictors) OR determinants) OR causes) OR reasons) OR risks) OR origins) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat])) Sort by: [relevance]	15343

Search	Query	Items found
#1	Search ((((((((((((repeat) OR repeated) OR subsequent) OR "secondary") OR "second") OR recurrent) OR reccurrence) OR next)) AND ((((((((((pregnancy) OR pregnancies) OR birth) OR births) OR childbearing) OR conception)) AND ((((((((((teen) OR teenage) OR teens) OR adolescent) OR adolescents) OR young) OR "young mother") OR "young mothers") OR "young moms") OR "young mom"))) OR (((((((((repeat) OR repeated) OR subsequent) OR multiple) OR another) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND (((((((("teenage pregnancy") OR "teenage birth") OR "teenage pregnancies") OR "teenage births") OR "adolesent birth") OR "adolescent births") OR "adolescent pregnancies") OR "adolescent pregnancy") AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat])))))) AND ((((((((factors) OR predictors) OR determinants) OR causes) OR reasons) OR risks) OR origins) AND ("1980/01/01"[PDat] : "3000/12/31"[PDat]))))) NOT outcomes Sort by: [relevance]	13215

Scopus

	Terms	Number of Studies
10	((("factors" OR "factor" OR "determinants" OR "determinant" OR "predictor" OR "predictors" OR "risks" OR "risk" OR " cause" OR "causes" OR "reasons" OR "origin" OR "correlates") AND ((("teen pregnancy" OR "teenage pregnancy" OR "adolescent pregnancy") OR ("teen birth" OR "teenage birth" OR "adolescent birth") OR ("teen pregnancies" OR "teenage pregnancies" OR "adolescent pregnancies") OR ("teen births" OR "teenage births" OR "adolescent births") OR ("teen childbearing" OR "teenage childbearing" OR "adolescent childbearing") OR ("teen conception" OR "teenage conception" OR "adolescent conception")) AND ("Repeat" OR "repeated" OR "repeats" OR "subsequent" OR "multiple" OR "second" OR "secondary " OR "recurrent" OR "recurrence" OR "succeeding" OR "next"))) AND NOT ((outcome* OR cancer OR program*))) AND ((TITLE-ABS-KEY ("Repeat" OR "repeated" OR "repeats" OR "subsequent" OR "multiple" OR "second" OR "secondary" OR "recurrent" OR "recurrence" OR "succeeding" OR "next")))	897 document results
9	(TITLE-ABS-KEY ("Repeat" OR "repeated" OR "repeats" OR "subsequent" OR "multiple" OR "second" OR "secondary" OR "recurrent" OR "recurrence" OR "succeeding" OR "next"))	7,058,523 document results
8	History Search Terms #7 AND (TITLE-ABS-KEY ("Repeat" OR "repeated" OR "repeats" OR "subsequent" OR "multiple" OR "second" OR "secondary" OR "recurrent" OR "recurrence" OR "succeeding" OR "next"))	2,153,111 document results
7	(("factors" OR "factor" OR "determinants" OR "determinant" OR "predictor" OR "predictors" OR "risks" OR "risk" OR "cause" OR "causes" OR "reasons" OR "origin" OR "correlates") AND ((("teen pregnancy" OR "teenage pregnancy" OR "adolescent pregnancy") OR ("teen birth" OR "teenage birth" OR "adolescent birth") OR ("teen pregnancies" OR "teenage pregnancies" OR "adolescent pregnancies") OR ("teen births" OR "teenage births" OR "adolescent births") OR ("teen childbearing" OR "teenage childbearing" OR "adolescent childbearing") OR ("teen conception" OR "teenage conception" OR "adolescent conception")) AND ("Repeat" OR "repeated" OR "repeats" OR "subsequent" OR "multiple" OR "second" OR "secondary " OR "recurrent" OR "recurrence" OR "succeeding" OR "next"))) AND NOT ((outcome* OR cancer OR program*))	1,878 document results
6	History Search Terms (outcome* OR cancer OR program*)	12,298,381 document results
5	("factors" OR "factor" OR "determinants" OR "determinant" OR "predictor" OR "predictors" OR "risks" OR "risk" OR "cause" OR "causes" OR "reasons" OR "origin" OR "correlates") AND ((("teen pregnancy" OR "teenage pregnancy" OR "adolescent pregnancy") OR ("teen birth" OR "teenage birth" OR "adolescent birth") OR ("teen pregnancies" OR "teenage pregnancies" OR	10,586 document results

	Terms	Number of Studies
	"adolescent pregnancies") OR ("teen births" OR "teenage births" OR "adolescent births") OR ("teen childbearing" OR "teenage childbearing" OR "adolescent childbearing") OR ("teen conception" OR "teenage conception" OR "adolescent conception")) AND ("Repeat" OR "repeated" OR "repeats" OR "subsequent" OR "multiple" OR "second" OR "secondary" OR "recurrent" OR "recurrence" OR "succeeding" OR "next"))	
4	(("teen pregnancy" OR "teenage pregnancy" OR "adolescent pregnancy") OR ("teen birth" OR "teenage birth" OR "adolescent birth") OR ("teen pregnancies" OR "teenage pregnancies" OR "adolescent pregnancies") OR ("teen births" OR "teenage births" OR "adolescent births") OR ("teen childbearing" OR "teenage childbearing" OR "adolescent childbearing") OR ("teen conception" OR "teenage conception" OR "adolescent conception")) AND ("Repeat" OR "repeated" OR "repeats" OR "subsequent" OR "multiple" OR "second" OR "secondary" OR "recurrent" OR "recurrence" OR "succeeding" OR "next")	11,388 document results
3	"factors" OR "factor" OR "determinants" OR "determinant" OR "predictor" OR "predictors" OR "risks" OR "risk" OR "cause" OR "causes" OR "reasons" OR "origin" OR "correlates"	17,718,839 document results
2	"Repeat" OR "repeated" OR "repeats" OR "subsequent" OR "multiple" OR "second" OR "secondary" OR "recurrent" OR "recurrence" OR "succeeding" OR "next"	13,190,850 document results
1	("teen pregnancy" OR "teenage pregnancy" OR "adolescent pregnancy") OR ("teen birth" OR "teenage birth" OR "adolescent birth") OR ("teen pregnancies" OR "teenage pregnancies" OR "adolescent pregnancies") OR ("teen births" OR "teenage births" OR "adolescent births") OR ("teen childbearing" OR "teenage childbearing" OR "adolescent childbearing") OR ("teen conception" OR "teenage conception" OR "adolescent conception")	25,322 document results

Web of Science

No.	Query	Results
#21	'factors' OR 'factor' OR 'predictor' OR 'predictors' OR 'risks' OR 'risk' OR 'determinants' OR 'determinant' OR 'cause' OR 'causes' OR 'reasons' OR 'reason' AND ('teen' OR 'teenage' OR 'teenager' OR 'teens' OR 'teenagers' OR 'adolescent' OR 'adolescents' OR 'young' OR 'young adults' OR 'young adult' OR 'youth' OR ('teen' OR 'teenage' OR 'teenager' OR 'teens' OR 'teenagers' OR 'adolescent' OR 'adolescents' OR 'young' OR 'young adults' OR 'young adult' OR 'youth' AND ('mother' OR 'mothers' OR 'moms' OR 'mom' OR 'parent' OR 'parents'))) AND ('pregnancy' OR 'pregnant' OR 'conception' OR 'childbearing' OR 'birth' OR 'births' OR 'pregnancies' OR 'delivery' OR 'deliveries') AND ('repeat' OR 'repeated' OR 'repeats' OR 'subsequent' OR 'multiple' OR 'secondary' OR 'second' OR 'next' OR 'recurrent' OR 'recurrence' OR 'another') NOT 'outcomes' OR ('teenage pregnancy'/exp OR 'teenage pregnancy' OR 'teenage birth' OR 'teenage pregnancies' OR 'teenage births' OR 'adolescent birth' OR 'adolescent births' OR 'adolescent pregnancies' OR 'adolescent pregnancy'/exp OR 'adolescent pregnancy' AND ('factors' OR 'factor' OR 'predictor' OR 'predictors' OR 'risks' OR 'risk' OR 'determinants' OR 'determinant' OR 'cause' OR 'causes' OR 'reasons' OR 'reason') AND ('repeat' OR 'repeated' OR 'repeats' OR 'subsequent' OR 'multiple' OR 'secondary' OR 'second' OR 'next' OR 'recurrent' OR 'recurrence' OR 'another') NOT 'outcomes') AND ([adolescent]/lim OR [adult]/lim OR [young adult]/lim) AND (1980:py OR 1981:py OR 1982:py OR 1983:py OR 1984:py OR 1985:py OR 1986:py OR 1987:py OR 1988:py OR 1989:py OR 1990:py OR 1991:py OR 1992:py OR 1993:py OR 1994:py OR 1995:py OR 1996:py OR 1997:py OR 1998:py OR 1999:py OR 2000:py OR 2001:py OR 2002:py OR 2003:py OR 2004:py OR 2005:py OR 2006:py OR 2007:py OR 2008:py OR 2009:py OR 2010:py OR 2011:py OR 2012:py OR 2013:py OR 2014:py OR 2015:py) AND ('abortion'/de OR 'anemia'/de OR 'asthma'/de OR 'congenital malformation'/de OR 'depression'/de OR 'diabetes mellitus'/de OR 'diseases'/de OR 'high risk pregnancy'/de OR 'hypertension'/de OR 'infection'/de OR 'insulin dependent diabetes mellitus'/de OR 'maternal hypertension'/de OR 'mental disease'/de OR 'multiple pregnancy'/de OR 'obesity'/de OR 'preeclampsia'/de OR 'pregnancy complication'/de OR 'pregnancy diabetes mellitus'/de OR 'premature labor'/de OR 'prematurity'/de OR 'recurrent disease'/de OR 'spontaneous abortion'/de) AND ('diagnosis'/lnk OR 'epidemiology'/lnk OR 'etiology'/lnk OR 'prevention'/lnk)	1660
#20	'factors' OR 'factor' OR 'predictor' OR 'predictors' OR 'risks' OR 'risk' OR 'determinants' OR 'determinant' OR 'cause' OR 'causes' OR 'reasons' OR 'reason' AND ('teen' OR 'teenage' OR 'teenager' OR 'teens' OR 'teenagers' OR 'adolescent' OR 'adolescents' OR 'young' OR 'young adults' OR 'young adult' OR 'youth' OR ('teen' OR 'teenage' OR 'teenager' OR 'teens' OR 'teenagers' OR 'adolescent' OR 'adolescents' OR 'young' OR 'young adults' OR 'young adult' OR 'youth' AND ('mother' OR 'mothers' OR 'moms' OR 'mom' OR 'parent' OR 'parents'))) AND ('pregnancy' OR 'pregnant' OR 'conception' OR 'childbearing' OR 'birth' OR 'births' OR 'pregnancies' OR 'delivery' OR 'deliveries') AND ('repeat' OR 'repeated' OR 'repeats' OR 'subsequent' OR 'multiple' OR 'secondary' OR 'second' OR 'next' OR 'recurrent' OR 'recurrence' OR 'another') NOT 'outcomes' OR ('teenage pregnancy'/exp OR 'teenage pregnancy' OR 'teenage birth' OR 'teenage pregnancies' OR 'teenage births' OR 'adolescent birth' OR 'adolescent births' OR 'adolescent pregnancies' OR 'adolescent pregnancy'/exp OR 'adolescent pregnancy' AND ('factors' OR 'factor' OR 'predictor' OR 'predictors' OR 'risks' OR 'risk' OR 'determinants' OR 'determinant' OR 'cause' OR 'causes' OR 'reasons' OR 'reason') AND ('repeat' OR 'repeated' OR 'repeats' OR 'subsequent' OR 'multiple' OR 'secondary' OR 'second' OR 'next' OR 'recurrent' OR 'recurrence' OR 'another') NOT 'outcomes') AND ([adolescent]/lim OR [adult]/lim OR [young adult]/lim) AND (1980:py OR 1981:py OR 1982:py OR 1983:py OR 1984:py OR 1985:py OR 1986:py OR 1987:py OR 1988:py OR 1989:py OR 1990:py OR 1991:py OR	1781

No.	Query	Results
	1992:py OR 1993:py OR 1994:py OR 1995:py OR 1996:py OR 1997:py OR 1998:py OR 1999:py OR 2000:py OR 2001:py OR 2002:py OR 2003:py OR 2004:py OR 2005:py OR 2006:py OR 2007:py OR 2008:py OR 2009:py OR 2010:py OR 2011:py OR 2012:py OR 2013:py OR 2014:py OR 2015:py) AND [female]/lim AND ('diagnosis'/lnk OR 'disease management'/lnk OR 'epidemiology'/lnk OR 'etiology'/lnk OR 'prevention'/lnk) AND [male]/lim	
#19	'factors' OR 'factor' OR 'predictor' OR 'predictors' OR 'risks' OR 'risk' OR 'determinants' OR 'determinant' OR 'cause' OR 'causes' OR 'reasons' OR 'reason' AND ('teen' OR 'teenage' OR 'teenager' OR 'teens' OR 'teenagers' OR 'adolescent' OR 'adolescents' OR 'young' OR 'young adults' OR 'young adult' OR 'youth' OR ('teen' OR 'teenage' OR 'teenager' OR 'teens' OR 'teenagers' OR 'adolescent' OR 'adolescents' OR 'young' OR 'young adults' OR 'young adult' OR 'youth' AND ('mother' OR 'mothers' OR 'moms' OR 'mom' OR 'parent' OR 'parents'))) AND ('pregnancy' OR 'pregnant' OR 'conception' OR 'childbearing' OR 'birth' OR 'births' OR 'pregnancies' OR 'delivery' OR 'deliveries') AND ('repeat' OR 'repeated' OR 'repeats' OR 'subsequent' OR 'multiple' OR 'secondary' OR 'second' OR 'next' OR 'recurrent' OR 'recurrence' OR 'another') NOT 'outcomes' OR ('teenage pregnancy'/exp OR 'teenage pregnancy' OR 'teenage birth' OR 'teenage pregnancies' OR 'teenage births' OR 'adolescent birth' OR 'adolescent births' OR 'adolescent pregnancies' OR 'adolescent pregnancy'/exp OR 'adolescent pregnancy' AND ('factors' OR 'factor' OR 'predictor' OR 'predictors' OR 'risks' OR 'risk' OR 'determinants' OR 'determinant' OR 'cause' OR 'causes' OR 'reasons' OR 'reason') AND ('repeat' OR 'repeated' OR 'repeats' OR 'subsequent' OR 'multiple' OR 'secondary' OR 'second' OR 'next' OR 'recurrent' OR 'recurrence' OR 'another') NOT 'outcomes') AND ([adolescent]/lim OR [adult]/lim OR [young adult]/lim) AND (1980:py OR 1981:py OR 1982:py OR 1983:py OR 1984:py OR 1985:py OR 1986:py OR 1987:py OR 1988:py OR 1989:py OR 1990:py OR 1991:py OR 1992:py OR 1993:py OR 1994:py OR 1995:py OR 1996:py OR 1997:py OR 1998:py OR 1999:py OR 2000:py OR 2001:py OR 2002:py OR 2003:py OR 2004:py OR 2005:py OR 2006:py OR 2007:py OR 2008:py OR 2009:py OR 2010:py OR 2011:py OR 2012:py OR 2013:py OR 2014:py OR 2015:py) AND [female]/lim AND ('clinical trial'/lnk OR 'diagnosis'/lnk OR 'disease management'/lnk OR 'epidemiology'/lnk OR 'etiology'/lnk OR 'prevention'/lnk)	3914
#18	'factors' OR 'factor' OR 'predictor' OR 'predictors' OR 'risks' OR 'risk' OR 'determinants' OR 'determinant' OR 'cause' OR 'causes' OR 'reasons' OR 'reason' AND ('teen' OR 'teenage' OR 'teenager' OR 'teens' OR 'teenagers' OR 'adolescent' OR 'adolescents' OR 'young' OR 'young adults' OR 'young adult' OR 'youth' OR ('teen' OR 'teenage' OR 'teenager' OR 'teens' OR 'teenagers' OR 'adolescent' OR 'adolescents' OR 'young' OR 'young adults' OR 'young adult' OR 'youth' AND ('mother' OR 'mothers' OR 'moms' OR 'mom' OR 'parent' OR 'parents'))) AND ('pregnancy' OR 'pregnant' OR 'conception' OR 'childbearing' OR 'birth' OR 'births' OR 'pregnancies' OR 'delivery' OR 'deliveries') AND ('repeat' OR 'repeated' OR 'repeats' OR 'subsequent' OR 'multiple' OR 'secondary' OR 'second' OR 'next' OR 'recurrent' OR 'recurrence' OR 'another') NOT 'outcomes' OR ('teenage pregnancy'/exp OR 'teenage pregnancy' OR 'teenage birth' OR 'teenage pregnancies' OR 'teenage births' OR 'adolescent birth' OR 'adolescent births' OR 'adolescent pregnancies' OR 'adolescent pregnancy'/exp OR 'adolescent pregnancy' AND ('factors' OR 'factor' OR 'predictor' OR 'predictors' OR 'risks' OR 'risk' OR 'determinants' OR 'determinant' OR 'cause' OR 'causes' OR 'reasons' OR 'reason') AND ('repeat' OR 'repeated' OR 'repeats' OR 'subsequent' OR 'multiple' OR 'secondary' OR 'second' OR 'next' OR 'recurrent' OR 'recurrence' OR 'another') NOT 'outcomes') AND ([adolescent]/lim OR [adult]/lim OR [young adult]/lim) AND (1980:py OR 1981:py OR 1982:py OR 1983:py OR 1984:py OR 1985:py OR 1986:py OR 1987:py OR 1988:py OR 1989:py OR 1990:py OR 1991:py OR	8675

No.	Query	Results
	1992:py OR 1993:py OR 1994:py OR 1995:py OR 1996:py OR 1997:py OR 1998:py OR 1999:py OR 2000:py OR 2001:py OR 2002:py OR 2003:py OR 2004:py OR 2005:py OR 2006:py OR 2007:py OR 2008:py OR 2009:py OR 2010:py OR 2011:py OR 2012:py OR 2013:py OR 2014:py OR 2015:py) AND [female]/lim	
#17	'factors' OR 'factor' OR 'predictor' OR 'predictors' OR 'risks' OR 'risk' OR 'determinants' OR 'determinant' OR 'cause' OR 'causes' OR 'reasons' OR 'reason' AND ('teen' OR 'teenage' OR 'teenager' OR 'teens' OR 'teenagers' OR 'adolescent' OR 'adolescents' OR 'young' OR 'young adults' OR 'young adult' OR 'youth' OR ('teen' OR 'teenage' OR 'teenager' OR 'teens' OR 'teenagers' OR 'adolescent' OR 'adolescents' OR 'young' OR 'young adults' OR 'young adult' OR 'youth' AND ('mother' OR 'mothers' OR 'moms' OR 'mom' OR 'parent' OR 'parents'))) AND ('pregnancy' OR 'pregnant' OR 'conception' OR 'childbearing' OR 'birth' OR 'births' OR 'pregnancies' OR 'delivery' OR 'deliveries') AND ('repeat' OR 'repeated' OR 'repeats' OR 'subsequent' OR 'multiple' OR 'secondary' OR 'second' OR 'next' OR 'recurrent' OR 'recurrence' OR 'another') NOT 'outcomes' OR ('teenage pregnancy'/exp OR 'teenage pregnancy' OR 'teenage birth' OR 'teenage pregnancies' OR 'teenage births' OR 'adolescent birth' OR 'adolescent births' OR 'adolescent pregnancies' OR 'adolescent pregnancy'/exp OR 'adolescent pregnancy' AND ('factors' OR 'factor' OR 'predictor' OR 'predictors' OR 'risks' OR 'risk' OR 'determinants' OR 'determinant' OR 'cause' OR 'causes' OR 'reasons' OR 'reason') AND ('repeat' OR 'repeated' OR 'repeats' OR 'subsequent' OR 'multiple' OR 'secondary' OR 'second' OR 'next' OR 'recurrent' OR 'recurrence' OR 'another') NOT 'outcomes') AND ([adolescent]/lim OR [adult]/lim OR [young adult]/lim) AND (1980:py OR 1981:py OR 1982:py OR 1983:py OR 1984:py OR 1985:py OR 1986:py OR 1987:py OR 1988:py OR 1989:py OR 1990:py OR 1991:py OR 1992:py OR 1993:py OR 1994:py OR 1995:py OR 1996:py OR 1997:py OR 1998:py OR 1999:py OR 2000:py OR 2001:py OR 2002:py OR 2003:py OR 2004:py OR 2005:py OR 2006:py OR 2007:py OR 2008:py OR 2009:py OR 2010:py OR 2011:py OR 2012:py OR 2013:py OR 2014:py OR 2015:py)	10025
#16	'factors' OR 'factor' OR 'predictor' OR 'predictors' OR 'risks' OR 'risk' OR 'determinants' OR 'determinant' OR 'cause' OR 'causes' OR 'reasons' OR 'reason' AND ('teen' OR 'teenage' OR 'teenager' OR 'teens' OR 'teenagers' OR 'adolescent' OR 'adolescents' OR 'young' OR 'young adults' OR 'young adult' OR 'youth' OR ('teen' OR 'teenage' OR 'teenager' OR 'teens' OR 'teenagers' OR 'adolescent' OR 'adolescents' OR 'young' OR 'young adults' OR 'young adult' OR 'youth' AND ('mother' OR 'mothers' OR 'moms' OR 'mom' OR 'parent' OR 'parents'))) AND ('pregnancy' OR 'pregnant' OR 'conception' OR 'childbearing' OR 'birth' OR 'births' OR 'pregnancies' OR 'delivery' OR 'deliveries') AND ('repeat' OR 'repeated' OR 'repeats' OR 'subsequent' OR 'multiple' OR 'secondary' OR 'second' OR 'next' OR 'recurrent' OR 'recurrence' OR 'another') NOT 'outcomes' OR ('teenage pregnancy'/exp OR 'teenage pregnancy' OR 'teenage birth' OR 'teenage pregnancies' OR 'teenage births' OR 'adolescent birth' OR 'adolescent births' OR 'adolescent pregnancies' OR 'adolescent pregnancy'/exp OR 'adolescent pregnancy' AND ('factors' OR 'factor' OR 'predictor' OR 'predictors' OR 'risks' OR 'risk' OR 'determinants' OR 'determinant' OR 'cause' OR 'causes' OR 'reasons' OR 'reason') AND ('repeat' OR 'repeated' OR 'repeats' OR 'subsequent' OR 'multiple' OR 'secondary' OR 'second' OR 'next' OR 'recurrent' OR 'recurrence' OR 'another') NOT 'outcomes')	14445
#15	'teenage pregnancy'/exp OR 'teenage pregnancy' OR 'teenage birth' OR 'teenage pregnancies' OR 'teenage births' OR 'adolescent birth' OR 'adolescent births' OR 'adolescent pregnancies' OR 'adolescent pregnancy'/exp OR 'adolescent pregnancy' AND ('factors' OR 'factor' OR 'predictor' OR 'predictors' OR 'risks' OR 'risk' OR 'determinants' OR 'determinant' OR 'cause' OR 'causes' OR 'reasons' OR 'reason') AND	783

No.	Query	Results
	('repeat' OR 'repeated' OR 'repeats' OR 'subsequent' OR 'multiple' OR 'secondary' OR 'second' OR 'next' OR 'recurrent' OR 'recurrence' OR 'another') NOT 'outcomes'	
#14	'factors' OR 'factor' OR 'predictor' OR 'predictors' OR 'risks' OR 'risk' OR 'determinants' OR 'determinant' OR 'cause' OR 'causes' OR 'reasons' OR 'reason' AND ('teen' OR 'teenage' OR 'teenager' OR 'teens' OR 'teenagers' OR 'adolescent' OR 'adolescents' OR 'young' OR 'young adults' OR 'young adult' OR 'youth' OR ('teen' OR 'teenage' OR 'teenager' OR 'teens' OR 'teenagers' OR 'adolescent' OR 'adolescents' OR 'young' OR 'young adults' OR 'young adult' OR 'youth' AND ('mother' OR 'mothers' OR 'moms' OR 'mom' OR 'parent' OR 'parents'))) AND ('pregnancy' OR 'pregnant' OR 'conception' OR 'childbearing' OR 'birth' OR 'births' OR 'pregnancies' OR 'delivery' OR 'deliveries') AND ('repeat' OR 'repeated' OR 'repeats' OR 'subsequent' OR 'multiple' OR 'secondary' OR 'second' OR 'next' OR 'recurrent' OR 'recurrence' OR 'another') NOT 'outcomes'	14445
#13	'teenage pregnancy'/exp OR 'teenage pregnancy' OR 'teenage birth' OR 'teenage pregnancies' OR 'teenage births' OR 'adolescent birth' OR 'adolescent births' OR 'adolescent pregnancies' OR 'adolescent pregnancy'/exp OR 'adolescent pregnancy' AND ('factors' OR 'factor' OR 'predictor' OR 'predictors' OR 'risks' OR 'risk' OR 'determinants' OR 'determinant' OR 'cause' OR 'causes' OR 'reasons' OR 'reason') AND ('repeat' OR 'repeated' OR 'repeats' OR 'subsequent' OR 'multiple' OR 'secondary' OR 'second' OR 'next' OR 'recurrent' OR 'recurrence' OR 'another')	986
#12	'factors' OR 'factor' OR 'predictor' OR 'predictors' OR 'risks' OR 'risk' OR 'determinants' OR 'determinant' OR 'cause' OR 'causes' OR 'reasons' OR 'reason' AND ('teen' OR 'teenage' OR 'teenager' OR 'teens' OR 'teenagers' OR 'adolescent' OR 'adolescents' OR 'young' OR 'young adults' OR 'young adult' OR 'youth' OR ('teen' OR 'teenage' OR 'teenager' OR 'teens' OR 'teenagers' OR 'adolescent' OR 'adolescents' OR 'young' OR 'young adults' OR 'young adult' OR 'youth' AND ('mother' OR 'mothers' OR 'moms' OR 'mom' OR 'parent' OR 'parents'))) AND ('pregnancy' OR 'pregnant' OR 'conception' OR 'childbearing' OR 'birth' OR 'births' OR 'pregnancies' OR 'delivery' OR 'deliveries') AND ('repeat' OR 'repeated' OR 'repeats' OR 'subsequent' OR 'multiple' OR 'secondary' OR 'second' OR 'next' OR 'recurrent' OR 'recurrence' OR 'another')	16894
#11	'teen' OR 'teenage' OR 'teenager' OR 'teens' OR 'teenagers' OR 'adolescent' OR 'adolescents' OR 'young' OR 'young adults' OR 'young adult' OR 'youth' OR ('teen' OR 'teenage' OR 'teenager' OR 'teens' OR 'teenagers' OR 'adolescent' OR 'adolescents' OR 'young' OR 'young adults' OR 'young adult' OR 'youth' AND ('mother' OR 'mothers' OR 'moms' OR 'mom' OR 'parent' OR 'parents')) AND ('pregnancy' OR 'pregnant' OR 'conception' OR 'childbearing' OR 'birth' OR 'births' OR 'pregnancies' OR 'delivery' OR 'deliveries') AND ('repeat' OR 'repeated' OR 'repeats' OR 'subsequent' OR 'multiple' OR 'secondary' OR 'second' OR 'next' OR 'recurrent' OR 'recurrence' OR 'another')	30516
#10	'pregnancy' OR 'pregnant' OR 'conception' OR 'childbearing' OR 'birth' OR 'births' OR 'pregnancies' OR 'delivery' OR 'deliveries' AND ('repeat' OR 'repeated' OR 'repeats' OR 'subsequent' OR 'multiple' OR 'secondary' OR 'second' OR 'next' OR 'recurrent' OR 'recurrence' OR 'another')	301639
#9	'repeat' OR 'repeated' OR 'repeats' OR 'subsequent' OR 'multiple' OR 'secondary' OR 'second' OR 'next' OR 'recurrent' OR 'recurrence' OR 'another'	4552920
#8	'pregnancy' OR 'pregnant' OR 'conception' OR 'childbearing' OR 'birth' OR 'births' OR 'pregnancies' OR 'delivery' OR 'deliveries'	153067

No.	Query	Results
		1
#7	'teen' OR 'teenage' OR 'teenager' OR 'teens' OR 'teenagers' OR 'adolescent' OR 'adolescents' OR 'young' OR 'young adults' OR 'young adult' OR 'youth' OR ('teen' OR 'teenage' OR 'teenager' OR 'teens' OR 'teenagers' OR 'adolescent' OR 'adolescents' OR 'young' OR 'young adults' OR 'young adult' OR 'youth' AND ('mother' OR 'mothers' OR 'moms' OR 'mom' OR 'parent' OR 'parents'))	2001032
#6	'teen' OR 'teenage' OR 'teenager' OR 'teens' OR 'teenagers' OR 'adolescent' OR 'adolescents' OR 'young' OR 'young adults' OR 'young adult' OR 'youth' AND ('mother' OR 'mothers' OR 'moms' OR 'mom' OR 'parent' OR 'parents')	115799
#5	'mother' OR 'mothers' OR 'moms' OR 'mom' OR 'parent' OR 'parents'	485821
#4	'teen' OR 'teenage' OR 'teenager' OR 'teens' OR 'teenagers' OR 'adolescent' OR 'adolescents' OR 'young' OR 'young adults' OR 'young adult' OR 'youth'	2001032
#3	'factors' OR 'factor' OR 'predictor' OR 'predictors' OR 'risks' OR 'risk' OR 'determinants' OR 'determinant' OR 'cause' OR 'causes' OR 'reasons' OR 'reason'	6615006
#2	child OR children OR kids OR kid OR deliver* OR birth* OR infant* OR baby OR babies OR offspring* OR pregnant OR pregnancy OR gravid* OR conception* OR childbearing OR pregnancies AND (repeat* OR subsequen* OR secondary OR second OR multiple OR many OR several OR another OR recurrence OR recurrent OR again OR succeed* OR later OR next) AND (mother* OR mom OR parent* OR moms AND (teen* OR adolescen* OR young OR youth OR 'under 20' OR 'under twenty' OR 'young adult' OR minor*) OR teen* OR adolescen* OR young OR youth OR 'under 20' OR 'under twenty' OR 'young adult' OR minor*) AND (factor* OR predictor* OR risk OR cause* OR reason* OR dynamic* OR influence* OR origin* OR basis OR bases OR risks)	167618
#1	'teenage pregnancy'/exp OR 'teenage pregnancy' OR 'teenage birth' OR 'teenage pregnancies' OR 'teenage births' OR 'adolescent birth' OR 'adolescent births' OR 'adolescent pregnancies' OR 'adolescent pregnancy'/exp OR 'adolescent pregnancy'	8700

Appendix 4. Assessed predictors and outcomes

Authors (Year)	Predictors assessed* (Measurement)	Outcomes (Definition)
Barnet, et al. (2008)	Maternal age (Q) Medicaid insurance (Q) Received assistance last month (Q) Lives with mother (Q) Not in school/dropped out (Q) Previous pregnancy (Q) Previous birth (Q) Previous abortion (Q) Previous miscarriage/still birth (Q) Wants another pregnancy within 2y of index child (Q) Trying to become again (Q) Condom use (Q) Parent beat /physically harmed (Q) Sexually abused (Q) Conflict tactics scale score (Q) Tobacco use (Q) Alcohol use (Q) Drugs use (Q) Age at baseline (Q) Age difference between teen mother and baby's father (Q) Married, living together or going with baby's father at baseline (Q) Depression (CES-D)	RRP (Occurrence of repeated pregnancy by 2y postpartum)
Bennett, et al. (2013)	Literacy level (SAT)	RB (Second birth before 20 years old)
Black, et al. (2006)	Friends have baby (Q) Fighting (Q) Cigarette use (Q) Alcohol use (Q) Marijuana use (Q) Experienced stealing (Q) Arrested (Q) Jailed (Q) More than 1 sexual partner (Q) Having STI (Q) Maternal age at delivery (Q) Dropped out from school (Q) Breastfeeding (Q) Romantic relationship with the father of baby (Q) Plan to have a second baby in next 5 year (Q) Advanced in education since delivery (Q) Married (Q) Live with partner (Q) Live with grandmother (Q) Romantic relationship with new partner (Q) Self-esteem (RS) Depressed (BDI) Parenting Satisfaction (PSC) Parenting Efficacy (PSC) Negative life events (LES) Positive life events (LES) Support from infant's grandmother (NRI) Conflict with infant's grandmother (NRI) Reading and math (KF)	RRB (Second birth 24m after the delivery of the first child)
Boardman, et al. (2006)	Age at first conception (Q) Race (Q) Education of teen's mother (Q) Age of teen's mom (Q) Did not live in 2-parent household as teen (Q) Religion in which raised (Q) Married at second conception (Q) Age at menarche (Q) First pregnancy intended by teen (Q) Prior poor obstetric outcome (Q) Age of partner during second conception (Q) Second pregnancy intended by partner (Q)	Intended or unintended RRP(Intended or unintended second pregnancy experienced by adolescent within 24m of the resolution of the first pregnancy which could have ended in miscarriage, elective abortion, ectopic pregnancy, preterm or term stillbirth, or preterm or term live birth)
Coard, et al. (2000)	Age (Q) School status (Q) In school or drop out Number in household (Q) Maternal education (Q) Reaction of adolescent's mother to pregnancy (Q) Reaction of baby's father to pregnancy (Q) Primary caretaker for baby (Q) Current contraceptive use (Q) Current contraceptive method (Q) Number of lifetime abortions (Q) Number of lifetime miscarriages (Q)	RRP (Repeated pregnancy within 1y or between 1y-2y postpartum)
Crittenden, et al. (2009)	Mental health index (RAND) Anxiety (Q) Depression (Q) Aggression proxy (Q)	RRP (Occurrence of pregnancy within 24m of the previous pregnancy)

Authors (Year)	Predictors assessed* (Measurement)	Outcomes (Definition)
	Substance use (Q) Birth control use (Q) Negative life experience (Q) Age (Q) Household size (Q) Households income (Q) Highest level of education (Q) Age at first period (Q) Age at first intercourse (Q) Maternal social support (Q) Maternal number of children (Q) African-American ethnicity (Q) Lived in subsidized housing (Q) Being head of household (Q) Employed (Q) Parents living apart before age 13 (Q) Maternal education (Q)	
Crosby, et al. (2002)	Parental monitoring (Q)	RRP (Occurrence of another pregnancy after 6m postpartum of the first pregnancy)
Damle, et al. (2015)	Number of prenatal care visits (Q) Contraception not initiated prior to discharge postpartum (Q) Attended postpartum visit within 8 weeks (Q) Long acting reversible contraceptive (LARC) initiation by 8 weeks postpartum (Q) Initiation to start LARC started at 8-weeks postpartum (Q)	RRP (Another pregnancy within 2y after the first child)
Davis (2002)	Self-esteem (RS) Locus of control (RM) Educational aspirations (Q) Religiosity (Q) Co-residence with kin(Q) Expelled or suspended in school (Q) Involved in theft (Q) Engagement in violent behavior (Q) Use of illegal drugs (Q) Race (Q) Religion (Q) Income (Q) Age at birth of first birth (Q)	RP (Occurrence of another pregnancy among unwed adolescent mothers)
De Fatima, et al. (2012)	Age per year (PNA) Age at first pregnancy (PNA) Age at first sexual intercourse (PNA) Time until first pregnancy (PNA) Use of contraceptives (PNA) Prenatal examinations (PNA) Age dropped out from school (PNA) Currently attending school (PNA) Year not attending school (PNA) Years of education (PNA) Monthly income (PNA) Living with partner (PNA) Currently working (PNA)	RP (Having two or more pregnancies)
Gillmore, et al. (1997)	Contraceptive use (Q) Frequency of intercourse (Q) Breastfeeding (Q) School expulsion/suspension (Q) Drug use (Q and UT) Fighting/delinquency (Q) Peer relationships/associations (Q) Living with parents (Q) Length of relationship with boyfriends (Q) Best friends experiencing pregnancies (Q) Age at first birth of first child Race and socio-economic status (Q)	RRP (Another pregnancy that occurs within 18m after the first birth)
Gray, et al. (2006)	Age at conception (Q) Race (Q) Educational status (Q) Marital status (Q) Prenatal contraceptive plan (Q) Formulated educational/career goals (Q) Use of contraception (Q)	RRP (Become pregnant again either between 0m-6m, 7m-12m, 13m-24m)
Jacoby, et al. (1999)	Spontaneous abortion (RR) Any form of physical or sexual violence during study period (RR) Family stress (RR) Financial stress (RR) Environmental stressors (RR) Demographics (RR)	RRP (Pregnancy 12m or 24m after the previous pregnancy)
Lewis, et al. (2010)	Type of contraceptive (LMUP) Ongoing sexual intercourse over 3 months (LMUP) Intends to become pregnant (LMUP) Indigenous Australian (ABS)	RRP (Teen mothers who experiences a pregnancy within 2y of a first teen birth)
Manlove, et al. (2000)	Race/ethnicity (Q) Family structure (Q) Individual characteristics after pregnancy or first birth (Q) Religious involvement (Q)	RB and RRB (Second birth at the 24th month assessment or at any time since the birth of the first child among teenagers)

Authors (Year)	Predictors assessed* (Measurement)	Outcomes (Definition)
	School and classroom characteristics (Q) School performance (Q) Enrolled in further education (Q) Educational achievement after first birth (Q) Age at first birth (Q) Dropout history (Q) Marital history (Q) Child care received after first birth (Q) Living situation after first birth (Q)	
Milbrook (2013)	Placement change (Q) Case manager changes (Q) School changes (Q) Age at birth of first child (Q) Enrolment status (Q)	RP (Number of pregnancy before age of 21 from enrolment)
Montgomery (2010)	Age (Q) Frequency and recency of sexual intercourse (Q) Suspension or expulsion (Q) Cigarette use (Q) Alcohol use (Q) Marijuana use (Q) Trying to get pregnant (Q) Number of sexual partners (Q) Positive marriage expectations (Q) Hopeless regarding future (Q) Expectations for adulthood (Q) Family rules (Q) Curfew (Q) parental monitoring (Q) Involved in organized activities (Q) Work at paid job (Q) Enrolled in school during previous year (Q) Want to finish high school (Q) Think will finish high school (Q) Want to go to college (Q) Think will go to college (Q) Warmth toward mother (Q) Absence of father figure (Q) Able to discuss sex with parents (Q) Have discussed sex with parents (Q) Parents' feeling if got pregnant (Q) Boy having sex proves he is a man (Q) Girl having sex proves she is a woman (Q) Negative peer pressure (Q) Feelings if got pregnant (Q) Self-worth (Q)	RRP (Reporting of one pregnancy with an additional pregnancy within 2y after the first)
Patel, et al. (1997)	Race/ ethnicity (RR) Parity (RR) Maternal Age (RR)	RB (Teenagers with at least 1 live birth from multiple gestation)
Pfitzner, et al. (2003)	Maternal age at entry (RR) Maternal age at delivery (RR) Maternal age at exit (RR) Paternal age at entry (RR) Paternal maternal age difference (RR) Time known father of baby (RR) Time in program (RR) Gestational age when prenatal care began (RR) Infant's birth weight (RR) Last grade completed (RR) Months out of school (RR) Physical abuse (Q) Sexual abuse (Q) Depression (Q) Suicidality (Q) Significant Psychiatric history (Q) Alcohol use (Q) Tobacco use (Q) Illicit drug use (Q) Parent a pregnant teen (Q) Planned pregnancy (Q) Placed child for adoption (Q) School attendance at entry (Q) Maternal ethnicity (Q) Relationship at conception (Q) Paternal ethnicity (Q) Pregnancy outcome (Q) Educational status at exit (Q) Relationship which father of baby at exit (Q) Exit reason (Q) Payer source (Q)	RP (Teenagers who experienced a repeat pregnancy)
Raneri and Wiemann (2007)	Self-esteem (RS) Depressive symptoms (BDI) Substance abuse (Q) Sexual activity (Q) Contraceptive use (Q) Living arrangement (Q)	RRP (Subsequent pregnancy or birth on one or more surveys within 24m)

Authors (Year)	Predictors assessed* (Measurement)	Outcomes (Definition)
	Romantic relationship (Q) Partner abuse (Q) Intention to have pregnancy (Q) Age of father of first child (Q) Maternal closeness (Q) Maternal monitoring (Q) Social support from family (Q) Overall support from any course (Q) Chronic verbal abuse (Q) Hit by a family member (Q) Enrolled in school (Q) Dropped out of school prior to first pregnancy (Q) Repeated at least one grade (Q) Enrolled in school (Q) Employed full- or part-time (Q) Higher religiosity (Q) At least half of friends were teenage mothers (Q) At least half of friends dropped out of high school (Q) Social stigma regarding teenage parenting (Q) Community violence (Q) Race (Q) Economic resources (Q)	
Richio, et al. (2010)	History of mode of delivery (Q)	RRB (Repeat births within 2y after first birth)
Sangalang, et al. (2006)	Age (Q) Race (Q) Marital status (Q)	RB (Occurrence of second birth)
Sims and Luster (2002)	Age (Q) Repeated grade (Q) Educational expectations (Q) Living with male partner (Q) Mother's education (Q) Sexual abuse (Q) Perception of family support (Q) Self-esteem (RS) Locus of control (RM) Depression (CES-D) Personal resources (Q)	RRP (Occurrence of pregnancy at the 24th m of assessment at any time since the birth of the first child) RRB (Occurrence of birth at the 24th m of assessment at any time since the birth of the first child)
Steven-Simon, et al. (1998)	School drop-out (Q) Inconsistent contraceptive use "harder to modify" explanation (Q)	RRP (Occurrence of another within 18m of study)
Stevens-Simon, et al. (2001)	Number of risk factors present (Q) Use of Norplant (Q) Use of Depo-Provera during the puerperium (Q)	RRP (Another pregnancy 24m from the first delivery)
Tocce, et al. (2012)	Did not receive immediate postpartum implant (Q)	RRP (Repeat pregnancy 12m after delivery

Measurement: ABS-Australian bureau of statistics index of relative social disadvantage, BDI-Beck depression inventory, CES-D-Center of epidemiologic studies depression scale, KF-Kaufman functional academic skills test, LES-Life experience survey, LMUP-London measure of unplanned pregnancy, NRI-Network of relationship inventory, PNA-Perinatal needs assessment, PSC- Parenting sense of competence scale, Q-Questionnaire, RAND-RAND mental health inventory, RM-Rotter's measure, RR-Records review, RS-Rosenberg's scale, SAT-Stanford achievement test, UT-Urine test; *****-Not necessarily in the final model

Appendix 5. Meta-analyses of factors associated with repeated teenage pregnancies and births using random-effects model: Pooled odd ratios and level of heterogeneity (n=47 factors)

		Pooled ES				Heterogeneity			Egger's bias		Begg's score		
Predictors	**n**	**OR**	**LCI**	**HCI**	**p**	**Q**	**p**	**I^2**	**S**	**p**	**S**	**p**	**p***
A/PNC visitations	2	0.371	0.053	2.58	0.316	17.41	<0.001	94.30%	-4.58	NA	-1	0.317	1
Adolescent's mother was a teen mother	2	1.056	0.784	1.421	0.72	0.09	0.766	0.00%	0.94	NA	1	0.317	1
Age at first sexual intercourse	2	0.997	0.584	1.701	0.991	7.61	0.006	86.90%	4.33	NA	1	0.317	1
Age at menarche	2	1.095	0.82	1.462	0.537	2.94	0.087	66.00%	-3.24	NA	-1	0.317	1
Age during first conception	10	0.989	0.868	1.128	0.874	77.72	<0.001	88.40%	-0.42	0.736	5	0.655	0.721
Age of the father at baseline	2	1.108	0.681	1.802	0.68	4.77	0.029	79.00%	3.23	NA	1	0.317	1
Age of the teenager	10	1.138	0.885	1.463	0.313	64.66	<0.001	86.10%	-1.97	0.198	-13	0.245	0.283
Alcohol use	5	1.332	0.89	1.991	0.163	1.62	0.805	0.00%	1.06	0.294	4	0.327	0.462
Depression	5	1.457	1.136	1.868	0.003	4.36	0.36	8.20%	0.65	0.645	2	0.624	0.806
Drug use	7	1.019	0.815	1.274	0.868	5.82	0.443	0.00%	-0.23	0.805	-9	0.176	0.23
Education of adolescent's mother	4	0.889	0.618	1.279	0.528	8.87	0.031	66.20%	-3.87	0.034	-6	0.042	0.089
Educational/career goals	4	0.953	0.905	1.003	0.065	5.12	0.163	41.40%	-1.44	0.111	-2	0.497	0.734
Employment	5	0.814	0.548	1.209	0.308	15.46	0.004	74.10%	-1.27	0.326	-2	0.624	0.806
Experienced physical or sexual abuse	5	1.405	0.953	2.07	0.086	9.97	0.041	59.90%	1.79	0.299	6	0.142	0.221
Frequency and recency of sexual intercourse	3	1.241	0.915	1.683	0.165	11.81	0.003	83.10%	2.57	0.066	3	0.117	0.296
Having a contraceptive plan	2	0.484	0.032	7.295	0.6	3.45	0.063	71.00%	-2.93	NA	-1	0.317	1
Highest level of education	7	0.741	0.603	0.911	0.004	18.02	0.006	66.70%	-0.83	0.461	-5	0.453	0.548
History of abortion/miscarriage	6	1.659	1.082	2.544	0.02	18.81	0.002	73.40%	2.78	0.184	5	0.348	0.452
Household size	2	0.979	0.954	1.005	0.105	0.19	0.667	0.00%	0.46	NA	1	0.317	1
In a relationship with the father of their first child	3	1.05	0.478	2.305	0.904	16.44	<0.001	87.80%	3.22	0.657	1	0.602	1
Income	5	0.93	0.788	1.098	0.393	8.62	0.035	65.20%	-0.16	0.934	0	1	1
Intending to become pregnant again	5	1.216	0.661	2.239	0.529	21.49	<0.001	81.40%	0.95	0.733	0	1	1
Living with at least 1 parent/kin	7	1.072	0.618	1.86	0.804	35.19	<0.001	82.90%	2.43	0.36	1	0.881	1
Living with partner	4	1.849	1.38	2.477	<0.001	4	0.262	25.00%	2.1	0.31	2	0.497	0.734
Locus of control	3	1.354	0.869	2.109	0.18	7.94	0.019	74.80%	2.18	0.01	3	0.117	0.296
Married	6	1.029	0.793	1.334	0.83	18.81	0.002	73.40%	-0.49	0.725	1	0.851	1
Number of sexual partners	2	1.269	0.787	2.046	0.328	0.07	0.784	0.00%	0.36	NA	1	0.317	1
Parental monitoring	2	1.403	0.547	3.602	0.481	4.93	0.026	79.70%	3	NA	1	0.317	1
Parity	2	1.659	1.425	1.931	<0.001	0.48	0.486	0.00%	0.93	NA	1	0.317	1
Partner support	3	1.429	1.133	1.802	0.003	0.97	0.615	0.00%	1.21	0.273	1	0.602	1
Partner-adolescent age difference	4	1.205	1.034	1.405	0.017	3.65	0.301	17.90%	1.49	0.191	2	0.497	0.734
Peers are teen mothers	3	1.643	1.178	2.291	0.003	1.51	0.471	0.00%	0.06	0.978	1	0.602	1
Planned first pregnancy	2	1.735	1.3	2.316	<0.001	0.38	0.538	0.00%	-6.56	NA	-1	0.317	1
Presence of multiple risk factors	3	2.604	1.836	3.694	<0.001	0.64	0.727	0.00%	4.05	0.242	3	0.117	0.296
Race	10	1.135	0.924	1.394	0.228	63.51	<0.001	85.80%	1.08	0.41	3	0.788	0.858
Received insurance or subsidy	5	1.106	0.872	1.403	0.405	5.88	0.209	31.90%	-1.72	0.528	-6	0.142	0.221
Religion	2	0.725	0.448	1.172	0.19	5.32	0.021	81.20%	-3.63	NA	-1	0.317	1
Religious involvement	3	1.193	1.062	1.339	0.003	1.84	0.399	0.00%	1.8	0.257	3	0.117	0.296
School drop-out	8	1.894	1.19	3.014	0.007	31.98	<0.001	78.10%	1.21	0.501	10	0.216	0.266
School expulsion/suspension	3	1.406	0.867	2.279	0.167	10.41	0.005	80.80%	2.27	0.242	3	0.117	0.296
School performance	4	1.02	1.003	1.037	0.02	1.58	0.664	0.00%	0.58	0.441	1*	0.734	1
Self-esteem	4	1.025	0.784	1.341	0.856	11.08	0.011	72.90%	0.39	0.8	2	0.497	0.734
Smoking	5	1.219	0.85	1.748	0.282	3.4	0.493	0.00%	-0.61	0.726	-4	0.327	0.462
Support from adolescent's mother	5	1.081	0.988	1.183	0.089	4.33	0.364	7.50%	0.77	0.303	6	0.142	0.221
Use of contraception	8	0.596	0.348	1.02	0.059	62.49	<0.001	88.80%	-2.65	0.498	-6	0.458	0.536
Use of LARC immediate postpartum	4	0.193	0.082	0.452	<0.001	8.79	0.032	65.90%	-2.64	0.045	0	1	1
Violence	3	1.357	1.029	1.79	0.03	0.69	0.709	0.00%	0.39	0.747	1	0.602	1

Legend: n-number of studies, OR=odds ratio, LCI- lower 95% confidence interval, HCI- lower 95% confidence interval, p*-corrected p-value, NA-not applicable

Appendix 6. Comparison of random effects and quality effects meta-analyses 47 factors associated with repeated teenage pregnancies and births: Pooled odd ratios and level of heterogeneity

		Random-Effects Model					Quality-Effects Model				
Predictors	**n**	**OR**	**LCI**	**HCI**	**Q**	**I^2**	**OR**	**LCI**	**HCI**	**Q**	**I^2**
A/PNC visitations	2	0.371	0.053	2.58	17.41	94.30%	0.933	0.066	13.242	17.41	94.26%
Adolescent's mother was a teen mother	2	1.056	0.784	1.421	0.09	0.00%	1.049	0.777	1.416	0.09	0.00%
Age at first sexual intercourse	2	0.997	0.584	1.701	7.61	86.90%	0.898	0.507	1.592	7.61	86.87%
Age at menarche	2	1.095	0.82	1.462	2.94	66.00%	1.135	0.843	1.529	2.94	65.97%
Age during first conception	10	0.989	0.868	1.128	77.72	88.40%	1.056	0.878	1.269	77.71	88.42%
Age of the father at baseline	2	1.108	0.681	1.802	4.77	79.00%	1.028	0.619	1.708	4.77	79.05%
Age of the teenager	10	1.138	0.885	1.463	64.66	86.10%	1.232	0.938	1.618	64.66	86.08%
Alcohol use	5	1.332	0.89	1.991	1.62	0.00%	1.385	0.912	2.105	1.62	0.00%
Depression	5	1.457	1.136	1.868	4.36	8.20%	1.468	1.136	1.898	4.36	8.17%
Drug use	7	1.019	0.815	1.274	5.82	0.00%	1.018	0.793	1.305	5.82	0.00%
Education of adolescent's mother	4	0.889	0.618	1.279	8.87	66.20%	0.954	0.658	1.384	8.87	66.17%
Educational/career goals	4	0.953	0.905	1.003	5.12	41.40%	0.971	0.916	1.030	5.12	41.41%
Employment	5	0.814	0.548	1.209	15.46	74.10%	1.017	0.520	1.988	15.46	74.12%
Experienced physical or sexual abuse	5	1.405	0.953	2.07	9.97	59.90%	1.324	0.883	1.986	9.97	59.87%
Frequency and recency of sexual intercourse	3	1.241	0.915	1.683	11.81	83.10%	1.390	0.953	2.029	11.81	83.06%
Having a contraceptive plan	2	0.484	0.032	7.295	3.45	71.00%	1.089	0.047	25.253	3.45	71.04%
Highest level of education	7	0.741	0.603	0.911	18.02	66.70%	0.752	0.596	0.947	18.02	66.70%
History of abortion/miscarriage	**6**	**1.659**	**1.082**	**2.544**	**18.81**	**73.40%**	**1.437**	**0.895**	**2.306**	**18.81**	**73.41%**
Household size	2	0.979	0.954	1.005	0.19	0.00%	0.983	0.951	1.017	0.19	0.00%
In a relationship with the father of their first child	3	1.05	0.478	2.305	16.44	87.80%	0.872	0.386	1.969	16.44	87.84%
Income	5	0.93	0.788	1.098	8.62	65.20%	0.946	0.756	1.184	8.62	65.19%
Intending to become pregnant again	5	1.216	0.661	2.239	21.49	81.40%	1.069	0.534	2.138	21.49	81.38%
Living with at least 1 parent/kin	7	1.072	0.618	1.86	35.19	82.90%	0.886	0.443	1.774	35.19	82.95%
Living with partner	4	1.849	1.38	2.477	4	25.00%	1.866	1.376	2.529	4.00	24.97%
Locus of control	3	1.354	0.869	2.109	7.94	74.80%	1.112	0.643	1.925	7.94	74.80%
Married	6	1.029	0.793	1.334	18.81	73.40%	1.121	0.840	1.496	18.81	73.42%
Number of sexual partners	2	1.269	0.787	2.046	0.07	0.00%	1.285	0.790	2.090	0.07	0.00%
Parental monitoring	2	1.403	0.547	3.602	4.93	79.70%	0.985	0.306	3.174	4.93	79.72%
Parity	2	1.659	1.425	1.931	0.48	0.00%	1.765	1.400	2.225	0.48	0.00%
Partner support	3	1.429	1.133	1.802	0.97	0.00%	1.426	1.131	1.799	0.97	0.00%
Partner-adolescent age difference	4	1.205	1.034	1.405	3.65	17.90%	1.227	1.049	1.435	3.65	17.91%
Peers are teen mothers	3	1.643	1.178	2.291	1.51	0.00%	1.604	1.147	2.242	1.51	0.00%
Planned first pregnancy	2	1.735	1.3	2.316	0.38	0.00%	1.768	1.317	2.375	0.38	0.00%
Presence of multiple risk factors	3	2.604	1.836	3.694	0.64	0.00%	2.618	1.845	3.716	0.64	0.00%
Race	10	1.135	0.924	1.394	63.51	85.80%	1.016	0.717	1.441	63.51	85.83%
Received insurance or subsidy	5	1.106	0.872	1.403	5.88	31.90%	1.124	0.882	1.432	5.88	31.93%
Religion	2	0.725	0.448	1.172	5.32	81.20%	0.766	0.468	1.254	5.32	81.22%
Religious involvement	3	1.193	1.062	1.339	1.84	0.00%	1.195	1.062	1.344	1.84	0.00%
School drop-out	8	1.894	1.19	3.014	31.98	78.10%	1.772	1.051	2.987	31.98	78.11%
School expulsion/suspension	3	1.406	0.867	2.279	10.41	80.80%	1.268	0.712	2.257	10.41	80.79%
School performance	4	1.02	1.003	1.037	1.58	0.00%	1.025	1.006	1.045	1.58	0.00%
Self-esteem	4	1.025	0.784	1.341	11.08	72.90%	1.071	0.779	1.472	11.08	72.92%
Smoking	5	1.219	0.85	1.748	3.4	0.00%	1.221	0.841	1.772	3.40	0.00%
Support from adolescent's mother	5	1.081	0.988	1.183	4.33	7.50%	1.084	0.989	1.188	4.33	7.54%
Use of contraception	8	0.596	0.348	1.02	62.49	88.80%	0.610	0.344	1.084	62.49	88.80%
Use of LARC immediate postpartum	4	0.193	0.082	0.452	8.79	65.90%	0.321	0.105	0.981	8.79	65.86%
Violence	3	1.357	1.029	1.79	0.69	0.00%	1.367	0.997	1.875	0.69	0.00%

Legend: n-number of studies, OR=odds ratio, LCI- lower 95% confidence interval, HCI- lower 95% confidence interval

Appendix 7. Sensitivity analyses of age during pregnancy and use of contraception

	Pooled Effect Size			Heterogeneity				
Excluded study	**OR**	**LCI**	**HCI**	**Q**	**p**	**I^2**	**LCI**	**HCI**
Age during first conception								
Milbrook, 2013	0.97	0.85	1.11	73.681	<0.001	89.14%	81.62	93.59
Black, et al., 2006	0.96	0.84	1.09	73.156	<0.001	89.06%	81.47	93.55
Davis, 2002	1.04	0.91	1.18	65.184	<0.001	87.73%	78.84	92.88
Gray, et al., 2006	1.00	0.88	1.14	74.628	<0.001	89.28%	81.89	93.66
Gillmore, et al., 1997	0.96	0.84	1.10	71.466	<0.001	88.81%	80.96	93.42
de Fatima, et al., 2012	1.04	0.91	1.19	59.206	<0.001	86.49%	76.35	92.28
Boardman, et al., 2006	0.93	0.81	1.06	67.040	<0.001	88.07%	79.51	93.05
Manlove, et al., 2000	1.01	0.77	1.31	77.139	<0.001	89.63%	82.56	93.83
Manlove, et al., 2000.	1.00	0.78	1.29	77.019	<0.001	89.61%	82.53	93.82
Pfitzner, et al., 2003	1.05	0.93	1.19	59.508	<0.001	86.56%	76.49	92.31
Use of contraception								
Gray, et al., 2006	0.63	0.36	1.13	60.006	<0.001	90.00%	81.95	94.46
Gillmore, et al., 1997	0.63	0.34	1.16	53.279	<0.001	88.74%	79.26	93.89
de Fatima, et al., 2012	**0.50**	**0.37**	**0.66**	**12.183**	**0.058**	**50.75%**	**0.00**	**79.10**
Barnet, et al., 2008	0.60	0.32	1.14	60.843	<0.001	90.14%	82.24	94.53
Crittenden, et al., 2009	0.55	0.30	1.03	59.640	<0.001	89.94%	81.82	94.43
Damle, et al., 2015	0.63	0.35	1.13	59.665	<0.001	89.94%	81.83	94.44
Coard, et al., 2000	0.65	0.37	1.15	58.872	<0.001	89.81%	81.54	94.37
Lewis, et al.,2010	0.61	0.33	1.12	61.177	<0.001	90.19%	82.35	94.55

Legend: OR=odds ratio, LCI=lower 95% confidence interval, HCI=lower 95% confidence interval; p=p-value