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Unintended rapid repeat pregnancy and low education status: Any role for depression and contraceptive use?

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Abstract

Objective—The purpose of this study was to assess the contribution of depressive symptoms and poor contraceptive use early in the first postpartum year to the risk of unintended repeat pregnancy at the end of that year among adults with low educational status (< 12th grade or equivalence).

Study design—This was a prospective observational cohort study of 643 sexually active, low-income, inner-city adult women (age 19) who enrolled prenatally (14.7 ± 6.9 weeks gestational age) and were followed twice after delivery (3.3 ± 1.3 months and 11.0 ± 1.3 months). Associations were assessed by multivariate logistic regression.

Results—Low educational status (odds ratio, 2.32; 95% CI, 1.25-4.33) and less effective contraceptive use (odds ratio, 2.31; 95% CI, 1.05-4.51) were associated with unintended pregnancy. Neither depressive symptoms nor contraceptive use reduced the risk of pregnancy that was associated with low educational status.

Conclusion—Low educational status was associated with more than twice the risk of unintended pregnancy 1 year after delivery. We found no evidence that depression or poor contraceptive use mediate this relationship.

Keywords

Fertility control; Postpartum period; Educational status; Contraception; Depressive symptom; Pregnancy interval

A disproportionately large number of unintended pregnancies in the United States occur among women from low-income minority populations.¹ Short interpregnancy intervals that result from unintended rapid repeat pregnancy increase the risk of adverse maternal-child health outcomes.^{2,3} Identifying factors that are linked to unintended pregnancy in the postpartum period may help to explain socioeconomic and racial/ethnic disparities in maternal-child outcomes and guide interventions to reduce these disparities. Low educational status (LEdS; <12th grade completion or equivalence) has been recognized as a risk factor for unintended pregnancy.^{1,4} However, the mechanisms that link LEdS and pregnancy intention have not been well-defined.

Effective contraceptive use is critical for reducing the rates of unintended pregnancy.⁵ LEdS has been associated with nonuse of contraception, the use of less effective contraception methods, increased contraceptive failure rates, and reduced adherence to treatment regimens for chronic illnesses.^{6,7} Because of its association with both LEdS and the inconsistent use of medications that include contraception, depression might also contribute to the risk of unintended pregnancy.^{8,9} Despite these findings, we are not aware of any analyses that directly assess the possible causal links between depression, contraceptive use, and unintended pregnancy in the postpartum period.

In this study, we sought to fill a gap in research on disparities in pregnancy intention by directly examining the contribution of postpartum depressive symptoms and contraceptive use regarding the risk of unintended repeat pregnancy among women with LEdS. The specific goals of this study were to assess whether LEdS confers increased risk of unintended repeat pregnancy 1 year after delivery in a low income inner city population and, if so, whether depressive symptoms and poor contraceptive use early in the first postpartum year contributes to this risk.

Material and methods

Institutional review board approval was received from all participating institutions, including the Philadelphia Department of Public Health, Drexel University, and the University of Pennsylvania.

Study design and population

The study sample was drawn from a prospective observational cohort study of birth and infant health outcomes and behaviors among low-income, inner-city women from the mid Atlantic region. Women were recruited to the study from public health centers from February 2000 through October 2002. Eligibility criteria included English- or Spanish-speaking ability and a singleton intrauterine pregnancy. After written consent was obtained, participants at their first prenatal care visit (mean gestational age, 14.7 ± 6.9 weeks) completed the first of 3 sequential survey interviews. Interviews were conducted in English and Spanish by trained female interviewers who used standardized questionnaires. The second and third interviews were conducted in the homes of the women at approximately 3 months (mean, 3.3 ± 1.3) and 11 months (mean 11.0 ± 1.3) after the delivery, respectively. Nine percent of the women declined participation at enrollment. More than 85% of the women who enrolled completed each subsequent interview. To eliminate young women who were not yet delayed in educational status, we began with women who were ≥ 19 years old ($n = 1045$). We then removed those women who did not complete an interview at all 3 time points ($n = 117$), who reported not having sexual intercourse since the birth of their child (measured at the second postpartum interview; $n = 89$), who reported sterilization ($n = 114$) or the use of an intrauterine device ($n = 22$) for contraception, who were pregnant at the time of the first postpartum interview ($n = 3$), who desired pregnancy ($n = 4$), or who had missing data for any of the variables that were used in the analysis ($n = 53$). The final sample for analysis was comprised of 643 women. We removed women who were sterilized, those with intrauterine devices, and those who had not had sexual intercourse from the analysis because of their negligible risk for pregnancy in the study period. These women did not vary significantly by educational status or depressive symptoms from those women who were included in the analysis (data not shown). Women who used injectable contraception methods (taken every 1 or 3 months) in the study period were not excluded because the effectiveness of these methods requires ongoing (if reduced in frequency) medical adherence behaviors. Women who were pregnant at the first postpartum visit were excluded to avoid confusing depressive symptoms and lack of contraceptive use that result from pregnancy with those that lead to pregnancy. Women who reported desiring pregnancy at the first

prenatal visit were removed because the current analysis targets factors related to unintended pregnancy.

Dependent variables and covariables

Unintended pregnancy at the time of the second post-partum study visit was the dependent variable for the current analysis. All women who reported a pregnancy and stated that the pregnancy was not planned were coded as having an unintended pregnancy. At the first postpartum study visit, women were asked whether they were using contraception, the type of contraception being used, and the consistency of use (in use at the time of every episode of intercourse, sometimes, and rarely). Both contraceptive method and behavior were used to construct a 3-part contraceptive use variable that included (1) high effectiveness, (2) less effectiveness, and (3) no contraception.¹⁰⁻¹² High-effectiveness contraceptive use included oral and transdermal hormonal contraception (in use during every episode of intercourse), injectable depot formulations of medroxyprogesterone acetate (used every 3 months), and combination medroxyprogesterone acetate and estradiol cypionate (used monthly). Methods with lower effectiveness included male or female condom, diaphragm, cervical cap, emergency contraception alone (combined estradiol-progestin products), “rhythm” (periodic abstinence), withdrawal, spermicide alone, or any high-effectiveness methods that were reported in use less than “every time you have intercourse.” When >1 method was used, the method with the higher effectiveness rating was used to categorize contraceptive effectiveness.

Educational status was self-reported and dichotomized LEdS and high school graduate/ equivalence or higher. Depressive symptoms was measured with the Center for Epidemiologic Studies Depression Scale (CES-D), a 20-item instrument that is used widely to assess depressive symptoms, with scores that range from 0 to 60. The CES-D has been used in similar populations that include women in pregnancy and after delivery.^{13,14} We used the standard score cut point of >16 to indicate elevated depressive symptoms in the current analysis.¹⁵

Potential confounders that were identified a priori through a review of the literature on fertility control included age, marital status, ethnicity, nativity (US born or not), income, homelessness, and parity (previous live births).^{1,4,5,8,16} Any amount of current breast feeding was assessed at both postpartum visits because of the known inhibitory effect on postpartum fertility and reported association with educational status.^{17,18} Poor health behaviors that included smoking, alcohol use, recent marijuana use, and recent use of other illicit drugs were also included in the analyses on the basis of the literature that indicates associations with pregnancy intentionality, contraceptive use, and depression.^{4,19,20}

Statistical analysis

Bivariate associations were assessed with the Student *t* test and the chi-square statistic, with appropriate extension when variables with >2 categories were assessed. Possible confounding with educational status was assessed for each variable by stratified analyses of the unintended pregnancy odds ratio (OR) for each education category. Our criterion for inclusion of variables in the regression models was whether the adjusted OR (aOR) differed from the crude OR by an absolute difference of 10%. None of the tested potential confounders met these criteria.

Logistic regression models were used to explore the independent effect of LEdS on the likelihood of unintended pregnancy. Depressive symptoms and contraception use (both measured at the first postpartum visit) were added to the model to determine whether these variables explained any of the association between LEdS and unintended pregnancy (at the

second postpartum visit). Specifically, model A included only educational status and unintended pregnancy (OR); model B added depressive symptoms to the model (aOR); model C added contraceptive method use to the model, and all variables were assessed simultaneously. For all analyses, a 2-sided significance level was set at .05. Statistical software (SPSS version 12; SPSS Inc, Chicago, IL; STATA 8.0; Stata Corporation, College Station, TX) were used for analyses.

Results

Characteristics of the sample are summarized in Table I. LEdS was associated with an increased risk of unintended pregnancy at the second postpartum interview ($P=.007$). LEdS was not associated with any demographic variables that were assessed. Breast feeding was reported by 22.3% and 8.5% of participants at the first and second postpartum visits, respectively, and was not associated with LEdS. Breast feeding was also not associated with a risk of unintended pregnancy (not shown). With regard to health risk behaviors, women with LEdS were more likely to have smoked >20 cigarettes in their lives ($P<.001$) and to have used marijuana recently ($P=.044$) or other illicit drugs ($P<.001$). LEdS also was associated with a history of homelessness ($P=.002$) and depressive symptoms at the first postpartum interview ($P=.029$).

In the area of reproductive health, the LEdS group was associated with a higher mean parity (mean, 1.37 ± 1.15 vs 0.85 ± 1.55 births; $P<.001$) and with reported nonuse of contraception before the current (index) pregnancy in comparison with higher educational status group ($P=.003$). However, there was no association found between educational status and contraceptive use at the first postpartum interview.

Table II presents the results of multivariate logistic regression models testing the independence of the association between LEdS and unintended pregnancy. The risk of unintended pregnancy at the second postpartum interview was elevated among women with LEdS, as indicated by the unadjusted OR (model A: OR 2.32; 95% CI, 1.25-4.33). The point estimate of the odds of unintended pregnancy that was associated with LEdS was not influenced significantly by the addition of depressive symptoms (model B: aOR, 2.30; 95% CI, 1.23-4.30) or contraceptive behaviors (model C: aOR, 2.28; 95% CI, 1.21-4.27) measured at the first postpartum interview. As shown in model B, depressive symptoms were not associated with subsequent unintended pregnancy. Conversely, in model C, the use of less effective contraceptive methods at the first postpartum interview was associated significantly with unintended pregnancy at the second postpartum interview, independent of LEdS or depressive symptoms (OR, 2.32; 95% CI, 1.08-4.96).

Comment

In this prospective observational study of low-income inner-city women, we found that LEdS was a strong and independent predictor of unintended repeat pregnancy with more than twice the risk 1 year after a birth. We found no evidence that depressive symptoms or poor contraceptive use mediated the increased risk of unintended pregnancy that is associated with LEdS. We did find that LEdS was associated with risk of depressive symptoms and that less effective contraception use early in the first postpartum year was associated with an increased risk of unintended pregnancy by the end of that year. However, the inclusion of depressive symptoms and contraceptive use in multivariate models showed no adjustment of the odds of unintended pregnancy for the LEdS group.

Before discussing the implications of our study results, the limitations should be reviewed. First, many of the variables under study are based on self-report. Self-reported adherence to medications that included contraceptives is known to over represent actual use signifi-

cantly.²¹ However, the validity of our measure of contraceptive method is supported by the increased risk of unintended pregnancy that we observed at 11 months after delivery (second postpartum interview) among women who reported using less effective methods at 3 months after delivery (first postpartum interview). Another limitation is that the primary outcome variable, current unintended pregnancy, does not account for pregnancies that occurred but failed or were terminated before the time of the interview. However, because of underreporting, the variable we used is likely a more precise measure than if we had attempted to assess interval terminations or losses.¹¹ The rate of repeat pregnancy that we observed is also within the range that was reported in other studies that worked with similar populations.⁴ Finally, we did not assess frequency of intercourse after delivery. The risk for unintended pregnancy may be captured better by including a more complete measure of sexual activity in the study period because rates of sexual activity might be either increased or decreased in the context of depression or depressive symptoms.

Despite these limitations, our study merits attention because it contributes to the understanding of candidate mediators of rapid unintended repeat pregnancy risk within a vulnerable population. Because of the prospective design, we were able to assess contraceptive use on subsequent pregnancy rather than to rely on retrospective measures with their inherent biases. We have also assessed important potential confounders that include demographic factors, breast feeding, and negative health behaviors. Our finding that LEdS increases the risk of unintended repeat pregnancy supports the epidemiologic literature that indicate that women with less than high school education have difficulty with fertility control as reflected in higher lifetime fertility and increased risk of unintended pregnancy.^{1,5,11} This study also supports the findings that LEdS is a contributing factor in the socioeconomic and ethnic disparity that is seen in the risk of unintended pregnancy.⁴

In contrast to other studies, we found no association between LEdS and poor contraceptive use.⁷ Women with LEdS have been found to have less consistent contraceptive use and higher failure rates among all contraceptive methods.^{5,11} We limited our assessment to the postpartum period, and it is possible that the differences in contraceptive use that are attributable to educational status in the postpartum period are less pronounced than they are at times more remote from a delivery. Our finding that LEdS was associated with not using contraception before the study index pregnancy and an overall higher parity supports that interpretation.

Our study is consistent with literature that indicates that LEdS is associated with an increased risk of postpartum depressive symptoms.²² However, we failed to identify any link between depressive symptoms and poor contraceptive use or unintended pregnancy. There is little research that directly has assessed the relationship between depression and contraceptive use. Our findings contrast with one study that identified more inconsistent oral contraceptive use in women with mild-to-moderate depressive symptoms.⁸ The lack of association between depressive symptoms and poor contraceptive use contrasts with research on adherence to other chronic medications and suggests that the models that have been developed for medical adherence for chronic illnesses may not be applicable fully to the study of contraception use, at least in the postpartum period.⁶

LEdS has been shown repeatedly to be associated independently with a wide range of negative health outcomes. Understanding the mediating factors that lead to these outcomes remains an important goal to inform interventions that aim to reduce disparities in these groups. The results of this study clearly indicate the strong and independent association of LEdS and unintended rapid repeat pregnancy. Because educational status is collected widely and available generally to clinicians in the medical setting, it should be considered by clinicians who provide postpartum contraception services. Additional fertility control

support and services for women with LEdS may be helpful in reducing the risk of rapid repeat pregnancy for this vulnerable group. Because LEdS is associated with more difficult patient-physician communication and low health literacy, an enhanced service model will need to include the use of optimal health communication methods in the care of these patients.^{23,24} Our results suggest that this support should extend beyond the first 3 months after delivery. Because the greatest risk of poor maternal-child outcomes is associated with interpregnancy intervals of < 9 months, enhanced fertility control services may be needed through this period. Further exploration of the mechanisms by which LEdS contributes to disparities in reproductive health is indicated.

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Table I
Characteristics of the study sample

Variable	Total (n = 643)	High education [*]	Low education [†]	P value
Demographic				
Mean age (y) [‡]	24.81 ± 5.17	24.86 ± 5.17	24.70 ± 5.18	.709
Mean annual income (\$) [‡]	9,301 ± 11,381	9,682 ± 11,010	8,430 ± 12,170	.216
Foreign born (n)	141 (21.8%)	104 (23.1%)	37 (18.8%)	.220
Single (n)	470 (72.6%)	323 (71.8%)	147 (74.6%)	.456
Race/ethnicity (n)				
Black (non-Hispanic)	443 (68.9%)	310 (69.6%)	133 (67.5%)	.053
White (non-Hispanic)	73 (11.4%)	51 (11.3%)	22 (11.7%)	
Latina/Hispanic	104 (16.1%)	65 (14.4%)	39 (19.8%)	
Other	23 (3.6%)	21 (4.7%)	2 (1.0%)	
Health behavior (n)				
Breast feeding 3 mo after delivery	144 (22.3%)	102 (22.7%)	42 (21.3%)	.705
Breast feeding 11 mo after delivery	51 (8.5%)	37 (9.1%)	14 (7.1%)	.402

^{*} n = 447 (69.5%).

[†] n = 196 (30.5%).

[‡] Data are given as mean ± SD.

Table II
Multivariate regression models assessing the association between LEdS and unintended pregnancy at 11 months after delivery (n = 643)

Variable	OR: Model A (95%CI) *	AOR (95%CI)	
		Model B [†]	Model C [‡]
LEdS (<high school)	2.32 (1.25-4.33) [§]	2.30 (1.23-4.30) [§]	2.28 (1.21-4.27) //
Depressive symptoms 3 mo after delivery (>16 CES-D)		1.12 (0.58-2.15)	1.08 (0.56-2.08)
Contraception use			
Highly effective			1.00
Less effective			2.32 (1.08-4.96) //
None			2.01 (0.93-4.35)

* Crude OR between LEdS and unintended pregnancy.

[†] Adjusted OR with depressive symptom score (CES-D > 16).

[‡] Includes contraceptive use at 3 months after delivery.

[§] $P < .01$.

// $P < .05$.