ORIGINAL ARTICLE

Macroeconomic Environment During Infancy as a Possible Risk Factor for Adolescent Behavioral Problems

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Context: Economic difficulties at the individual level can lead to a number of behavioral problems, including substance abuse and delinquent behaviors.

Objective: To examine the influence of a nationwide adverse economic environment during infancy, specifically, the high unemployment rates during and after the 1980 and 1981-1982 recessions, on rates of subsequent adolescent substance use and delinquent behaviors.

Design: We used data from the National Longitudinal Survey of Youth 1997 and estimated logit regressions to examine the effect of changes in unemployment rates during infancy on the incidence of adolescent behavioral problems, controlling for known youth, family, and environmental risk factors.

Setting: Adolescents living in the United States in 1997.

Participants: Nationally representative sample of 8984 adolescents born from January 1, 1980, through December 31, 1984.

Main Outcome Measures: Probability of engaging in substance use (marijuana, smoking, alcohol, and hard [ie, illegal] drugs) and delinquent behaviors (arrest, handgun use, gang affiliation, petty and major theft, property destruction, and assaultive behavior).

Results: Exposure to a 1% deviation from mean regional unemployment rates at the age of 1 year was associated with an increase in the odds ratios of engaging in marijuana use (1.09 [95% CI, 1.04-1.14]), smoking (1.07 [1.03-1.11]), alcohol use (1.06 [1.02-1.10]), arrest (1.17 [1.09-1.25]), gang affiliation (1.09 [1.00-1.19]), and petty (1.06 [1.01-1.10]) and major theft (1.11 [1.05-1.18]). No significant associations were noted with use of hard drugs, property destruction, and assaultive behavior.

Conclusions: The macroeconomic environment during infancy can have serious long-term effects on substance use and delinquent behavior. These potential long-term effects can play an important role in policy making for adolescent mental health care.

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THE CURRENT ECONOMIC CRISIS has received a lot of attention from policy makers. However, the traditional focus of the attention has been on short-term effects, such as housing and unemployment. The long-term influences of such crises, particularly on infants and young children, have generally not been examined. This study investigates the relationship between exposure to macroeconomic crises during infancy and long-term behavioral problems, including substance use and delinquency.

The study focuses on 1 important type of macroeconomic crisis: recessions. A *recession* refers to a period of diminishing economic activity; however, the most noticeable impact of a recession is a high level of unemployment, which typically increases during the recession and often continues to be high for several months after the recession.[1,2] The impact of such widespread unemployment is 2-fold. Unemployment reduces the household income and increases financial stress among the jobless individuals. Furthermore, those who remain employed often face wage cuts and uncertainty about the stability of their jobs. We can expect such adverse economic experiences to have serious effects on the emotional and mental health of individuals.[3-6]

Studies have identified an increased risk for substance abuse, depression, anxiety, and violent behaviors among adults who were exposed to economic crises.[7,8] In addition to individual mental health, unem-

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ployment can also affect marital relationships and family dynamics.[1,4,9,10] These effects, in turn, can have a harmful influence on other family members, particularly the more vulnerable members of the family system.[11] For instance, Dooley and Prause[8] augmented previous research[12-15] by confirming that parental unemployment, particularly maternal unemployment, is associated with increased risk for low birth weight. Similarly, in the Danish Birth Cohort study, maternal unemployment was associated with increased odds of a child's being hospitalized for neglect or abuse.[16] Adverse social conditions arising from difficult financial circumstances have also been associated with conduct problems and oppositional behaviors and with substance abuse in children.[17-19] Descriptive studies suggest that, during the Great Depression of 1929, "unstable" behaviors, such as antisocial behavior, increased among children.[20]

In a longitudinal study of 167 children and adolescents during the Great Depression, Elder[1] explored the effect of changing family role, status, and dynamics during periods of high unemployment on children and adolescents. Elder concluded that parental unemployment can have a significant effect on the adolescent's attitudes and personality and established the effect of high unemployment rates on families and the long-term effects on children. In another longitudinal study, Hayatbakhsh et al[21] noted that economic difficulties and disruption in the family structure as early as 5 years of age can influence adolescent substance abuse. They also reported that changes in maternal marital status, maternal substance abuse, and inadequate maternal supervision can increase the risk for substance abuse during adolescence in particular. More recently, Huisman et al[22] pooled data from the Avon Longitudinal Study of Parents and Children and the Tracking Adolescents' Individual Lives Survey and reported that low household income was associated with an increased risk of internalizing and externalizing problems in children. In a similar vein, low family socioeconomic position, independent of parental psychopathology, can be a significant risk factor for mental health problems in the offspring.[23]

We build on these studies by exploring the possible effects of exposure to macroeconomic crises during infancy on subsequent behavioral development. Specifically, this study examined the relationship between changes in unemployment rates and certain behavior markers of substance use and delinquency. Dysfunctional family dynamics and parental psychopathology can affect early parenting.[24-26] Thus, we hypothesized that an environment of high unemployment rates during infancy would influence long-term adolescent psychopathology.

METHODS

DATA

The primary source of data was the National Longitudinal Survey of Youth 1997 (NLSY97).[27,28] The NLSY97 survey is sponsored and directed by the US Bureau of Labor Statistics and conducted by the National Opinion Research Center at the University of Chicago, Chicago, Illinois, with assistance from the Center for Human Resource Research at The Ohio State University, Columbus. The NLSY97 survey was designed to be representative of adolescents living in the United States in 1997 and collected information on demographics, family and community background, and criminal and other delinquent behavior for a cohort of 8984 youth born from January 1, 1980, through December 31, 1984. The NLSY97 consisted of 5 rounds of interviews beginning in 1997. During round 1 in 1997, the Youth Questionnaire, which inquired into employment, schooling, family background, health, attitudes, and behaviors, was administered to each youth participant. In the same round, a Parent Questionnaire, which explored the youth's history and status and key aspects of the parent's own life, including household income, was administered to one of the youth's parents.

The NLSY97 was selected for 3 reasons. First, as described in the previous paragraph, it provides a nationally representative sample of adolescents. To our knowledge, our study is the first to use a nationally representative sample of adolescents in the United States to examine the research question. Second, considerable fluctuations occurred in the macroeconomic environment from 1980 through 1984, including 2 periods of recession as defined by the National Bureau of Economic Research and a wide range of national unemployment rates (6.6% to 11.4%).[2] Hence, some members of the NLSY97 cohort were exposed to periods of high unemployment rates during their infancy, while others were not; about 25% of the cohort was exposed to regional unemployment rates above 9.25% at the age of 1 year, whereas about 25% of them turned 1 year of age when the regional unemployment rate was below 7.25%. This broad range of exposure provides statistical variation for a meaningful examination of the effects of changes in the macroeconomic environment on behavioral development. Finally, the macroeconomic climate in the United States was generally very favorable and accompanied by robust economic growth from 1984 until 1997, except for a short recession from July 1990 through March 1991 that did not affect unemployment rates as much as those in the 1980s. Thus, the NLSY97 cohort of youth was not exposed to periods of economic crises later in their life until 1997.

DEPENDENT VARIABLES

The main dependent variables were behavioral problems among adolescents aged 12 to 16 years in 1997. The underlying source of data for these variables was the Youth Questionnaire, which asks respondents about problem behaviors in the past. We identified the following 10 specific behavioral problems: marijuana abuse (n=8064), smoking (n=8069), alcohol consumption (n=8063), hard (ie, illegal) drug abuse (n=7538), arrests (n=8072), handgun use (n=8074), gang affiliation (n=8080), theft (petty [<$50], 8075 responses; major [>$50], 8073 responses), property destruction (n=8074), and assaultive behavior (n=8072), which were examined in detail (the numbers refer to the number of valid responses on that problem behavior variable). These behaviors were chosen because they fell under the broad umbrella of substance use and delinquent behaviors, which are suggestive of conduct problems.

MAIN INDEPENDENT VARIABLE

The main independent variable was the unemployment rate. Because unemployment rates differ across geographic regions, the study used regional unemployment rates from the Local Area Unemployment Statistics, Bureau of Labor Statistics, for analyses.[29]

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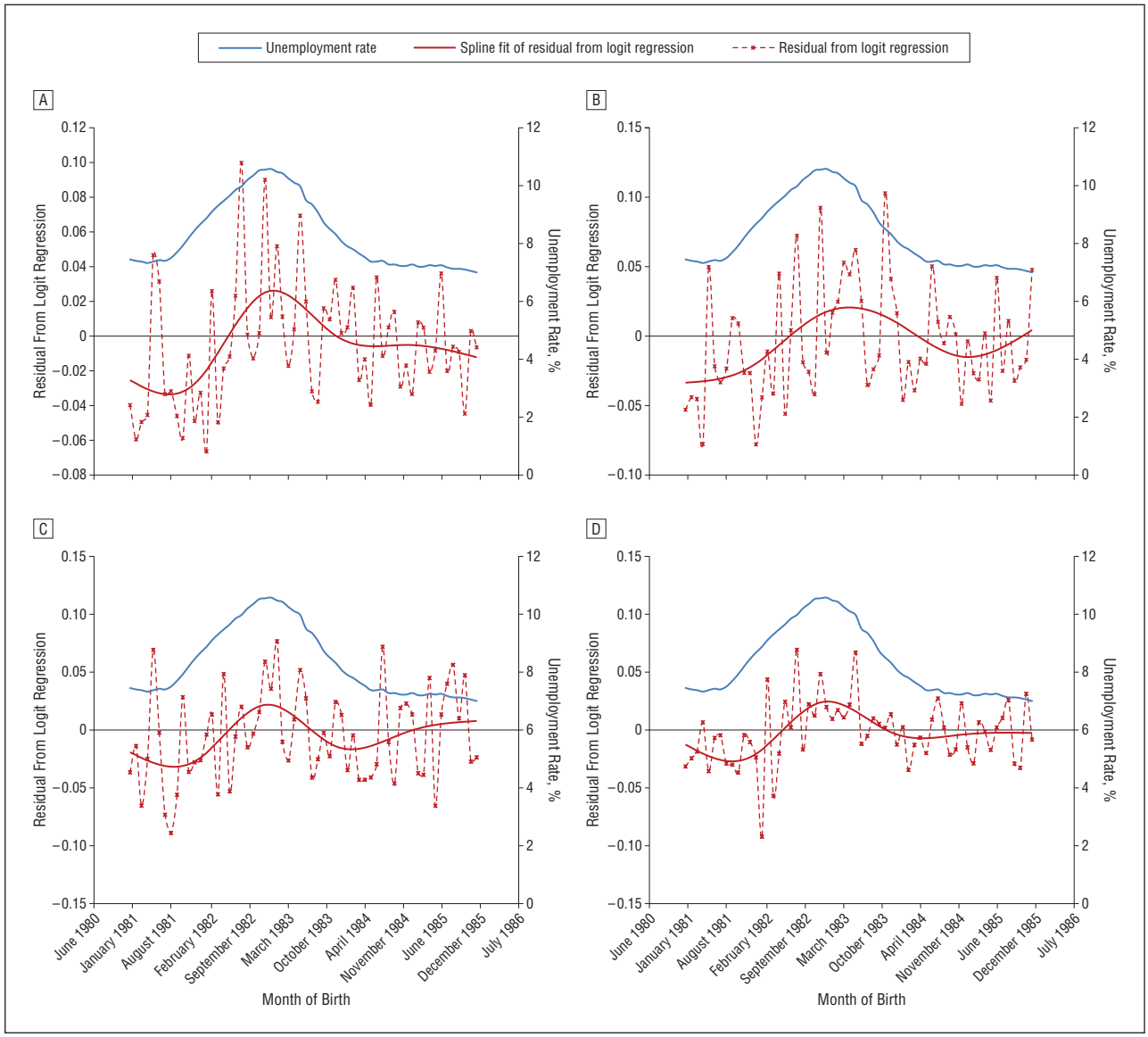

Figure 1. Residuals and unemployment rates. A visual comparison of the national unemployment rate at 12 months of age with the predicted probability to engage in select behavioral problems. The behavioral problems are measured as the residuals from logistic regressions of the problem on all confounding variables. A, Marijuana use. B, Smoking. C, Alcohol use. D, Arrest.

OTHER COVARIATES

The influence of unemployment rate on behavior was covaried on youth, family, and environmental factors. Specifically, the following variables (hereinafter referred to as *confounding variables* [CVs]) were included:

1. Youth factors: age, sex, and ethnicity of the youth.
2. Family factors: mother's age at birth and parenting style. Parenting style, one of several "created variables" in the NLSY97,[27,28] was derived from a set of questions administered to the youth that enquired into supportiveness and permissiveness of the parent.
3. Environmental factors: whether the youth was living in a foster family and whether any siblings were gang members.

Furthermore, interregional differences in the means of these CVs were controlled for by including region as a fixed effect in our regression analyses.

STATISTICAL ANALYSIS

All analyses were performed using commercially available software (STATA/SE 9.0 and STATA/IC 12.0; StataCorp). The first part of the analysis involved a visual examination of the temporal association between the 2 variables of interest (ie, unemployment rate and the behavioral problem) after controlling for other potential risk factors. We used logit regressions to predict the probability of engaging in a specific problem behavior based only on the CVs. Residuals were computed as the difference between the outcome variable (0 or 1) and the predicted probability. These residuals represent the probability of indulging in problem behaviors that cannot be explained by these CVs. Monthly averages of these residuals (based on the month of birth) and natural splines of these residuals with 4 knots were plotted. We then superimposed the average unemployment rate when the youth was 12 months of age on these plots, giving us **Figure 1**. Thus, Figure 1 compares the predicted rate of the problem behavior (be-

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Table. Unemployment Rates and Problem Behavior[a]

	Entire Sample (Baseline)				Excluding January to July 1980 Cohort			
		Age, mo				Age, mo		
	At Birth	6	12	18	At Birth	6	12	18
Substance abuse								
Marijuana	1.08[b]	1.10[c]	1.09[c]	1.08[c]	1.06	1.09[c]	1.10[c]	1.09[b]
Tobacco	1.06[b]	1.07[c]	1.07[c]	1.05	1.04	1.06[c]	1.05[b]	1.01
Alcohol	1.00	1.03	1.06[c]	1.06[c]	0.99	1.02	1.07[c]	1.09[c]
Hard drugs	1.02	1.00	1.01	1.03	1.01	1.00	1.00	1.06
Delinquency								
Arrest	1.11[b]	1.16[c]	1.17[c]	1.13[b]	1.07	1.15[c]	1.19[c]	1.17[b]
Handgun use	1.04	1.07	1.06	1.05	1.04	1.09[b]	1.12[c]	1.11
Gang affiliation	1.01	1.09[b]	1.09[b]	1.03	1.03	1.11[b]	1.19[c]	1.16
Theft								
Petty (<$50)	1.03	1.05[b]	1.06[b]	1.04[b]	1.02	1.05	1.06	1.04
Major (>$50)	1.06	1.09[c]	1.11[c]	1.12[c]	1.02	1.07[b]	1.09[b]	1.09
Property destruction	1.03	1.04	1.05	1.06[b]	1.02	1.02	1.02	1.04
Assaultive behavior	0.95	1.00	1.02	1.02	0.97	1.01	1.05	1.12[b]

[a] Data are expressed as the factors by which a 1% increase in the regional unemployment rate during infancy (above the mean rate) increases the odds ratio of indulging in a specific behavior during adolescence. The entire sample uses unemployment rate at birth and at 6, 12, and 18 months of age, computed as follows: the number of births in 1981 was 3.629 million.[30] The average incidence of marijuana use (in 1997) in the nationally representative sample for children born from 1980 through 1984 was 0.200. Using the factor increase in odds ratio from the logit regressions (1.09), the higher unemployment rate in 1982 translates to an odds ratio of 0.232 ($0.200 \times 1.091^{1.7}$). Hence, the additional number of 1981-born youth using marijuana in 1997 is 3.629 million× (0.232 − 0.200), or approximately 115 000.

[b] Significant at the 5% level (2-tailed).

[c] Significant at the 1% level (2-tailed).

yond that explained by the CVs) with the national unemployment rate at 12 months of age. Owing to space constraints, we restricted the graphs to 4 behaviors (specifically, marijuana use, smoking, alcohol use, and arrest).

The second part of the analysis used logit regressions. We examined the effect of regional unemployment rate at birth and 6, 12, and 18 months of age in 4 separate logit regressions for each adolescent behavioral problem. As explained in the previous paragraph, the focal behavioral problem was the dependent variable in these regressions. In addition to the main independent variable of interest (ie, regional unemployment rate), these regressions included all the CVs. Finally, as an eAnalysis (http://www.jamapsych.com), we examined whether household income may mediate the effect of unemployment on long-term outcomes. To do so, we used the NLSY97 variable termed the *povratio*, defined as the ratio of the gross annual household income variable to the federal poverty level for the previous year, taking household size into account. Based on this variable, we stratified the sample into youth whose households were below and above the median povratio and created a variable that was 0 for youth in the former strata and 1 for youth in the latter strata. Throughout, we followed the recommendations of NLSY97 documentation and adjusted for sample weights by weighting the regressions appropriately. The eAnalysis provides further details on the statistical aspects of the study.

RESULTS

Figure 1 presents a visual examination of the temporal association between the propensity to engage in some of the problem behaviors (after accounting for the effect of the CVs) and the national unemployment rate. Figure 1 demonstrates that the pattern of the residuals is strikingly similar to that of the unemployment rate; youth who were exposed (at the age of 1 year) to a macroeconomic environment of high unemployment were more likely to engage in problem behavior. This finding suggests a strong association between the unemployment rate during infancy and subsequent problem behaviors. Similar examinations were performed with the remaining variables (abuse of hard drugs, handgun use, gang affiliation, petty theft, major theft, property destruction, and assaultive behavior). Although petty theft, major theft, and gang affiliation showed patterns similar to those presented in Figure 1, the other variables did not.

The **Table** presents a more formal analysis of the findings in Figure 1. It provides the results of regressions, including the variable of interest—regional unemployment rate—as an independent variable. The Table presents the factor by which a 1% increase in the regional unemployment rate (over the regional mean) increases the odds ratio of indulging in a specific behavior. Hence, in column 1, a 1% increase in the regional unemployment rate (over the regional mean) is associated with an increase in the odds ratio of marijuana use (over the regional mean) by a factor of 1.08 (95% CI, 1.01-1.51).

The Table shows that the propensity to abuse substances such as marijuana, tobacco, and alcohol shows a positive correlation with increases in the unemployment rate. The effects tend to be higher when unemployment rates at 12 months of age rather than at birth are used. Many of the delinquent behaviors also show similar positive correlations. At 12 months, the magnitude of these effects ranges from 1.06 (petty theft, $z = 2.44$; $P = .02$) to 1.17 (arrest, $z = 4.63$; $P < .001$). A 1% deviation from the mean regional unemployment rates at the age of 1 year was associated with an increase in the odds ratios of engaging in marijuana use (1.09 [95% CI, 1.04-1,14]), smoking (1.07 [1.03-1.11]), alcohol use (1.06 [1.02-1.10]), arrest (1.17 [1.09-1.25]), gang affiliation (1.09 [1.00-1.19]), and petty (1.06 [1.01-1.10]) and major theft (1.11 [1.05-1.18]). No statistically significant

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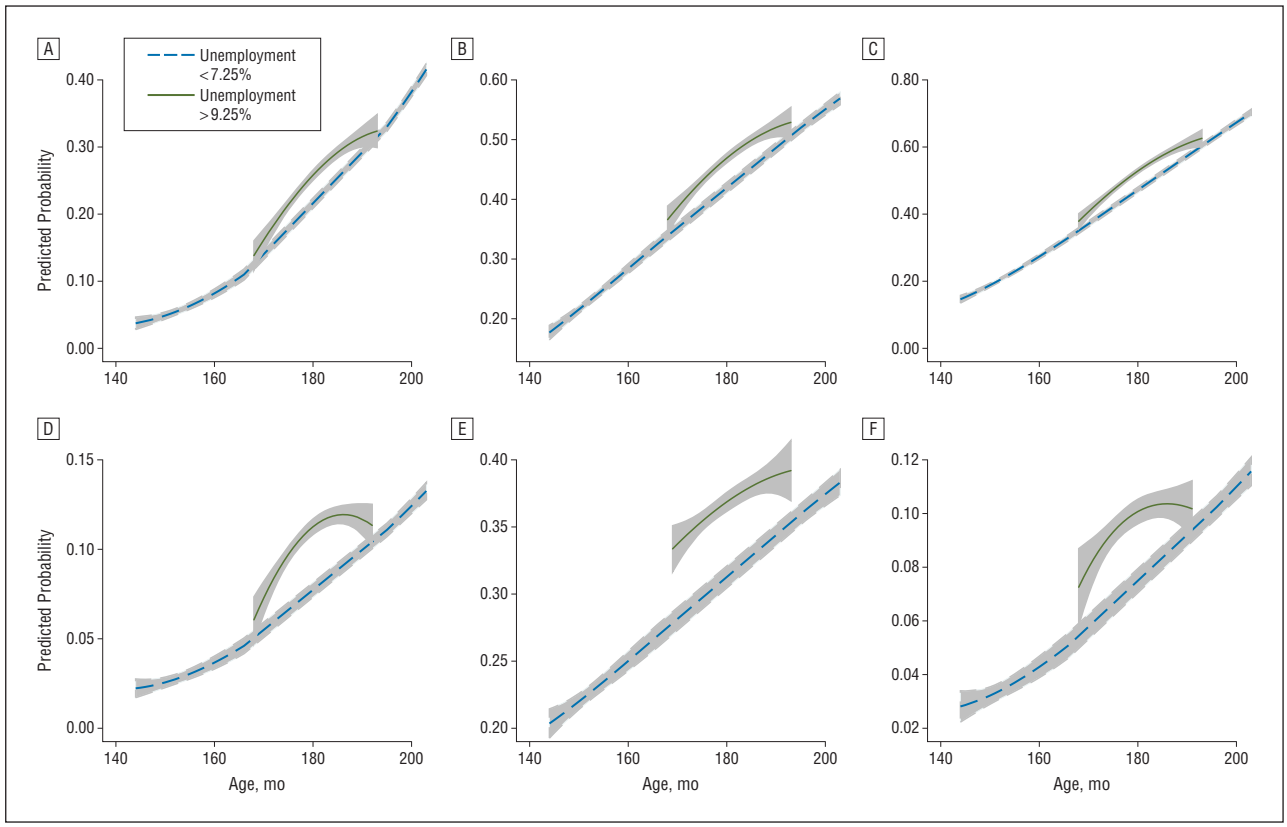

Figure 2. Macroeconomic unemployment rates at infancy and problem behavior. The predicted propensity of engaging in various behavioral problems during adolescence for youth who turned 1 year of age in a period of low unemployment (<7.25%) and who turned 1 year of age in a period of high unemployment (>9.25%). These 2 rates were approximately the 25th and 75th percentiles of unemployment rates during the study period. The lines for higher unemployment rate start at a later age than the line for lower unemployment rate because the periods of higher unemployment occurred in the earlier part of the study period. A, Marijuana use. B, Smoking. C, Alcohol use. D, Arrest. E, Petty theft. F, Major theft. The predicted probability of a problem behavior was calculated as a fractional polynomial fit of logit residuals (scales differ across graphs). Shaded areas indicate 95% confidence intervals.

effect was noted on abuse of hard drugs, handgun use, and assaultive behavior. These effects can be seen more clearly in **Figure 2**, which presents how the predicted propensity to engage in problem behavior changes with age for the following 2 sets of youth: those who turned 1 year of age in periods of low unemployment (<7.25%, approximately the 25th percentile) and those who turned 1 year of age in periods of high unemployment (>9.25%, approximately the 75th percentile). Even after controlling for all the CVs, the plots in Figure 2 demonstrate that the propensity of youth to engage in problem behaviors at a given age is significantly higher for those who were exposed to periods of high macroeconomic unemployment in their infancy than for those who were exposed to periods of low macroeconomic unemployment. For instance, the predicted probability of a 15-year-old youth (ie, 180 months of age) using marijuana is about 20% for those who turned 1 year of age in periods of low unemployment; the corresponding number is approximately 25% for those who turned 1 year of age in periods of high unemployment.

In all the baseline regressions in the Table, age was found to be a significant predictor of developing behavioral problems. Based on the regressions using unemployment rates at 12 months, increasing age by 1 month increased the odds of problem behavior by a factor of 1.01 (for property destruction [$z = 3.48$; $P = .001$]) to 1.06 (for marijuana abuse [$z = 23.94$; $P < .001$]). The strongest predictor of engaging in problem behavior was gang membership of siblings. For subjects whose siblings had gang affiliations, the odds of such behavior ranged from about 1.61 (for hard drug use [$z = 5.38$; $P < .001$]) to 10.57 (for gang affiliation [$z = 19.89$; $P < .001$]) times as high as for those whose siblings did not have any gang affiliations. Youth in foster families were also found to be much more prone to such behavior (by a factor of 1.24 for handgun use [$z = 2.61$; $P = .009$] to 2.13 for arrest [$z = 6.40$; $P < .001$]). The mother's parenting style was also a significant predictor of problem behavior. Youth who reported that their mother had an uninvolved parenting style compared with an authoritative style had a significantly higher propensity for such behavior by a factor of 1.50 (for arrest [$z = 2.47$; $P = .01$]) to 2.77 (for theft [$z = 7.70$; $P < .001$]). Boys appeared to be more prone to indulging in these activities than girls, although the difference was not always statistically significant.

Next, we ruled out the influence of 2 potentially confounding subsamples. We excluded the cohort born from January through July 1980, which was exposed to 2 recessions, and repeated the analysis. The results, shown in the last 4 columns of the Table, were very similar to the baseline results, suggesting that this unique cohort was not driving these results. The NLSY97 contains an indicator of whether a youth has faced "hard times" (eg, lived

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in a place without water or electricity or in a homeless shelter). To ensure that the results were not being driven by this small, unique subsample, these youth (n = 435) were excluded in a subsequent analysis. The magnitude of the coefficients was similar to the baseline results presented in the eTable, thus indicating that the results were not solely attributable to this small subsample.

We performed additional checks to ensure the robustness of our results. One potentially confounding factor that could result in autocorrelation is the season of birth. To address this potential concern, we reestimated the regressions after including season as a fixed effect. The results, presented in the eTable, are similar to our baseline results, suggesting that the season of birth does not influence our results significantly. The results also remained robust to inclusion of month as a fixed effect (eTable). Another test ruled out the influence of whether the youth was in a rural or urban locality. We included a dummy variable that measured this influence and found our results to be robust to this inclusion (eTable). A similar test ruled out the influence of whether the youth lived in a metropolitan statistical area.

A final analysis attempted to explain the influence of socioeconomic status. We reestimated the regressions in the Table after including the median povratio variable and the interaction of the povratio variable with the regional unemployment rate at 12 months after birth. The coefficients on the interaction term were always statistically not significant ($P > .05$), indicating that the impact of the regional unemployment rate was not significantly influenced by the socioeconomic status. A similar analysis was performed using youth in the top 5% and bottom 5% of the median povratio variable. Again, the interaction coefficients did not show statistical significance (eTable).

COMMENT

This study establishes that exposure to a national economic crisis, such as a recession, as early as 1 year of age is correlated with the development of behavioral problems in adolescence. The study used a nationally representative sample of youth born from 1980 through 1984 and demonstrated a strong correlation between changes in the regional unemployment rate during infancy and subsequent prevalence rates of behavioral problems. This influence was noted while controlling for a number of known risk factors for adolescent behavioral problems, including sex, parenting style, season of birth, and locale. These results held true even when we stratified the sample to rule out the cushion of financial comfort, suggesting that household financial stability does not offer much protection. These results suggest that, irrespective of socioeconomic status, unfavorable economic conditions during infancy may create circumstances that can have an adverse effect on the psychological development of the infant and lead to the development of behavioral problems. An earlier study by Duncan et al[31] using the Infant Health and Development Study suggested that family income and poverty could affect cognitive development. Duncan and colleagues further clarified that neighborhood economics have a significant influence on externalizing behaviors. The present study differs from this landmark study in examining long-term rather than immediate consequences.

The Table indicates that the impact of the macroeconomic problem was highest at the age of 12 months; however, the coefficients between the various time points are statistically similar. Marijuana use was most highly correlated with unemployment rates at infancy, closely followed by tobacco use, whereas use of hard drugs was the least correlated. With regard to delinquent behaviors, the most significant correlation was associated with arrest, followed by theft, handgun use, and property destruction. The study confirms findings from earlier literature that a permissive parenting style and male sex are associated with behavioral problems during adolescence.[30,32]

The magnitudes of the observed effects are considerable. The average unemployment rate during 1982 was approximately 1.7% higher than that during the other years. Using estimates from the regressions at 12 months and assuming causality, if the unemployment rate in 1982 was equal to the average rate from 1980 through 1981 and 1983 through 1984, approximately 115 000 (95% CI, 50 043-181 091) fewer 1981-born youth would have abused marijuana by 1997. This rate is computed from the number of births in 1981 at 3.629 million[30] and the average incidence of marijuana use (in 1997) in the nationally representative sample for children born from 1980 through 1984 at 0.200. Using the factor increase in odds ratio from the logit regressions (1.091), the higher unemployment rate in 1982 translates to an odds ratio of 0.232 ($0.200 \times 1.091^{1.7}$). Hence, the additional number of 1981-born youth using marijuana in 1997 is 3.629 million $\times$ (0.232 $-$ 0.200), or approximately 115 000. This rate is about 16% of the estimated number of 1981-born marijuana users (computed using the average incidence of marijuana use in the sample). Similar computations for smoking and alcohol use were 12% (172 520 individuals [95% CI, 72 936-274 744]) and 10% (162 491 [53 427-274 475]), respectively. Similar computations for delinquent behaviors ranged from 31% (88 814 individuals [95% CI, 45 806-133 932]) for arrests to 10% (120 545 [19 749-203 602]) for petty theft.

Three plausible mechanisms could lead to a correlation between macroeconomic environment during infancy and subsequent problem behavior. Given the scope of this study, we limit ourselves to a discussion of the possibilities based on the literature and do not attempt to discriminate among them. The first possible mechanism can be found in the investment model.[33] Economic stability provides parents with adequate economic resources for ensuring adequate academic and social growth of the child. Periods of high unemployment disrupt the economic stability of the parents and thereby jeopardize the child's growth.

The second possible mechanism relates to the family stress model.[33] Economic hardships can affect the quality of parenting by affecting parents' emotional states and by creating stressful marital and family environments.[10,34-37] These parental issues can also traumatize family dynamics.[1,34,38] Leinonen et al[34] examined the 1991 economic recession in Finland and concluded that economic hardships, including job instability, create stress-

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ful family environments, increase parental conflicts, and affect the quality of parenting. Thornberry and Krohn,[38] in their summary of the findings from the Rochester Youth Development Study, confirmed that economic hardship is associated with dysfunctional parenting, disrupting family processes and thereby leading to externalizing and internalizing behaviors. McLoyd et al[37] provided an interesting model explaining that maternal unemployment creates financial strain in families. This finding in turn leads to depressive symptoms in the mother, thereby affecting punishment and the adolescents' perception of the mother. All these factors affect the adolescent's socioeconomic functioning. Thus, a negative economic effect on parents causes dysfunctional parenting in early childhood, which can lead to the development of aggressive and impulsive tendencies, which in turn can have long-term consequences, including serious psychopathology during adolescence and adulthood. Furthermore, parental supervision during a period of macroeconomic stress can be affected by parental emotional disturbances[6] and increases in parental substance abuse. Parental supervision has been shown to affect risky behavior in adolescents.[39,40] Costello et al[18] also observed that dysfunctional parental supervision during economic crises played an important role in the development of behavioral problems.

A third possible mechanism is through changes in parental bonding and attachment. Early infancy is considered a critical age for parental bonding and attachment. Impaired early attachment has been identified as a risk factor for externalizing and internalizing behaviors.[41,42] The deficiency of adequate parental contact at a young age may lead to the development of dysfunctional impulse control, which has also been associated with adolescent substance abuse.[40,43] Studies have also reported that unemployment is associated with an increase in child abuse rates, which can lead to behavioral problems among children.[4,23,44] Furthermore, a widespread economic crisis can lead to significant changes in the infant's neighborhood, caretaking facilities, and possibly nutrition.[4,11] These changes can affect externalizing and internalizing behaviors in children.[11,45]

An important semantic point of discussion is that this study examines a statistical association between the unemployment rate and behavioral problems.[46] The study thus establishes that the macroeconomic unemployment rate at infancy is a risk factor for adolescent behavioral problems. This work does not establish that the unemployment rate is a causal factor for behavioral problems during adolescence. One advantage of using the unemployment rate is its monthly availability for all regions. We were unable to find other measures, such as median family income, net sales or employment in the retail trade, and the number of building permits, at this frequency across regions.[1] However, although the unemployment rate is correlated with median family income, unemployment rate does not measure the extent of financial resources available to the family directly. Furthermore, unemployment rates may not fully reflect the extent of underemployment in the economy.

We should note some other potential limitations of the study. Our objective was to provide indicative estimates of the magnitude of the effects of economic crisis at a national level. Hence, the study has abstracted away from the details of hardships suffered by individual families during these crises. One of the subanalyses, however, excluded families who had experienced particularly hard times. In addition, other unmeasured characteristics may have influenced the unemployment rate and the incidence of adolescent behavioral problems simultaneously. However, the likelihood that such characteristics exist is very small because the unemployment rate is determined at a far greater level of aggregation than individual adolescent behavioral problems. On a related note, the study lacks data on events between infancy and youth. Hence, the unemployment rate might reflect some unobserved events in the lives of these youth that influenced their behavior, although such reflection is unlikely. One important risk not factored in was parental substance abuse and behavioral disorders. Furthermore, the analysis was restricted to adolescents who had been exposed to a macroeconomic environment of high unemployment rates at ages 6, 12, and 18 months. If we had extended the age to, for example, 24 months, the sample would have consisted primarily of children born before 1982; hence, very few children in the sample would not have been born during a recession. Previous studies[11] have also suggested that financial support may mitigate some of the adverse impact of high unemployment rates. Unfortunately, these details were not available, and we were unable to control for any protective role of such public aid. Finally, the study lacks detailed data on the locality of the youth, which may also influence problem behavior.

Notwithstanding the mechanisms at work, some ameliorative measures have been proposed. Harper et al[11] recommend the introduction of measures and policies that enhance financial stimulus, including public assistance and unemployment benefits, to assuage some of the deleterious effects of high unemployment rates. As potential interventions, Conger[33] recommends the introduction of mental health programs for parents and children during times of crisis and help with parenting. Finally, basic measures aimed at improving nutrition, safety, and education can also provide much-needed respite during these times of crisis.[11,33]

CONCLUSIONS

This study used a nationally representative sample of youth born from 1980 through 1984 to examine the effects of an adverse macroeconomic environment during infancy on subsequent problem behaviors during adolescence. The results demonstrate a strong correlation between the unemployment rate during infancy and subsequent behavioral problems. This finding suggests that unfavorable economic conditions during infancy may create circumstances that can affect the psychological development of the infant and lead to the development of behavioral problems in adolescence. Thus, we may benefit by reflecting on potential long-term effects of the current recession in addition to the immediate mental health concerns normally considered in discussions of economic crises. Although the past does not necessarily predict the future, it provides important lessons. Our findings suggest an important static risk factor that mental health professionals may want to take

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into account when dealing with children exposed to the current economic crisis. We hope that the study inspires mental health professionals to look for potential causes and explore interventions that can mitigate some of these long-term consequences.

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