Family Poverty Over the Early Life Course and Recurrent Adolescent and Young Adult Anxiety and Depression: A Longitudinal Study

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Objectives. We determined whether exposure to family poverty over a child's early life course predicts adolescent and young adult anxiety and depression.

Methods. We used a birth cohort study of a sample of women in Brisbane, Australia, who were recruited in early pregnancy and whose children were followed up on at ages 14 and 21 years. Some 2609 mothers and adolescents provided usable data at the 14- and 21-year follow-ups.

Results. After adjustment for poverty at other phases, poverty at the 14-year follow-up was the strongest predictor of adolescent and young adult anxiety and depression. The more frequently the child was exposed to poverty, the greater was the risk of that individual being anxious and depressed at both the 14- and 21-year follow-ups.

Conclusions. Family poverty predicts higher rates of adolescent and young adult anxiety and depression. Increased frequency of child exposure to poverty is a consistent predictor of adolescent and young adult anxiety and depression. Repeated experiences of poverty over a child's early life course are associated with increased levels of poor mental health. (*Am J Public Health.* 2010;100: 1719–1723. doi:10.2105/AJPH.2009.180943)

Family poverty has been associated with a variety of adverse health outcomes,[1–6] including poor mental health. Relatively little, however, is known about the extent to which poverty and socioeconomic disadvantage experienced early in the life course (e.g., fetal, childhood, or adolescent period) may have long-term consequences. Poverty experienced in early childhood has been found to affect cognitive and other health and developmental outcomes.[7–9] Little is known, however, about whether there may be critical periods during gestation, childhood, or adolescence when exposures to poverty may have major and irreversible consequences.

The notion of critical or sensitive periods has a long history.[10] The concept of sensitive periods must be distinguished from the effects of the intensity, duration, or frequency of exposure to a stimulus (i.e., the cumulative level of exposure). Generally, periods over the life course that might be characterized as critical or sensitive are periods when those exposed are experiencing important biological changes, and when the exposure modifies these ongoing biological changes.[11,12] Gestation, early childhood, and adolescence are stages of the life course during which the fetus, child, or adolescent is experiencing rapid biological change. Although the specific mechanisms involved in the finding of critical or sensitive periods remain a matter of debate, they are likely to include the concept of brain plasticity and epigenetic processes.[13]

Whether there are critical or sensitive periods for the impact of family poverty on the development of childhood mental illness (specifically, anxiety and depression) does not appear to have been a subject of previous research. In some of the few studies that have tracked the impact of early life-course experiences of poverty on adult chronic diseases, the observation of statistically significant associations has not been accompanied by a focus on differences in life-course stage in the experience of poverty.[8,14]

We examined 3 specific questions concerning the association between family poverty and anxiety and depression among adolescents and young adults: Does family poverty experienced at different points over the early life course affect anxiety and depression at the 14-year (adolescent) and 21-year (young adult) follow-ups? Does recurrent exposure to family poverty have a cumulative effect on adolescent and young adult anxiety and depression? Is the association between family poverty and anxiety and depression in children and young adults independent of some possible confounding factors—specifically, mother's age at time of pregnancy, mother's marital status, mother's anxiety and depression, and offspring's income in adulthood?

METHODS

We used data from the Mater Hospital–University of Queensland Study of Pregnancy (MUSP), a prospective longitudinal study of a consecutive cohort of individuals born in Brisbane, Australia, between 1981 and 1984 at a major public hospital (Mater Misericordiae Hospital). Recruitment procedures for the larger study have been detailed elsewhere.[15] This study is based on 2609 children who provided self-reported data on their level of anxiety and depression at the 14- and 21-year follow-ups and for whom data were available on family income and other covariates at previous follow-ups.

Measures

Family income. Mothers of the respondents were asked about their total gross annual household income (including spouse's income, child endowment, and so on) during pregnancy (mean=18 weeks of gestation), 3 to 5 days after the child's birth, and when the child was 6 months, 5 years, and 14 years old. Those with low income comprised approximately 25% of the sample at each phase of data collection (Table 1). The low-income group was selected

TABLE 1—Percentage of Participants Experiencing Family Poverty at Each Phase of Data Collection and Percentage Experiencing Recurrent Poverty: Mater Hospital–University of Queensland Study of Pregnancy, Brisbane, Australia, 1981–1984

	Phase of Data Collection			
	Mother's Pregnancy	Age 6 Months	Age 5 Years	Age 14 Years
% poor (n = 3907)	28.7	22.8	22.3	18.9
Of those poor during mother's pregnancy (n = 1122), % subsequently poor	. . .	50.5	38.3	26.4
Of those poor at 6 mo (n = 890), % subsequently poor	. . .	. . .	44.8	31.0
Of those poor at 5 y (n = 737), % subsequently poor	. . .	. . .	. . .	38.5

to represent a group estimated to be at or below the poverty level (see Keeping et al.[16] for details of sampling). Data on the personal income of the respondent was also obtained at the 21-year follow-up.

Child anxiety and depression. Child anxiety and depression was assessed by using the Youth Self-Report (YSR) questionnaire at the 14-year follow-up and the Young Adult Self-Report (YASR) questionnaire at the 21-year follow-up. The YSR is based on the Child Behavior Checklist (CBCL)[17] and obtains self-reports from 11- to 18-year-olds. Only the anxiety and depression subscale (Cronbach $\alpha = 0.84$) was used. We used a 10% cutoff to create a dichotomous variable by treating the highest 10% of scores as anxious and depressed "cases." This is consistent with criteria listed by Achenbach[18] for using the CBCL and YSR for research purposes. The YASR is also based on the CBCL and YSR and is administered to persons aged 18 years and older. It presents a series of statements that address the experience of symptoms during the last 6 months. Only the anxiety and depression subscale (Cronbach $\alpha = 0.91$) is presented. The CBCL and related scales (YSR, YASR) have been extensively used and validated.[19]

Control variables. Maternal age was measured at the first clinic visit (mean = 18 weeks of pregnancy). Mothers were a mean age of 25 years (SD = 4.9). Marital status at entry to the study was divided into 2 categories: mothers who were married or living in a de facto relationship and mothers with no partner (single, separated or divorced, or widowed). We adjusted for marital status and maternal age because these factors are associated with both socioeconomic status and mental health.

Maternal reports of anxiety and depression were assessed at entry to the study with established subscales for each measure obtained from the Delusions Symptoms-States Inventory (DSSI) of Bedford et al.[20] The DSSI has been validated against groups with diagnosed mental illness.[21,22] For the current cohort, the Cronbach α was 0.77 for the 7-item depression subscale (prenatal) and 0.76 for the 7-item anxiety subscale (prenatal).

Statistical Analysis

Participants for whom information was available on anxiety and depression at age 14 and 21 years, family income at each phase, and information on maternal age, marital status, and maternal mental health were included in the present analyses. Using the χ^2 statistic, we first examined the association between exposure to family poverty at different stages of child development and anxiety and depression measured when the child was aged 14 and 21 years. We then used logistic regression models to estimate the association between frequency of exposure to poverty and child anxiety and depression measured by the YSR and YASR at age 14 and 21 years, respectively. Data analysis was undertaken with Stata 10 (StataCorp LP, College Station, TX).

RESULTS

The size of the group living in poverty declined somewhat over time (Table 1). Of those mothers living in poverty at recruitment, some 50.5% at the 6-month follow-up, 38.3% at the 5-year follow-up, and 26.4% at the 14-year follow-up were still living in poverty. Table 2 suggests that poverty at any phase of the study appears to be associated with an

TABLE 2—Percentage of Participants Exposed to Family Poverty at Different Stages of Life Course and Experiencing Anxiety and Depression at Age 14 Years or 21 Years: Mater Hospital–University of Queensland Study of Pregnancy, Brisbane, Australia, 1981–1984

		Anxiety and Depression at Ages 14 and 21 Years (n = 2609)			
Poverty Status	No.	At Neither Age, %	At Either Age, %	At Both Ages, %	α^2_2 (*P*)
During mother's pregnancy					
Not poor	1877	73.4	21.8	4.9	
Poor	732	67.4	24.9	7.8	12.9 (<.01)
At age 6 mo					
Not poor	2061	72.9	21.9	5.2	
Poor	548	67.2	25.4	7.5	8.2 (<.05)
At age 5 y					
Not poor	2057	72.9	22.2	4.9	
Poor	552	67.0	24.3	8.7	14.2 (<.01)
At age 14 y					
Not poor	2172	73.4	21.7	4.9	
Poor	437	63.2	27.2	9.6	24.5 (<.001)

Note. Anxiety and depression as reported in the Youth Self-Report (14 years) questionnaire and the Young Adult Self-Report (21 years) questionnaire.

TABLE 3—Association Between Participants' Family Poverty and Anxiety and Depression at Age 14 Years or 21 Years: Mater Hospital–University of Queensland Study of Pregnancy, Brisbane, Australia, 1981–1984

	Model 1, OR (95% CI)			Model 2, OR (95% CI)			Model 3, OR (95% CI)			Model 4, OR (95% CI)		
Time of Poverty	At Neither Age (Ref)	At Either Age	At Both Ages	At Neither Age (Ref)	At Either Age	At Both Ages	At Neither Age (Ref)	At Either Age	At Both Ages	At Neither Age (Ref)	At Either Age	At Both Ages
During mother's pregnancy	1.0	1.2 (1.0, 1.5)	1.7 (1.2, 1.5)	1.0	1.1 (0.9, 1.4)	1.5 (1.0, 2.2)	1.0	1.2 (0.9, 1.5)	1.4 (1.0, 2.1)	1.0	1.2 (0.9, 1.5)	1.5 (1.0, 2.2)
At age 6 mo	1.0	1.3 (1.0, 1.6)	1.6 (1.1, 2.3)	1.0	1.1 (0.9, 1.4)	1.1 (0.7, 1.6)	1.0	1.1 (0.9, 1.5)	1.0 (0.6, 1.6)	1.0	1.1 (0.9, 1.4)	1.0 (0.7, 1.6)
At age 5 y	1.0	1.2 (1.0, 1.5)	1.9 (1.4, 2.8)	1.0	1.0 (0.8, 1.3)	1.5 (1.0, 2.2)	1.0	1.0 (0.8, 1.3)	1.4 (1.0, 2.2)	1.0	1.0 (0.8, 1.3)	1.4 (0.9, 2.2)
At age 14 y	1.0	1.5 (1.1, 1.8)	2.3 (1.6, 3.3)	1.0	1.4 (1.0, 1.8)	1.9 (1.3, 2.9)	1.0	1.4 (1.1, 1.8)	1.9 (1.3, 2.9)	1.0	1.4 (1.1, 1.8)	1.8 (1.2, 2.8)

Note. CI = confidence interval; OR = odds ratio. Anxiety and depression as reported in the Youth Self-Report (age 14 years) questionnaire and the Young Adult Self-Report (age 21 years) questionnaire. Total number of participants was 2609. Model 1 is unadjusted; model 2 is adjusted for poverty at other phases; model 3 is adjusted for model 2 plus maternal anxiety and depression at first clinic visit; model 4 is adjusted for model 3 plus income at 21-year follow-up.

increased rate of anxiety and depression for the children at both the 14- and 21-year follow-ups.

After adjustment for poverty at other phases, poverty experienced at the time of the early childhood (6-month) follow-up was not independently related to subsequent anxiety and depression (Table 3). Additional adjustment for maternal anxiety and depression (model 3) and respondent's (i.e., child's) income at 21-year follow-up (model 4) did not greatly affect these findings. In the final model, family poverty experienced at the 14-year follow-up provided the strongest independent prediction of recurrent experiences of adolescent and young adult anxiety and depression.

Overall, 50.6% of the 2609 respondents for whom complete data were available did not experience poverty, whereas 24.8% of respondents experienced poverty at 1 follow-up, 14.1% at 2 follow-ups, and 10.4% at 3 or more follow-ups (Table 4). Multiple experiences of family poverty were associated with a point estimate of 3.2 times the odds of the respondent being anxious and depressed at both the 14- and 21-year follow-ups. Successive adjustments for the mother's age and marital status (model 2), and additionally for maternal marital status and maternal anxiety and depression (model 3), confirmed the strong association between repeated experience of family poverty and adolescent and young adult anxiety and depression. Further adjustment for the respondents' own income at the 21-year follow-up (model 4) confirmed a linear association between the number of times the family had experienced poverty and the subsequent rate of anxiety and depression experienced by the adolescent or young adult.

DISCUSSION

Our findings confirm an association between family poverty experienced at a number of stages in the child's early developmental life course and that child's mental health. Gestation, childhood, and adolescence have previously been suggested as either critical or sensitive periods for exposure to poverty.[23] Unexpectedly, we did not find that family poverty experienced during the first year of life (6-month follow-up) independently predicted subsequent anxiety and depression in the adolescent or young adult. Our findings suggest that it is the cumulative effect of exposure to family

TABLE 4—Multivariate Association Between Participants' Exposure to Frequent Poverty and Anxiety and Depression at Age 14 Years or 21 Years: Mater Hospital–University of Queensland Study of Pregnancy, Brisbane, Australia, 1981–1984

		Model 1, OR (95% CI)			Model 2, OR (95% CI)			Model 3, OR (95% CI)			Model 4, OR (95% CI)		
No. of Times in Poverty[a]	No.	At Neither Age	At Either Age	At Both Ages	At Neither Age (Ref)	At Either Age	At Both Ages	At Neither Age (Ref)	At Either Age	At Both Ages	At Neither Age (Ref)	At Either Age	At Both Ages
0 (Ref)	1321	74.6	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
1	647	72.3	1.1 (0.9, 1.4)	1.3 (0.9, 2.0)	1.0	1.0 (0.9, 1.4)	1.3 (0.8, 2.0)	1.0	1.1 (0.8, 1.3)	1.2 (0.7, 1.8)	1.0	1.1 (0.8, 1.4)	1.1 (0.7, 1.8)
2	369	67.8	1.3 (1.0, 1.7)	1.9 (1.2, 1.7)	1.0	1.3 (1.0, 1.7)	1.8 (1.1, 2.9)	1.0	1.3 (1.0, 1.7)	1.7 (1.0, 2.7)	1.0	1.3 (1.0, 1.7)	1.7 (1.0, 2.8)
3–4	272	61.4	1.6 (1.2, 2.1)	3.2 (2.0, 5.1)	1.0	1.5 (1.1, 2.1)	2.8 (1.7, 4.5)	1.0	1.5 (1.1, 2.1)	2.6 (1.5, 4.3)	1.0	1.5 (1.1, 2.1)	2.6 (1.5, 4.3)

Note. CI = confidence interval; OR = odds ratio. Anxiety and depression as reported in the Youth Self-Report (age 14 years) questionnaire and Young Adult Self-Report (age 21 years) questionnaire. Total number of participants was 2609. Model 1 is unadjusted; model 2 is adjusted for poverty at other phases; model 3 is adjusted for model 2 plus maternal anxiety and depression at first clinic visit; model 4 is adjusted for model 3 plus income at 21-year follow-up.

[a]Number of times at follow-up that the respondent reported living in poverty.

poverty that has the most consistent impact on adolescent and young adult anxiety and depression.

What is the process that is likely to connect recurrent exposure to family poverty with adolescent anxiety and depression? It has been argued that the poor are continually confronted by their relative deprivation of resources, with the consequence that their emotional and mental health is adversely affected.[24] It may be, however, that poverty affects a number of lifestyle characteristics, and these in turn may lead to increased rates of anxiety and depression.[7,12,23,25] Cumulative experiences of poverty over the early life course may be important because they are associated with different developmental and environmental exposures as the child matures (e.g., parental marital conflict, poor school performance, difficulty obtaining employment).

The finding that poverty experienced shortly after birth is not independently related to subsequent anxiety and depression is particularly interesting, as is the finding that family poverty during the mother's pregnancy is not as strong a predictor of outcomes as family poverty in later childhood and the adolescent period. Strong advocacy for "early" intervention programs to prevent the onset of anxiety and depression are not supported by our findings.

In this study, we found no support for the existence of critical or even particularly sensitive periods for the development of anxiety and depression. Family poverty during the mother's pregnancy or during the respondent's childhood do not appear to be associated with a greatly disproportionate increase in adolescent and young adult anxiety and depression. However, family poverty experienced in the child's adolescent period appears to be the strongest independent predictor of repeated experiences of higher levels of anxiety and depression. Our findings argue for policies that directly affect the amount of time a child may be exposed to family poverty rather than programs that address the many specific and arguably more proximate factors that may affect adolescent and young adult anxiety and depression. It must also be noted that poor mental health is associated with a wide range of adult health characteristics, including cardiovascular disease and tobacco and alcohol abuse.[24,26] This emphasizes the importance of learning more about the causal pathways that connect early-life-course experiences of poverty and major chronic diseases (including mental illness) in adulthood.

Limitations

Of the 3588 adolescents who provided information on anxiety and depression in the YSR at the 14-year follow-up, only 2609 responded to the YASR questionnaire at the 21-year follow-up, creating a possible source of bias. Those lost to follow-up were disproportionately from the lowest socioeconomic groups.[15] We have examined the family income at entry to the study of those who completed or did not complete the YSR and the YASR. Although those in the lowest income groups were less likely to complete the YSR and YASR, the differences were not large. In any event, the effect of any bias would be to remove participants who were both living in disadvantaged socioeconomic circumstances and were more likely to score poorly on the YSR and YASR. Our findings should therefore be interpreted as providing a conservative assessment of the impact on child anxiety and depression of socioeconomic disadvantage over the early life course. We statistically modeled a number of best-case and worst-case scenarios, replacing those lost to follow-up with different assumptions (e.g., that they were 1.5, 2.0, or 2.5 times more likely to experience anxiety and depression). A general finding from these modeling exercises was that even with the replacement of cases on the basis of the loss of the most economically disadvantaged, the effect on estimates of association was modest. Furthermore, the available data did not document the precise age of onset of the child's mental health problems.

Conclusions

Children born into a family that experiences recurrent poverty are more likely to experience anxiety and depression when they reach adolescence and young adulthood. It is the cumulative impact of recurrent poverty over the early life course that has the most consistent association with subsequent reductions in mental health. If, as we suggest, poverty leads to a range of experiences that negatively affect a child's mental health, it may be important to develop policies that move families out of poverty with the aim of reducing the burden of chronic diseases experienced by the economically disadvantaged. ■

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Contributors

J.M. Najman developed the study aims and wrote the first full draft of the article. M.R. Hayatbakhsh conducted the analysis and helped with interpretation of the findings. A. Clavarino contributed to the interpretation of findings and discussion. J.M. Najman, W. Bor, M.J. O'Callaghan, and G.M. Williams were responsible for the development and management of the project. G.M. Williams also contributed to data analysis and presentation of data.

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Human Participant Protection

All relevant ethical safeguards were met regarding participant protection, and participants included in the project gave informed consent and their anonymity was preserved. Ethics committees of the University of Queensland and the Mater Hospital approved the study.

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