Age at First Birth and Psychiatric Disorders in Low-Income Pregnant Women

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Abstract

Background: Young maternal age at first birth has been associated with poor mental health. However, few studies directly compared the prevalence of psychiatric disorders among adolescent versus adult mothers at first birth using a comprehensive diagnostic tool. This study examined the association between age at first birth and 22 current and lifetime psychiatric disorders in a cohort of low-income pregnant women.

Methods: The sample consisted of 744 low-income currently pregnant women who were Medicaid-eligible and enrolled in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) in Saint Louis City and 5 rural counties in Southeastern Missouri. Current (previous 12 months) and lifetime psychiatric disorders were assessed using the Diagnostic Interview Schedule IV (DIS-IV). Logistic regression analyses tested the association between women's age at first birth and psychiatric disorders, controlling for potential confounders, including relative poverty.

Results: When adjusting for confounders, mothers giving birth in their teens had 2.5 times the odds of having a lifetime behavior disorder (odds ratio [OR] 2.66, 95% confidence interval [CI] 1.35–5.24) and current post-traumatic stress disorder (PTSD) (OR 2.54, 95% CI 1.38–4.70) and almost twice the odds of having at least one anxiety disorder compared to older women at first birth (OR 1.78, 95% CI 1.10–2.85).

Conclusion: Low-income women who have their first birth in adolescence have higher odds of psychiatric disorders and should be the target of psychiatric screening during their pregnancy. Mothers beginning childbearing before age 19 should be screened during pregnancy for anxiety disorders, including PTSD, and behavior disorders.

Introduction

YOUNG MATERNAL AGE at first birth is associated with a variety of adverse outcomes, including increased psychological distress.^{1–4} A growing body of evidence indicates a higher prevalence of psychiatric disorders among pregnant adolescents versus adults.^{5–8} The association between psychiatric disorders and early childbearing has not been fully elucidated, but evidence shows that psychiatric disorders in adolescence may increase the risk of having either a first or a repeat teen pregnancy.^{9–11} Furthermore, entering pregnancy in adolescence is linked to lower educational and occupational attainment, lower income, and greater risk of remaining single. These factors, in turn, may further worsen the mental health of young mothers and contribute to their disadvantaged circumstances.^{5,12–14}

For instance, Behague et al.² reported that earlier age at first birth increased the odds of psychiatric distress in early

adulthood, with adjusted odds ratios (ORs) of 1.2, 1.6, and 2.4 for those entering pregnancy at ages 17–19, 15–16, and 11–14, respectively. Similarly, Williams et al.¹⁵ followed up women in New Zealand for 19 years and observed higher psychological symptom scores among women with adolescent versus adult age at first birth, with worse scores among those who dropped out of school. Also, Lanzi et al.⁶ found a higher likelihood of prenatal and postpartum depression among adolescent mothers at first birth compared to low-resource and high-resource adult mothers at first birth. Higher odds of postpartum depression were also observed among adolescent versus adult mothers in Portugal.¹⁶ This is worrisome because maternal mental health adversely impacts birth outcomes and is associated with offspring cognition, behavior, and psychomotor development.^{17–22}

Despite growing evidence of high rates of psychiatric disorders among pregnant and parenting adolescents, studies

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directly comparing the prevalence of psychiatric disorders among adolescents versus adults at first birth are few, and their results have varied. Studies have been limited by the almost exclusive use of screening tools rather than comprehensive diagnostic measures and have largely focused on depressive symptoms, while only a few examined anxiety, bipolar disorders, or substance use.⁸ A major design issue in studies comparing young to older mothers has been the comparability of the population from which each group was drawn. Prior studies included women from the general population. Their findings are thus potentially biased, as age at first birth is strongly confounded by poverty,^{4,12,23} and poverty is also associated with high rates of mental illness.^{2,24}

Only 2% of women from middle-income families experience their first birth before 18 years, while the rate from low-income families is 7%.²⁴ In a National Head Start program sample, low-income mothers were 1.56 times likely to have depression (95% confidence interval [CI] 1.30–1.88) compared to higher income mothers.²⁵ Similarly, data from the Parenting for the First Time Project indicated that clinical depression was highest among adolescent mothers, followed by low-income adult mothers compared to higher resource adult mothers.⁶ Merely adjusting for socioeconomic status in statistical analyses—as was done in previous studies—may still result in residual confounding by relative poverty, and thus, restricting the sample to an all-low-income population may help circumvent this issue.

This study compared the prevalence of 22 current (previous 12 months) and lifetime Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV) psychiatric disorders among currently pregnant women by their age at first birth (<19 vs. ≥19). Participants were recruited from the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), ensuring that all were low income and therefore avoiding the flaw of comparing largely low-income adolescent mothers to older mothers from general population samples. Psychiatric disorders were assessed with the Diagnostic Interview Schedule IV (DIS-IV), a standardized, reliable psychiatric diagnostic tool.²⁶

Materials and Methods

Study design

The sample included White and African American Medicaid-eligible pregnant women who were enrolled in WIC in Saint Louis City and five rural Missouri counties. Other race/ethnicity groups were too small for inclusion. Women were recruited at each WIC site, in the order identified, between February 25, 2000, and August 16, 2001. To obtain stable estimates by race and area of residence, the total sample was frequency matched by area of residence (urban vs. rural) and by race (White vs. African American).

Eligible women spoke English and were 13–45 years old when interviewed. Women were excluded if they had cognitive impairment as determined by having ≥12 errors on the dementia section of the DIS, as this may interfere with understanding of the interview questions. Only one woman was ineligible based on such exclusion criteria. Out of 878 women approached for participation, the final sample included 744 women (participation rate 85%). See Loveland Cook et al.²⁷ for a complete description of sampling.

Data collection

After approval by the Institutional Review Boards of Saint Louis University and the Missouri Department of Health and Senior Services, written informed consent was obtained from participants. Adolescent subjects provided their own consent since Missouri statutes allow pregnant minors to consent to medical care. Participants were interviewed once during their pregnancy for ~2 hours, either in their homes or at WIC sites, and received a \$25 gift card for participation. Interviewers received standardized training by certified DIS trainers in the administration of the DIS and study protocol. Data collection quality was monitored through taping of interviews.

Instruments

The DIS, a standardized diagnostic interview based on the American Psychiatric Association's DSM-IV, was used to assess whether respondents met criteria for 22 current (previous 12 months) and lifetime psychiatric disorders.^{26,28} The DIS-IV has shown good to excellent reliability for most diagnoses ($\kappa=0.60$ – 0.81) and to be valid compared to other structured diagnostic interview tools and assessments made by psychiatrists in both general and clinical populations.^{29–32}

Psychiatric disorders definition and categories

Psychiatric diagnoses included affective disorders (major depressive disorder [MDD], bipolar I and bipolar II disorders, and dysthymia), anxiety disorders (posttraumatic stress disorder [PTSD], obsessive compulsive disorder [OCD], generalized anxiety disorder, panic disorder, social phobia, specific phobia, and agoraphobia), psychotic disorders (schizophrenia, schizophreniform, and schizoaffective disorder), eating disorders (anorexia and bulimia), attention deficit-hyperactivity disorder, behavior disorders (antisocial personality disorder, oppositional disorder, and conduct disorder), and substance use disorders (alcohol abuse or dependence, nicotine dependence, and drug abuse or dependence).

The prevalence of the composite measures “any psychiatric disorder” and “any psychiatric disorder (excluding nicotine)” represented the prevalence rate of having at least one of the aforementioned psychiatric disorders, and all disorders except for nicotine dependence, respectively. Likewise, the prevalence of “any affective disorder,” “any anxiety disorder,” “any behavior disorder,” and “any substance use disorder” each represented the prevalence rate for having at least one of the disorders from their respective categories. Also, non-diagnosis variables were included for lifetime and current depressive and manic episodes, the building blocks for the affective disorders.

Statistical analysis

Statistical analysis was performed using the Statistical Analysis Package for Social Sciences SPSS version 20.0, and the level of significance was set at $p < 0.05$. Descriptive statistics were used to assess sociodemographic and pregnancy-related characteristics of the study sample and the prevalence rates of 22 current (previous 12 months) and lifetime psychiatric disorders. Bivariate analysis was conducted to compare women who had their first birth in adolescence versus adulthood using the chi-square test for categorical

variables and *t*-test for continuous variables. Multivariable logistic regression was used to estimate the crude and adjusted OR and its corresponding 95% CI for associations between age at first birth and outcomes of interest.

We evaluated potential confounders, including maternal race, area of residence, mother's trimester at interview, maternal education (corresponding vs. not corresponding for age), marital status, annual income (adjusted for a family size of four), and number of children previously born. Education corresponding for age was defined as having at least a high school education or General Educational Development certificate education for those ≥ 18 years, and on the corresponding number of school years by age for those < 18 years. Confounder selection was based on the 10% change in estimate rule, through which a variable was retained in the regression model if its removal from the model produced a change in OR of 10% or more compared to the estimate from the full model.³³

Due to the matching study design by race and area of residence, we evaluated whether those factors modified the association between age at first birth and psychiatric disorders, by including an interaction term between each of race and area of residence with age at first birth. Where the *p*-value from the Wald test for the interaction term was significant, results were presented stratified by the effect modifier variable.

Results

Most women in our study (60%) had experienced at least one previous live birth, and women were at different stages of pregnancy when interviewed, with 22% in their first trimester, 41% in their second trimester, and 37% in their third trimester. Age at first birth averaged 16.72 years for women who were adolescents (< 19 years) at first birth and 21.26 years for adults (≥ 19 years) at first birth. At the time of interview, most women (75.9%) were ≥ 19 years old, while 24.1% were < 19 years of age (data not shown).²⁷

Table 1 shows the demographic and pregnancy-related characteristics of participants by age at first birth. Two-thirds of women who were adolescents at first birth (64.4%) and half of those who were adults at first birth (50.9%) were African American. Almost 45% of mothers having their first child in adolescence did not have an education level that corresponded to age, whereas the majority (70.7%) of women who had their first child in adulthood did. Women who were adolescents at first birth were mostly single (51.8%), while about two-thirds of adult women at first birth were either married or living with a partner (67.8%).

A third of the sample had at least one current psychiatric disorder (Table 2), while almost half had at least one lifetime psychiatric disorder. Psychiatric disorders with the highest prevalence were affective disorders, followed by substance use, anxiety disorders, and behavior disorders. A similar pattern was observed for lifetime psychiatric disorders among adult women at first birth. In contrast, the most prevalent lifetime psychiatric disorders among adolescent women at first birth were anxiety disorders, followed by affective disorders, substance use disorders, and behavior disorders.

Ten percent of women having their first child as adolescents had a lifetime behavior disorder compared to about 4% of those who had their first child as adults ($p < 0.001$). Wo-

TABLE 1. SAMPLE CHARACTERISTICS BY AGE AT FIRST BIRTH ($N = 744$)

	<i>Age at first birth</i>		<i>p</i> ^a
	<i><19 years, n (%)</i>	<i>≥ 19 years, n (%)</i>	
Age at interview (years)			
Mean $\pm$ SD	20.11 $\pm$ 4.35	24.22 $\pm$ 5.13	< 0.001
Race			< 0.001
African American	235 (64.4)	193 (50.9)	
White	130 (35.6)	186 (49.1)	
Education			< 0.001
Corresponding for age	163 (44.7)	268 (70.7)	
Marital status			< 0.001
Married/living with partner	176 (48.2)	257 (67.8)	
Single	189 (51.8)	122 (32.2)	
Income			0.002
$< \$3600$	107 (29.9)	75 (20.1)	
$\geq \$3600$	251 (70.1)	299 (79.9)	
Number of previously born children			0.007
Mean $\pm$ SD	1.20 $\pm$ 1.40	0.95 $\pm$ 1.16	
Trimester at interview			0.588
Trimester 1	80 (22.0)	79 (20.9)	
Trimester 2	151 (41.5)	147 (38.9)	
Trimester 3	133 (36.5)	152 (40.2)	
Area of residence			0.588
Urban	146 (40.0)	159 (42.0)	
Rural	219 (60.0)	220 (58.0)	

^aChi-square test between < 19 years and ≥ 19 years at first birth for categorical variables and *t*-test for continuous variables.
SD, standard deviation.

men beginning childbearing in adolescence also had a significantly higher rate of any current psychiatric disorder excluding nicotine dependence (29.6% vs. 23.0%, respectively; $p < 0.05$), and about twice the rate of any current behavior disorder (7.1% vs. 3.4%, respectively; $p < 0.05$) and PTSD (10.4% vs. 5.0%, respectively; $p < 0.01$) compared to those older at first birth.

Adjusted multivariable binary logistic regression analyses (Table 3) showed that among the 12 current outcomes assessed, the odds of PTSD (aOR 2.54, 95% CI 1.38–4.70) and any anxiety disorder (aOR 1.78, 95% CI 1.10–2.85) were significantly higher among adolescents versus adults at first birth. Among the 18 lifetime outcomes assessed, the odds of any behavior disorder (aOR 2.66, 95% CI 1.35–5.24) were higher among adolescent versus adult women at first birth. There were no significant associations between age at first birth and the remaining current and lifetime outcomes assessed.

There was a significant interaction between age at first birth and race in predicting the nondiagnosis variable current manic episodes ($p = 0.024$; data not shown). Stratified analysis by race showed that White adolescent women with a first birth were twice as likely to have current manic episodes as Whites who were adults at first birth (aOR 2.10, 95% CI 0.74–5.96). African American women who were adolescents at first birth were almost half as likely to have a current manic episode than African American women who were adults at first birth (aOR 0.42, 95% CI 0.15–1.18) (Table 4, model 1).

TABLE 2. PREVALENCE OF CURRENT AND LIFETIME PSYCHIATRIC DISORDERS BY AGE AT FIRST BIRTH

	<i>Current psychiatric disorders, n (%)</i>			<i>Lifetime psychiatric disorders, n (%)</i>		
	<19 years	≥19 years	p ^a	<19 years	≥19 years	p ^a
Behavior disorders						
Any behavior disorder	26 (7.1)	13 (3.4)	0.024	38 (10.4)	14 (3.7)	<0.001
Affective disorders						
Major depressive disorder	34 (9.3)	27 (7.1)	0.276	55 (15.1)	65 (17.2)	0.440
Bipolar I	19 (5.2)	20 (5.3)	0.965	25 (6.8)	27 (7.1)	0.883
Any affective disorder	53 (14.5)	48 (12.7)	0.460	82 (22.5)	93 (24.5)	0.505
Anxiety disorders						
Generalized anxiety disorders	n/a	n/a	n/a	17 (4.7)	14 (3.7)	0.511
Specific phobia	n/a	n/a	n/a	15 (4.1)	20 (5.3)	0.452
Social phobia	n/a	n/a	n/a	19 (5.2)	13 (3.4)	0.233
Posttraumatic stress disorder	38 (10.4)	19 (5.0)	0.006	58 (15.9)	49 (12.9)	0.250
Any anxiety disorder	56 (15.3)	41 (5.5)	0.067	88 (24.1)	76 (20.1)	0.182
Any attention deficit hyperactivity disorder	n/a	n/a	n/a	11 (3.0)	19 (5.0)	0.166
Substance use disorders						
Nicotine dependence	26 (7.1)	36 (9.5)	0.241	39 (10.7)	62 (16.4)	0.024
Drug abuse or dependence	n/a	n/a	n/a	28 (7.7)	29 (7.7)	0.992
Alcohol abuse or dependence	n/a	n/a	n/a	33 (9.0)	30 (7.9)	0.581
Any substance use disorder	40 (11.0)	41 (10.8)	0.951	77 (21.1)	87 (23.0)	0.541
Any psychiatric disorder	124 (34.0)	106 (28.0)	0.076	162 (44.4)	177 (46.7)	0.526
Any psychiatric disorder (excluding nicotine)	108 (29.6)	87 (23.0)	0.040	152 (41.6)	161 (42.5)	0.817
Depressive episode	45 (12.3)	35 (9.3)	0.177	78 (21.4)	88 (23.2)	0.545
Manic episode	17 (6.5)	23 (7.6)	0.610	26 (7.1)	31 (8.2)	0.588

^ap-Value based on chi-square test.

n/a, numbers not reported if total count <30 for a given condition.

TABLE 3. OR AND 95% CI FOR AGE AT FIRST BIRTH IN ASSOCIATION WITH CURRENT AND LIFETIME PSYCHIATRIC DISORDERS

	<i>Current psychiatric disorders</i>		<i>Lifetime psychiatric disorders</i>	
	<i>Crude OR (95% CI)</i>	<i>Adjusted OR (95% CI)^a</i>	<i>Crude OR (95% CI)</i>	<i>Adjusted OR (95% CI)^a</i>
Behavior disorders				
Any behavior disorder	2.16 (1.09–4.27)	1.41 (0.67–2.96)	3.03 (1.61–5.69)	2.66 (1.35–5.24)
Affective disorders				
Major depressive disorder	1.34 (0.79–2.27)	1.39 (0.78–2.48)	0.86 (0.58–1.27)	1.11 (0.72–1.71)
Bipolar I	0.99 (0.52–1.88)	1.09 (0.54–2.21)	0.96 (0.55–1.69)	0.97 (0.53–1.80)
Any affective disorder	1.17 (0.77–1.78)	1.27 (0.80–2.01)	0.89 (0.64–1.25)	1.10 (0.76–1.61)
Anxiety disorders				
Generalized anxiety disorders	n/a	n/a	1.27 (0.62–2.62)	1.49 (0.68–3.27)
Specific phobia	n/a	n/a	0.77 (0.39–1.53)	0.91 (0.43–1.94)
Social phobia	n/a	n/a	1.55 (0.75–3.18)	1.86 (0.85–4.05)
Posttraumatic stress disorder	2.20 (1.24–3.90)	2.54 (1.38–4.70)	1.27 (0.84–1.92)	1.30 (0.83–2.03)
Any anxiety disorder	1.49 (0.97–2.30)	1.78 (1.10–2.85)	1.27 (0.90–1.79)	1.35 (0.92–1.99)
Any attention deficit hyperactivity disorder	n/a	n/a	0.59 (0.28–1.26)	0.70 (0.31–1.57)
Substance use disorders				
Nicotine dependence	0.73 (0.43–1.24)	0.91 (0.51–1.63)	0.61 (0.40–0.94)	0.64 (0.39–1.05)
Drug abuse or dependence	n/a	n/a	1.00 (0.58–1.72)	1.02 (0.57–1.83)
Alcohol abuse or dependence	n/a	n/a	1.16 (0.69–1.94)	1.36 (0.76–2.41)
Any substance use disorder	1.02 (0.64–1.61)	1.24 (0.74–2.07)	0.90 (0.63–1.27)	0.99 (0.67–1.47)
Any psychiatric disorder	1.33 (0.97–1.81)	1.38 (0.94–1.89)	0.91 (0.68–1.22)	0.98 (0.71–1.36)
Any psychiatric disorder (excluding nicotine)	1.41 (1.02–1.96)	1.36 (0.94–1.95)	0.97 (0.72–1.29)	1.08 (0.78–1.49)
Psychiatric symptoms				
Depressive episode	1.38 (0.86–2.20)	1.43 (0.85–2.39)	0.90 (0.64–1.27)	1.14 (0.77–1.68)
Manic episode	0.85 (0.44–1.62)	0.91 (0.45–1.84)	0.86 (0.50–1.48)	0.83 (0.46–1.49)

First birth as an adult is the reference group.

^aOR was adjusted for race, education, marital status, income, number of children previously born, trimester at interview, and area of residence.

CI, confidence interval; n/a, numbers not reported if total count <30 for a given condition; OR, odds ratio.

TABLE 4. OR AND 95% CI FOR AGE AT FIRST BIRTH IN ASSOCIATION WITH SELECT PSYCHIATRIC DISORDERS, STRATIFIED BY RACE (MODEL 1) AND AREA OF RESIDENCE (MODEL 2)

	White		African American	
	Crude OR (95% CI)	Adjusted OR (95% CI) ^a	Crude OR (95% CI)	Adjusted OR (95% CI) ^a
<i>Model 1</i>				
Current psychiatric disorders				
Manic episode	2.07 (0.79–5.46)	2.10 (0.74–5.96)	0.41 (0.16–1.02)	0.42 (0.15–1.18)
	Urban		Rural	
	Crude OR (95% CI)	Adjusted OR (95% CI) ^b	Crude OR (95% CI)	Adjusted OR (95% CI) ^b
<i>Model 2</i>				
Lifetime psychiatric disorders				
Posttraumatic stress disorder	0.63 (0.34–1.16)	0.58 (0.30–1.13)	2.51 (1.37–4.60)	2.69 (1.39–5.18)
Any anxiety disorder	0.85 (0.50–1.42)	0.86 (0.48–1.53)	1.79 (1.11–2.89)	1.94 (1.14–3.30)

First birth as an adult is the reference group; Analyses are only shown where interaction term between age at first birth and each of race (model 1) and area of residence (model 2) is significant.

^aCovariates included were education, marital status, income, number of children previously born, trimester at interview, and area of residence.

^bCovariates included were race, education, marital status, income, number of children previously born, and trimester at interview.

Furthermore, there was a significant interaction between age at first birth and area of residence in predicting lifetime PTSD and any lifetime anxiety disorder ($p=0.001$ and $p=0.027$, respectively; data not shown). Stratified analysis by area of residence showed that among rural women, those adolescents at first birth were more than 2½ times as likely to have lifetime PTSD as those adults at first birth (aOR 2.69, 95% CI 1.39–5.18). Among women residing in urban areas, those adolescents at first birth were about half as likely to have lifetime PTSD as those adults at first birth (aOR 0.58, 95% CI 0.30–1.13) (Table 4, model 2). Similarly, among women residing in rural areas, those adolescents at first birth were almost twice as likely to have a lifetime anxiety disorder compared to women older at first birth (aOR 1.94, 95% CI 1.14–3.30), whereas among urban women, those adolescents at first birth were less likely to have a lifetime anxiety disorder than those adults at first birth (aOR 0.86, 95% CI 0.48–1.53) (Table 4, model 2).

Discussion

The prevalence of at least one current psychiatric disorder among low-income pregnant women who had their first birth at ≥ 19 years (28.0%) was slightly higher than the rate of 25.3% reported by Vesga-Lopez et al.³⁴ from a national probability sample of pregnant and postpartum women. This is consistent with studies showing a higher prevalence of psychiatric disorders among low-income samples such as ours.³⁵ While Andersson et al.³⁶ and Spitzer et al.³⁷ reported a lower rate of any current psychiatric disorder among adult pregnant women in Sweden (14.1%) and U.S. women of reproductive age (20.0%), respectively, these findings are not comparable to ours given their use of the Primary Care Evaluation of Mental Disorders (PRIME-MD) diagnostic tool. The PRIME-MD includes only 13 rather than 22 psychiatric disorders and yields a point estimate based on symptoms over the previous 2–4 weeks.³⁷ In contrast, the DIS current diagnosis is based on meeting criteria within the last 12 months.

We found a higher prevalence of having at least one current psychiatric disorder among those <19 years at first birth

(34.0%). This rate is comparable to the 32.5% prevalence reported by Mitsuhiro et al.⁷ among 1000 low-income Brazilian teenage women using the Brazilian version of the Composite International Diagnostic Interview.

The most prevalent categories of disorders among adult women at first birth were those of any current and any lifetime affective disorders (12.7% and 24.5%, respectively), with the most prevalent disorder in that category being current and lifetime MDD (7.1% and 17.2%, respectively). These rates are similar to the 13.3% for current affective disorders and 8.4% for MDD reported by Vesga-Lopez et al.³⁴ In contrast, the most prevalent category of current psychiatric disorders among adolescent women at first birth was anxiety disorders (14.5%), while the most prevalent current individual disorders were PTSD (10.4%), MDD (9.3%), and nicotine dependence (7.1%). Mitsuhiro et al.⁷ reported similar rates among pregnant adolescents with prevalence of any current affective disorder, PTSD, MDD, and nicotine dependence of 14.1%, 10.0%, 12.9%, and 10.3%, respectively.

It is notable that in our sample, the rate of both current and lifetime PTSD exceeds that of MDD for women <19 years at first birth but not for women older at first birth. In addition, the rate of current PTSD among women with early first birth was more than twice that among women older at first birth (10.4% vs. 5.0%, respectively, $p=0.006$). While few studies have assessed the prevalence of PTSD among pregnant women, Mitsuhiro et al.⁷ found a similar rate (10.0%) in an adolescent sample, and Ayers and Pickering³⁸ found a slightly lower rate (8.1%) in a study involving both adolescent and adult pregnant women.

Our multivariable analysis showed that, after controlling for confounders, adolescent women at first birth were 2.54 times more likely to have current PTSD compared to mothers older at first birth. It should be noted that in our study, the group with adolescent first birth also included all of those (24.1%) who were <19 years when assessed. Adolescent pregnancy is associated with traumatic childhood events, including rape and sexual abuse with the strongest

associations for the youngest mothers,^{39,40} so it is not surprising that current PTSD was so prevalent among those with early first birth. However, that PTSD was more prevalent than MDD suggests that the current emphasis on depression among young mothers needs to be expanded to address PTSD.

Another interesting finding of this study is that women beginning childbearing as adolescents were 2.66 times as likely to have a lifetime behavior disorder (95% CI 1.35–5.24) and 1.78 times as likely to have any current anxiety disorder (95% CI 1.10–2.85) than women older at first birth. Finding lifetime but not current behavior disorder to be associated with younger age at first birth is likely an artifact of the three behavior disorders that make up the any behavior disorder diagnostic category, namely oppositional disorder, conduct disorder, and antisocial personality disorder. Since 24.1% of our sample were adolescents when assessed and 0.5% were <15 years (*i.e.*, the threshold for antisocial personality symptoms), a proportion of mothers in the young age at first birth category had not yet passed out of the period of risk for conduct disorder or very far into the period of risk for antisocial personality disorder.

The absence of association between age at first birth and affective disorders is striking, given what has been reported in the literature. Indeed, the fact that the comparison by age at first birth was made between women from directly comparable, low-income, populations may account for this absence of association. Prior studies largely compared adolescent women to adult women from a general population and did not adequately control for relative poverty even within a clinic or low-income sample. Consequently, results were confounded by poverty. Rates of depression are higher among low-income populations than more affluent groups,^{2,24} and adolescent mothers in the general population are much more likely to be poor and minority than women beginning their families in adulthood.^{4,12,23} Even in our exclusively low-income sample, relative poverty (income adjusted for a family of four) met criteria as a confounder and was included as a covariate in the adjusted models.

Another finding of note is that women in either age group in our study were equally likely to have substance use disorders. This is surprising because the cluster of behavior problems historically associated with early risky behavior includes substance use in addition to early sexual behavior. However, early sexual behavior, poor contraceptive use, and other circumstances leading up to adolescent parenthood are each strongly associated with poverty, and prevalence of mental health disorders is higher among low-income populations.^{2,24}

While Kessler et al.⁴¹ provided strong evidence from the National Comorbidity Study that mental health disorders predicted increased odds for adolescent parenthood, they did not control for relative poverty, which may explain some of the excess risks demonstrated. Indeed, our low-income sample reported a much higher prevalence of both substance use and affective disorders than reported by Kessler et al.,⁴¹ suggesting that their findings may have been confounded by poverty. In addition, substance use may be underreported by our sample because of the social undesirability of substance use during pregnancy.^{42,43} This may have resulted in non-differential misclassification, biasing the estimate toward the null.

Strengths and limitations

Our study has several limitations. First, our multivariable analyses (Table 3) were adjusted for confounding from race, education corresponding for age, income, marital status, and number of children previously born. With the exception of race, each of these characteristics is negatively affected by young age at first birth.^{5,7,12} That is, remaining single, not completing high school, having reduced income, and having more children could be consequences of first birth in adolescence. They could be on the causal pathway from young age at first birth to increased odds of psychiatric disorders. Controlling for these factors might therefore result in an underestimation of the association between age at first birth and psychiatric disorders.

Second, power analysis revealed that we had sufficient statistical power (*i.e.*, ≥80%) for any lifetime behavior disorder, while the power for the remaining outcomes ranged from 3% for lifetime drug abuse to 77% for current PTSD. Thus, we cannot rule out the possibility that a significant association might have been detected for psychiatric disorders that showed null associations had our sample size been larger. A third limitation is that the analysis is cross-sectional, which impedes any temporal analysis between age at first birth and the development of psychiatric disorders. Fourth, while the DIS has been validated for use among other population groups, it has not been tested for use among pregnant women in particular. Nevertheless, prevalence rates of psychiatric disorders in this study were comparable to those reported from other studies, including national probability samples of women of childbearing age. Also, the adult version rather than the child version of the DIS was used for the assessment of psychiatric conditions among adolescent mothers in our sample for comparability purposes. However, the DIS has been considered valid among youth as young as 15 and 16 years of age,^{44,45} and only 2.8% of the current sample was <16.

Fifth, there may be residual confounding by variables we did not control for such as the presence of comorbid medical conditions, genetic inheritance, child maltreatment, planned versus unplanned pregnancy, father involvement, and family/social support. Of note is that we evaluated history of partner abuse, adverse life events, and traumatic events as potential confounders in the regression analysis and found they did not confound the association of interest.

Sixth, women in our sample were 13–43 years of age at the time of interview. This may have increased the likelihood of recall bias for lifetime psychiatric disorders among older mothers, while it likely underestimated such disorders among younger mothers since the probability of having a psychiatric disorder at some point in one's lifetime increases with age. Similarly, younger mothers may not have crossed yet the age threshold for the diagnosis of select psychiatric disorders such as conduct disorder, potentially underestimating such diagnoses among these women. Finally, our findings are based on a sample of women who were Medicaid-eligible and enrolled in WIC in selected areas in Missouri, and may not be generalizable beyond these groups.

Despite its limitations, this study is one of the first few to examine associations between psychiatric disorders and age at first birth, while adequately controlling for differences in socioeconomic status between women who became mothers

in adolescence versus adulthood. Becoming a mother in adolescence does not occur randomly and is preceded by several crossroads, including becoming sexually active at a young age, lack of or inconsistent use of contraception, and once pregnant, carrying an infant to term, and raising the infant rather than placing it for adoption.⁴⁶ Each crossroad passed creates a yet more selected subset of the population of young women.

Consequently, the biggest challenge is testing whether young initiation of motherhood is in itself associated with higher odds of mental health disorders or whether the apparent association is due to the socioeconomic circumstances associated with odds of early parenthood. That is, an adult mother comparison group should be drawn from a similar population. Additional strengths of this study include its use of a standardized diagnostic tool (DIS-IV) to assess psychiatric disorder prevalence and the inclusion of low-income pregnant women using WIC, a population group susceptible for both early childbearing and psychiatric disorders.^{2,6,24,25,41}

Conclusion

Women living in poverty and having a first birth in adolescence versus adulthood are more likely to have psychiatric disorders, including PTSD and behavior disorders, but not depression and other affective disorders. Increased odds of PTSD are not surprising considering that the younger the age at first birth among adolescents, the greater the likelihood of a history of childhood sexual or physical abuse.^{47,48} Likewise, the risk of a lifetime behavioral disorder is not surprising, given that early sexual behavior and pregnancy have been associated with several adolescent problem behaviors.^{1,9,10,49} However, that older women at first birth in our sample were just as likely as younger ones to have affective disorders suggests that adolescent mothers at first birth should be screened for psychiatric disorders beyond depression, including anxiety disorders and PTSD specifically.

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