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

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OBJECTIVE: Existing evidence of predictors of repeated teenage pregnancy has not been assessed rigorously. This systematic review provides a comprehensive evaluation of protective and risk factors that are associated with repeated teenage pregnancy through a metaanalytical consensus.

DATA SOURCES: We used PubMed, EMBASE, CINAHL, ProQuest, PsychINFO, ScienceDirect, Scopus, and Web of Science databases from 1997—2015 and the reference list of other relevant research papers and related reviews.

STUDY ELIGIBILITY CRITERIA: Eligibility criteria included (1) epidemiologic studies that analyzed factors associated with repeated pregnancy or birth among adolescents <20 years of age who were nulliparous or experienced at least 1 pregnancy, and (2) experimental studies with an observational component that was 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 metaanalyses with meta-regression to obtain pooled odds ratios of identified factors and to determine sources of between-study heterogeneity.

RESULTS: Twenty-six eligible epidemiologic studies, most from the United States (n=24), showed >47 factors with no evidence of publication bias for each metaanalysis. Use of contraception (pooled odds ratio, 0.60; 95% confidence interval, 0.35—1.02), particularly long-acting reversible contraceptives (pooled odds ratio, 0.19; 95% confidence interval, 0.08—0.45), considerably reduced repeated teenage pregnancy risk. Among studies about contraception, the number of follow-up visits (adjusted coefficient, 0.72; *P*=.102) and country of study (unadjusted coefficient, 2.57; permuted *P*=.071) explained between-study heterogeneity. Education-related factors, which included higher level of education (pooled odds ratio, 0.74; 95% confidence interval, 0.60—0.91) and school continuation (pooled odds ratio, 0.53; 95% confidence interval, 0.33—0.84), were found to be protective. Conversely, depression (pooled odds ratio, 1.46; 95% confidence interval, 1.14—1.87), history of abortion (pooled odds ratio, 1.66; 95% confidence interval, 1.08—2.54), and relationship factors, such as partner support, increased the repeated teenage pregnancy risk.

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

Key words: adolescent, factor, metaanalysis, repeated teenage pregnancy, review

Teenage mothers have an elevated risk of repeated pregnancy (RTP) within 2 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 with 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 with the first pregnancy, RTP reflects not only the reproductive health status of adolescents but also the capacity of health systems to address the needs (ie, education, social welfare) of adolescents after their first pregnancy. With these immense effects across life course, identification of the causes of RTP is essential to develop appropriate prevention strategies to reduce its occurrence.

The only systematic study that 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 that were grouped according to family structure, psychologic, education, obstetric, and family planning characteristics. The review mainly identified studies with case-control or cross-sectional designs but did not perform a metaanalytic approach to produce aggregate estimates of risk factors, explore heterogeneity among study estimates, and include studies conducted in countries other than the United States. Knowing the high RTP rates among developing countries,[10-12] there is a need to contextualize RTP factors in this type of setting. RTP predictors may differ

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between developed and underdeveloped countries because of the unique sociocultural 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[1,5,16,20] play a role in the determination of high RTP risk. On the other hand, there have been inconsistent findings as to the role of sexual behavior,[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 a socioecologic 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 that will adopt 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 article, we reviewed and quantitatively synthesized various predictors of RTP from the current literature and analyzed it using the socioecologic framework. We used a rigorous approach to pool estimates from each study to identify whether a factor has a protective, risk, or null effect. We examined between-study heterogeneity of RTP risks as a function of study characteristics because heterogeneity may reflect methodologic diversity[35] and direct future research to improve their methods and design. Through these steps, modifiable and nonmodifiable characteristics of RTP can be identified while various risks are targeted and embanking on protective factors to facilitate the development of evidence-based programs.

Methods

Search strategy

We searched 8 electronic databases, including EMBASE, CINAHL, ProQuest, PsychINFO, PubMed, ScienceDirect, Scopus and Web of Science, using different key terms (ie, factors, predictors, determinants, reduce, prevent, repeat, subsequent, multiple, second, young, teen, adolescent, pregnancy, birth, childbearing, and gravid) for studies published in English from 1997−2015 (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 lists from other research papers and related reviews.

Screening and selection

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

Data extraction and quality assessment

Three reviewers (J.C.M., K.S.B., and C.C.C.) independently abstracted data from all the articles; all of the reviewers cross-checked the study characteristics, participant information, and results and identified limitations from each study. Risk of bias within each study was evaluated with the use of 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 (ie, adjusted) model of each study, except for intervention-related factors (in the case of experimental studies), were ascertained for our metaanalysis. If the predictors in the final models were not mentioned, all factors analyzed were assumed to be in the final model. For studies that have assessed predictors at >1 time point,[14,22,25,39,40] we considered only the most recent OR because 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 Metaanalysis 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 probability value of .10 was assumed for studies that did not report any probability value[46] and .04 for studies that reported a probability value of <.05. For categoric predictors, those with >2 categories were dichotomized because studies used different measures to operationalize a particular predictor. For example, some studies measured education as the highest educational attainment (ie, primary, secondary, tertiary education); others used only secondary education as the highest educational attainment (ie, 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 (ie, the effect of being at least a high school graduate; Appendix 2).

Data analyses

Only those predictors that were assessed by at least 2 studies were considered for metaanalysis and arranged from protective factors to risk factors with the use of the socioecologic framework. This