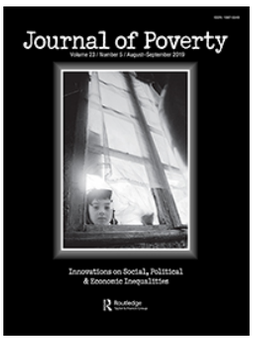

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The Role of Poverty and Income in the Differential Etiology of Violence: An Empirical Test

Joanne Savage[a], Stephanie K. Ellis[b], and Kevin H. Wozniak[c]

[a]Criminal Justice Sciences, Illinois State University, Normal, Illinois, USA; [b]Department of Criminal Justice, Marymount University, Fairfax, Virginia, USA; [c]Department of Sociology, University of Massachusetts Boston, Boston, Massachusetts, USA

ABSTRACT

Poverty has been linked with criminal behavior in theory and empirical research. The authors test the differential etiology of violence thesis using a sample of teenagers from the Add Health data set. Employing a three-pronged test and conservative models, the authors find that income is associated with variability in violent offending, even controlling for nonviolent offending. The family incomes of nonviolent-only offenders were comparable to those of nonoffenders. The findings call into question general theories of criminality that do not distinguish between violent and other forms of offending and support the proposal that poverty is differentially associated with violent crime.

KEYWORDS

Poverty; violence; differential etiology of violence

Introduction

In the present article, we are interested in the association between poverty and violence. This association has been tested before, but here we ask whether poverty is especially associated with violence, beyond its effect on nonviolent, even chronic offending. The "differential etiology of violence" thesis is the central tenet of a recent book by Savage and Wozniak (2016). The authors make the case that violent behavior is an important focus of research and policy, and that differential predictors of violence have been understudied. They point to a series of reasons why violence is "different"—the language and conventional norms that distinguish it from other forms of criminal behavior, the relative distribution of serious violent compared to nonviolent offending, case study evidence capturing the "deeply troubled" backgrounds of violent offenders (Schechter, 2003, p. 22), a host of developmental steps and skills more likely related to serious behavioral pathology than to minor offending.

An important aspect of the differential etiology of violence thesis is the methodological problem of disentangling the effects of of various causes of crime on violence. The main complication is that violent behavior is highly

CONTACT Joanne Savage jsavag1@ilstu.edu Criminal Justice Sciences, Illinois State University, Campus Box 5250, Normal, IL 61790-5250, USA.

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correlated with nonviolent offending. Perhaps because of this, modern criminological research has relied mainly on "general" theories, and tests of those theories have employed general, combined measures of criminality. However, violent offending has many distinct features and is not perfectly correlated with nonviolent offending. As Felson (2009) points out in his "dual conceptualization" of violent offending, violent offending is at once "rule breaking," like other forms of offending, but also "harm-doing." Felson argues that theories of aggression are required to explain violence as a separate phenomenon from other, more common, forms of crime. Although the causes of violent crime are likely to overlap with those of nonviolent crime, that overlap will be incomplete; some factors should help us understand violence per se, and not just violence as a subset of a larger, unidimensional criminality.

Thus, it is unreasonable to make the assumption that tests employing general measures of criminality, mathematically dominated by common, nonviolent crime, will teach us about violent crime. The correlation between violent and nonviolent offending not being perfect, it is likely that some of these theory tests are relevant for understanding the causes of violence, and some are not. Long lists of correlates and risk factors have been produced, but items on these lists may or may not apply to the study of serious violence.

Certainly, many studies have used a measure of violent offending as a dependent variable, but this is also problematic. Because violent offending and nonviolent offending are correlated, it may happen that correlations uncovered in such studies could be due to the "common factor," general offending. This problem is analogous to typical concerns about spuriousness in correlational research. Savage and Wozniak (2016) imply three ways to look for a differential association between a potential causal factor (X) and violence. First, X might be associated with violent behavior and not associated with nonviolent offending or there may be a correlation between X and violent and nonviolent offending, but the slope of that correlation could be significantly steeper for violent offending. Second, X could be significantly associated with violence, holding nonviolent offending constant, suggesting an association with violence per se, over and above an association between X and general deviance. Finally, a measure of a differential predictor of violence could have different levels among violent compared to nonviolent-only offenders. A comparison of offenders effectively controls for the "general offending" problem.

Poverty and the differential etiology of violence

Savage and Wozniak (2016) identify poverty as a "good prospect" for predicting violent crime, *per se*. Poverty is central to several prominent theories purporting to predict crime in general, notably classical strain (Merton, 1938), general strain (Agnew, 1992), and social disorganization (Shaw & McKay, 1942). These theories do not attempt to distinguish violent from nonviolent crime, though

Agnew (1992) identifies anger as a key mediator between strain and deviant behavior. Savage and Wozniak (2016) reason that low income and poverty can cause intense negative emotion, which they demonstrate is more commonly associated with violent than nonviolent antisocial behavior.

Some lesser-known theories have focused on violence. Bernard (1990) proposes that impoverished neighborhoods contribute to a high baseline level of stress and physiological arousal in neighborhood residents. This heightened level of arousal leads residents to interpret minor conflicts as provocations and augments the likelihood that residents will respond to such conflicts with anger and violence. Anderson (1999) christens the set of rules for guiding conduct under such pressures "the code of the street" and explicitly links the code to neighborhoods of concentrated disadvantage. According to Anderson, the code is a by-product of the helplessness of urban poverty. Other authors focus on the intense pressure on young people in a society that confers respect upon those who have money and status and disdains those who do not (e.g., Canada, 1996; Silberman, 1989). Thus, youth who live in conditions of poverty are thought to be doubly frustrated by inadequate resources and obstacles to establishing a reputation and achieving respect, and their chronic stress and anger are likely to lead to the violent resolution of conflict. Qualitative scholarship frequently draws links between ambition, self-worth, notions of honor and respect, and poverty (e.g., Canada, 1996; Miethe & McCorkle, 1998; Silberman, 1989).

Empirical research has provided evidence of correlations between poverty and general criminal behavior (e.g., Cottle, Lee, & Heilbrun, 2001; Denno, 1990; Elliott, Huizinga, & Menard, 1989; Farrington, 1989, 2001; Fergusson, Horwood, & Nagin, 2000; Huesmann, Eron, Lefkowitz, & Walder, 1984; Moffitt, 2003; Thornberry, Lizotte, Krohn, Smith, & Porter, 2003; in contrast, see Dunaway, Cullen, Burton, & Evans, 2000). Based on their meta-analysis of correlates of crime, Pratt and Cullen (2005) conclude that poverty is one of only five factors that predict crime with high strength and high stability across types of studies.

Of course, many studies have also looked at associations between poverty and violence and found significant associations in the predicted direction (aggregate studies include, e.g., Hipp, 2007; Krivo & Peterson, 1996; Steffensmeier & Haynie, 2000; individual-level studies include, e.g., Bellair, Roscigno, & McNulty, 2003; Heimer, 1997; Jarjoura, Triplett, & Brinker, 2002; Mladenka & Hill, 1976). Although these studies adequately test whether violence is associated with poverty or income, their methods do not address the question of whether poverty is differentially associated with violence.

We wish to be clear that this manuscript does not present a test of offense specialization. Approaches by Deane, Armstrong, and Felson (2005), who were interested in whether the commission of other offenses would make it more likely for an offender to commit certain offense types, and Osgood and

Schreck (2007) who needed to "contrast between an individual's concentration of offenses" in violence and the overall rate in the population, are not appropriate here. In our models, individuals who commit a great deal of violence and a great deal of nonviolent crime are of the same interest as those who commit a great deal of violence but no other types of crime. Methods provided by these authors would not allow us to combine them.

Studies of income and violence that employ models that might answer our research question have been accruing in a piecemeal fashion and clearly point to the possibility that poverty is differentially related to violence. Farrington (1978) reported some evidence that childhood family income and social class were lower among violent offenders compared to nonviolent frequent offenders. One analysis of National Youth Survey (NYS) data showed that lower socioeconomic (SES) participants were more likely to report committing felony assault than other participants, but this finding held for only one year of three examined (Elliott et al., 1989). Dunaway et al. (2000) report that SES is negatively related to violence, but the association was not statistically significant. By contrast, some evidence suggests that middle class participants have higher rates of property offending than lower SES participants. Close to our own analysis, Deane et al. (2005) show that being on public assistance (their indicator of poverty) was positively and significantly associated with the commission of three out of five types of violent offenses but significantly negatively associated with drug crime and minor property crime, and not significantly associated with serious property crime. In a later analysis of the same data, the authors report that adolescents whose families receive public assistance are significantly more likely to commit two of five types of violent crime—but they are not more likely to engage in drug or property crime (Felson, Deane, & Armstrong, 2008).

A few authors have reported analyses of National Longitudinal Study of Adolescent Health (Add Health) data that include indicators of income or poverty in their models, but their modeling was designed to test other research questions (e.g., Bellair & McNulty, 2005; Marcus & Jamison, 2013; McNulty & Bellair, 2003; Wright & Fitzpatrick, 2006; Yun, Ball, & Lim, 2011). None of these has specifically modeled the research question that we wish to answer. The findings are mixed across many different multivariate models. Hart and Marmorstein (2009) show that public assistance is negatively associated with Wave 1 aggression, in a model controlling for many other factors, but not nonviolent antisocial behavior. Franke (2000) examined the role of attachment as a protective factor in adolescent violent behavior. He used Wave 1 data, and his table shows that "receiving public assistance" is positively associated with three measures of violence; no control for nonviolent offending is present. However, it is notable that two measures of nonviolent offending, shoplifting and burglary, were not significantly associated with being on public assistance.

In this article we test the differential etiology thesis directly using methods recommended by Savage and Wozniak (2016). Their method includes a three-pronged approach to the analysis. First, we hypothesize that income will be negatively associated with frequency of violent offending and that the magnitude of the association will be larger (i.e., significantly more negative) than the association between income and nonviolent-only offending. Second, we hypothesize that income will be negatively associated with violent offending, even if we control for frequency of nonviolent offending. Third, we hypothesize that violent offenders will have significantly lower incomes than non-violent-only offenders.

Method

Data

We analyzed secondary data from the Add Health. The Add Health data were obtained from a sample of adolescents across the United States. Data collection began with participants in Grades 7 through 12 during the 1994 to 1995 school year (Harris & Udry, 1994–2002). The Add Health cohort has been followed over time using in-home interviews and contextual data on families, neighborhoods, schools, communities, and peers. In the present study, we analyzed data from Wave 1 parent-report and self-report and Wave 2 self-report surveys. The use of computers for eliciting more sensitive information in the Add Health data is thought to improve the validity of self-reported crime measures over face-to-face methods (Deane et al., 2005).

Sample

We selected participants who were age 15 to 17 years in Wave 2. There are several advantages of using a more narrowly defined age group than that included in the original data set. Removing children younger than age 15 helps focus the analysis on those youths most likely to commit delinquency. Confining the sample to a group of individuals at the same developmental stage increases the likelihood that the many factors in our model will affect our participants in the same way (avoiding the need to test interactions between independent variables and age). We also removed older participants in part to enhance comparability of the family income measures (in Wave 1, some of the participants were 11 and some were 17). We expect that parent-reported family income among those living at home is likely to be a more reliable measure than one including older adolescents or young adults who are more likely to be living away from home or supplementing their income with work. The vast majority of participants age 15 to 17 in the Add Health data set lived at home with their parents.

Descriptive data for the sample are provided in Table 1. The average annual family income was $49,303. Slightly under one half of the sample was male (47.5%).

Measures

Dependent variables

Frequency of violent delinquency. Participants in the Add Health sample were asked to report how often they had committed a series of violent acts within the past 12 months (e.g., "Got into a serious physical fight," "Pulled a knife or gun on someone," etc.; we report these items in Table 2. Response categories were either *never, once, more than once* or *never, 1–2 times, 3–4 times, 5+ times*. As has been done in other published studies (e.g., Vaughn, Beaver, & DeLisi, 2009), we computed frequency of violence by summing responses. The items are listed in Table 2. The average frequency of violent offending was 0.8 acts in the past year.

Frequency of nonviolent offending. We computed frequency of nonviolent offending by summing self-reported frequency ratings for a series of items

Table 1. Descriptive Data for the Analytic Sample Age 15–17 in Wave 2.

	Percentage	Mean
Family income (Wave 1)		$49,303
Poverty (Income < $10,000)	10.1	
Male	47.5	
Peer substance use		1.92
Alcohol use Wave 2	47.3	
Drug use Wave 2	29.7	
Frequency of violence Wave 2		0.80
Any violence Wave 2	31	
Frequency of nonviolent offending Wave 2		1.21
Any nonviolent offending Wave 2	34.6	
N = 2150 (includes nonoffenders)		

Table 2. Items Used to Compute Dependent Variables.

Violent Delinquency Wave 2	Nonviolent Delinquency Wave 2
Got into a serious physical fight	Damaged property
Took part in a fight "where a group of your friends was against another group"	Painted graffiti
Used or threatened to use a weapon to get something from someone	Stolen something worth more than $50
Hurt someone badly enough to need medical care	Sold marijuana or other drugs
Pulled knife or gun on someone	Stolen something worth less than $50
used a weapon in a fight	Taken something from a store without paying for it
Shot or stabbed someone	Went into a house to steal something

related to damaging property, stealing, selling drugs, and the like (see Table 2). The average frequency of nonviolent offending in the past year was 1.21.

Violent versus nonviolent-only offending. We constructed two dummy variables. The first is coded 1 if the participant reported having committed any of the violent offenses and 0 if the participant reported committing nonviolent offenses only (thus, the comparison is between violent and nonviolent-only offenders and excludes nonoffenders). Second, we compared any violent to frequent nonviolent offenders. Frequent nonviolent offenders (0) are those who reported a score of 4 or higher on the frequency of nonviolence scale (and no violent offenses). These frequent nonviolent offenders constitute the upper 10th percentile of the nonviolent group.

Measures of income (independent variables)

Family income was reported by parents in dollar amounts in Wave 1 of the Add Health survey. We also computed a quadratic term by taking the square of family income to test for a curvilinear effect.

Poverty was operationalized using a dummy code, based on the 1996 poverty thresholds provided by the U.S. government (U.S. Department of Health and Human Services, 1996). Participants were coded 1 if their family income in Wave 1 was below the threshold for their family size (the largest family size included 14 members). Otherwise they were coded 0. Follow-up analyses to test the influence of "poverty" on violent offending are explained below.

Control variables

Demographic characteristics. Demographic characteristics include age and gender (1 = male, 2 = female as originally coded in the Add Health data set). Corrections for race were not as straightforward as expected. To code for race/ethnicity, we examined the associations between measures of violence and being Hispanic, Black, American Indian or Asian and found that a dummy code indicating whether the participant was from a disadvantaged minority (Hispanic, Black, or American Indian) performed best.

Neighborhood characteristics. Sampson and Groves (1989) found that the effect of poverty on crime was mediated by community disorganization. The Add Health data set included several items related to community disorder, most of which were rated by parents in Wave 1 on a scale of 1(*no problem*), 2 = (*small problem*), and 3 = (*big problem*), and two items rated only as *yes* or *no*. We dummy coded each item such that 1 reflects that there is at least a "small" neighborhood problem, and 0 otherwise. The items indicated whether the parent respondent knew her or his neighbors (reverse coded), whether the neighborhood was safe (reverse coded), and if trash was

a problem or drugs were a problem in the neighborhood. Because there is no assumption of an interitem correlation, and neighborhood disorder is seen as a "formative" index, an additive index was warranted (Coltman, Devinney, Midgley, & Venaik, 2008). We added the dummy codes together to create a perceived community disorder scale (0 = *no problems* to 4 = *all four problems*). Analogous questions about community disorder were not asked in Wave 2.

Peer substance use. We also control for peer substance use. As done in other studies (e.g., Vaughn et al., 2009) we used a summated scale combining adolescent respondents' answers to the questions, "Of your three best friends, how many …" (1) smoke at least one cigarette a day, (2) drink alcohol, or (3) use marijuana at least once a month. Unfortunately, the Add Health data set does not include items related to other forms of peer delinquency. Many others have used this measure as a proxy for peer deviance (e.g., Bellair & McNulty, 2005).

Alcohol use. Alcohol use is associated with violent and nonviolent offending. We controlled for this through a single item which asked, "During the past 12 months, on how many days did you drink alcohol?" the responses varied on a 6-point scale from 0 (*never*) to 6 (*every day/almost every day*). The vast majority of these teenagers reported never drinking alcohol; several hundred reported drinking at least once a week.

Drug use. Drug use has also been associated with offending, and with income. Participants were asked in Wave 2 whether they had used marijuana, cocaine, inhalants, or "other" illegal drugs since their last interview. We created a 4 point scale, 1 point for each *yes* answer. Thus a score of 4 indicates the participant had used all four categories of drugs in the past year.

Analytic approach

To examine the differential etiology thesis, we first ran a series of ordinary least squares (OLS) regressions, used to compare the coefficients representing the magnitude of the association between income, poverty, and violent offending with the association between income, poverty, and nonviolent offending. Second, we ran a regression model estimating the association between income, poverty, and violent offending, controlling for the frequency of nonviolent offending. Finally, we ran binary logistic regression models to see if income was significantly lower among violent offenders than nonviolent-only offenders, and if the proportion of those in poverty was higher. Because of concerns about multicollinearity, we examined the tolerance, eigen values, condition indices, and variance proportions to determine

the extent and nature of the collinear relationships (see Wilkinson, Blank, & Gruber, 1996). Collinearity often inflates the Standard Errors of the collinear variables, and "while this does not bias the coefficient estimates, the inflated standard errors mean that the estimated coefficients may not be very close to the population coefficients and their size, sign, and significance tests may not be accurate" (Wilkinson et al., 1996, p. 257). We found some evidence of collinearity in the models when we controlled for age in Wave 2. Removing this variable from the models resolved the collinearity problem but did not substantially change the explanatory power of the models. Because the control variable for the participants' age in Wave 2 was not collinear with the variables of interest, we decided not to remove this variable from the tables. Although we anticipated strong collinearity between our control for frequency of nonviolent offending and measures of income, we did not find any evidence for it. We note that Tittle, Broidy, and Gertz (2008) controlled for self-reported past offending in models of projected future offending and also note no serious problems with collinearity among predictors.

Results

The pattern of mean incomes suggests that violent delinquents live in families with lower incomes than nonviolent-only offenders (M = \$43,051 compared to \$54,374) and nonviolent-only offenders have the highest income in both data sets, even compared to nonoffenders (M = \$51,352). The poverty rate among violent offenders was 20.3%, compared to 14.6% among nonviolent-only offenders. The poverty rate among nonoffenders was 15.9%, slightly higher than the nonviolent-only group.

OLS regression analysis

Table 3 displays the findings from the regression analysis, using income as the independent variable. In this data set, income is not significantly associated with variation in nonviolent offending, controlling for age, minority status, sex, community disorder, peer substance use, alcohol use and drug use. By contrast, income was significantly, negatively associated with violent offending, and that association was curvilinear, as evidenced by the statistically significant square term. A visual inspection of the data indicates a steep decline in reported violent behavior as incomes increase within the middle class range, in particular between incomes from around \$50,000 to \$120,000, above which some affluent participants report elevated rates of violent behavior (see Figure 1).

Although it is clear from the initial models that the coefficient representing the relationship between income and violent behavior is significantly more negative than the coefficient for nonviolent behavior, we estimated a formal

Table 3. Ordinary Least Squares Regression Models of Income and Violent and Nonviolent Offending.

	Nonviolent Offending		Violent Offending		Violent Offending	
	b (SE)	β	*b* (SE)	β	*b* (SE)	β
Income in thousands	.001	.015	−.004**	−.117	−.004**	−.122
	(.002)		(.001)		(.001)	
Income squared	−.059	−.001	.004**	.097	.004**	.097
	(.002)		(.002)		(.002)	
age	−.231**	−.072	−.126**	−.055	−.067	−.029
	(.062)		(.046)		(.044)	
Minority status	.182+	.034	.505**	.129	.458**	.117
(0 = minority; 1 = White)	(.107)		(.081)		(.076)	
Sex	−.703**	−.135	−.624**	−.166	−.443**	−.118
(1 = male 2 = female)	(.100)		(.075)		(.071)	
Community disorder	−.032	−.013	−.009	−.005	−.001	−.001
	(.051)		(.038)		(.036)	
Peer substance use (Wave 2)	.140**	.104	.139**	.142	.103**	.105
	(.033)		(.025)		(.023)	
Alcohol use (Wave 2)	.239**	.136	.178**	.140	.116**	.092
	(.042)		(.032)		(.030)	
Drug use (Wave 2)	1.061**	.294	.341**	.131	.068	.026
	(.083)		(.062)		(.061)	
Frequency of nonviolent delinquency					.257**	.356
					(.015)	
N	2150		2150		2150	
R^2	.219		.157		.256	

+ $p \leq .10$, *$p \leq .05$, **$p \leq .01$.

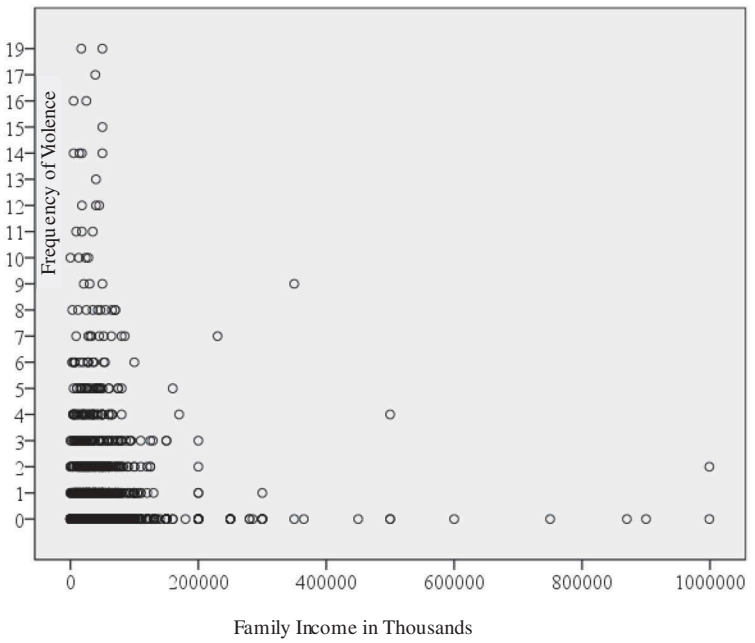

Figure 1. Scatterplot of the Association between frequency of Violent behavior (Wave 2) and Wave 1 Family Income (in thousands).

comparison of the coefficients, to follow through on recommendations by Savage and Wozniak (2016). Using the Paternoster, Brame, Mazerolle, and Piquero (1998) method (see below), we estimated a Z-score representing the difference between the partial coefficient for income in the model of nonviolent offending, to the coefficient in the model of violent offending (Z = − 2.08). The difference between the coefficients is negative and statistically significant. Using the method advocated by Meng, Rosenthal, and Rubin (1992), to account for the nonindependence of violent and nonviolent offending, we estimated Z = − 3.16, which is also statistically significant. Thus, the first prong of analysis supports the differential etiology of violence thesis that income levels have a special association with violent behavior.

Paternoster et al. (1998) formula:

$$Z = \frac{b_1 - b_2}{\sqrt{\mathrm{SE}b_1{}^2 + \mathrm{SE}b_2{}^2}}$$

Meng et al. (1992) formula, where r_x is the correlation between the two correlated variables and the formula includes an adjustment for that association:

$$Z = (z_{r1} - z_{r2})\sqrt{\frac{N-3}{2(1-r_x)h}}$$

N is the number of cases, z_{r1} and z_{r2} are the Fisher z-transformed correlation coefficients.

$$h = \frac{1 - f\overline{r^2}}{1 - \overline{r^2}} = 1 + \frac{\overline{r^2}}{1 - r^2}(1 - f)$$

$$f = \frac{1 - r_x}{2(1 - \overline{r^2})}$$

$\overline{r^2}$ is the mean of $r_1{}^2$ (the squared correlation between X and violence) and $r_2{}^2$ (the squared correlation between X and nonviolent offending).

The second step in evaluating the differential etiology of violence is to determine whether violent behavior is still associated with income after controlling for frequency of nonviolent offending. In this data set, income continued to be significantly associated with violent behavior when a control for nonviolent offending was applied (see Table 3). It should be pointed out that, though frequency of nonviolent offending was very strongly associated with violent offending, its presence in the model does not detract from the association between income and violent offending. In addition, although the size of the coefficients for the control variables are attenuated in most cases, other variables such as minority status, sex, peer substance use, and alcohol use remain statistically significant as well, which supports Savage and

Wozniak's (2016) broader claim about the causes of violence not being wholly the same as the causes of nonviolent offending.

The dependent variables, frequency of nonviolent and frequency of violent offending, were highly skewed, with the vast majority of participants reporting a zero value, many participants reporting one or two incidents, and a long tail. One can remedy this problem by converting the dependent variable to its natural log. Data transformations are not universally recommended, however (Tabachnick & Fidell, 2007), in part because the interpretability of the coefficient is lost when a logarithm is used. In addition, least squares regression estimates are fairly robust with respect to the assumption of normally distributed dependent variables (e.g., Judd & McClelland, 1989). We have opted to report tables in the original metric. However, we did estimate the same models displayed in Table 3 using the natural log of frequency of nonviolent and frequency of violent criminal behavior as the dependent variable. Income remained negatively associated with violent offending, and its square term continued to have a positive coefficient; both remained statistically significant across models. There was only one change in the substantive interpretation of the other partial coefficient estimates in Table 3: the association between disadvantaged minority and nonviolent offending, when the natural log was used, just reached statistical significance ($p< .05$), when it had been marginally significant ($p < .10$) in the earlier model. This slight change is not unexpected given the additional statistical power afforded when the logarithm is used.

Table 4 displays the OLS findings when the dummy-coded indicator of poverty was used. Frequency of violent offending was slightly higher among those in poverty, but the difference compared to those not in poverty was only marginally statistically significant. In the full model, however, controlling for nonviolent offending, the association between poverty and frequency of violence was positive and statistically significant. This progression is consistent with the differential etiology hypothesis, though the association between poverty and violent offending is not very large in magnitude. Poverty was not associated with nonviolent offending.

The comparisons of the strength of the coefficients also provide additional support for the differential etiology thesis, though the differences between coefficients were not very large. We estimated a Z-score representing the difference between the partial coefficient for poverty in the model of nonviolent offending, to the coefficient in the model of violent offending ($Z = -1.54$). The difference between the coefficients is negative and only marginally statistically significant ($p = .062$). Using the method advocated by Meng et al. (1992), to account for the nonindependence of violent and nonviolent offending, We estimated $Z = -1.78$, which is statistically significant.

All of the models displayed in Table 4 were also estimated using the natural log of the dependent variable to correct for heteroscedasticity. The only substantive change was attached to a control variable; in the full model,

Table 4. Ordinary Least Squares Regression Models of Poverty and Violent and Nonviolent Offending.

	Nonviolent Offending		Violent Offending		Violent Offending	
	b (SE)	β	*b* (SE)	β	*b* (SE)	β
Poverty	−.071	.015	.171+	−.117	.189*	−.122
	(.126)		(.094)		(.088)	
Age	−.219**	−.072	−.128**	−.055	−.074+	−.029
	(.057)		(.042)		(.040)	
Minority Status (0 = minority; 1 = White)	.207*	.034	.496**	.129	.445**	.117
	(.099)		(.073)		(.069)	
Sex	−.610**	−.135	−.602**	−.166	−.451**	−.118
(1 = male 2 = female)	(.092)		(.068)		(.065)	
Community disorder	−.023	−.013	.006	−.005	.012	−.001
	(.047)		(.035)		(.033)	
Peer substance use (Wave 2)	.133**	.104	.121**	.142	.088**	.105
	(.031)		(.023)		(.022)	
Alcohol use (Wave 2)	.250**	.136	.195**	.140	.133**	.092
	(.039)		(.029)		(.027)	
Drug use (Wave 2)	1.05**	.294	.326**	.131	.067	.026
	(.077)		(.058)		(.056)	
Frequency of nonviolent delinquency					.247**	.356
					(.014)	
N	2422		2422		2422	
R^2	.217		.154		.247	

+ $p \leq .10$, *$p \leq .05$, **$p \leq .01$.

the association between age and frequency of violence was statistically significant, rather than marginally significant.

Binary logistic regression analysis

In Table 5, we report the results of binary logistic regression analyses that estimate whether violent and nonviolent offenders differ in their family income. We display the semistandardized binary logistic regression coefficient favored by Kaufman (1996); this coefficient reflects the change in predicted probability of the outcome corresponding to a one-standard-deviation difference in an independent variable[1].

First we compare violent offenders to nonviolent-only offenders (see Table 5). Note that the sample size is smaller than it was in the previous table because no nonoffenders are included. The binary logistic regression findings confirm that violent offenders have significantly lower incomes than nonviolent ones, even controlling for age, minority status, sex, community disorder, peer substance

1.We display the semistandardized binary logistic regression coefficient favored by Kaufman (1996); this coefficient reflects the change in predicted probability of the outcome corresponding to a one-standard -deviation difference in an independent variable.[1] We use the reference point around the mean:

$$SS_j^{\Delta P} = \frac{1}{1 + e^{-\left(\ln\left(\frac{P_{ref}}{1-P_{ref}}\right) + \frac{1}{2} b_j s_j\right)}} - \frac{1}{1 + e^{-\left(\ln\left(\frac{Pref}{1-Pref}\right) - \frac{1}{2} b_j s_j\right)}}$$

Where, P_{ref} is the probability of Y at the reference point (the mean of the dichotomized dependent variable), b_j is the unstandardized binary logistic regression coefficient for the independent variable, and s_j is the standard deviation of the independent variable.

Table 5. Binary Logistic Regression Models of Comparing Incomes of Violent and Nonviolent-Only Offenders.

	Any Violent versus Nonviolent			Any Violent versus Frequent Nonviolent-only Offenders		
	b (Exp[B])	$SS^{\Delta P}$	Wald	*b* (Exp[B])	$SS^{\Delta P}$	Wald
Family income (in thousands)	−.009	−.125	15.3**	−.017	−.121	5.77*
	(.991)			(.983)		
Family income squared	.000	0	7.98*	.051	.268	2.39
	(1.01)			(1.053)		
Age	−.093	−.017	1.22	−.047	−.004	.119
	(.912)			(.954)		
Minority status	.399	.044	7.76**	.333	.018	1.95
	(1.49)			(1.40)		
Sex	−.450	−.052	11.3**	−.127	.007	.335
(1 = male 2 = female)	(.637)			(.880)		
Community disorder	−.055	−.013	.665	−.105	−.012	.905
	(.946)			(.900)		
Peer substance use (Wave 2)	.069	.030	2.71+	.058	.013	.756
	(1.07)			(1.06)		
Alcohol use (Wave 2)	.041	.014	.644	−.064	−.011	.684
	(1.04)			(.938)		
Drug use (Wave 2)	−.109	−.018	1.37	−.440	−.037	12.1**
	(.897)			(.644)		
N	1038			768		
Cox & Snell R^2	.041	.041			.038	
−2 Log Likelihood		1308			770	

Note. $SS^{\Delta P}$ = Semi-standardized binary logistic regression coefficient.
+ $p \leq .10$, *$p \leq .05$, **$p \leq .01$.

use, alcohol and drug use. The odds ratio appears to be small in magnitude (OR = .99), but the reader is reminded that the 1% change in the odds of being a violent, rather than a nonviolent-only offender is per $1000 of income; thus, an individual whose family income is $30,000 higher has a 30% lower chance of being violent, given that he or she is an offender.

The size of the effect can also be understood by comparing the semistandardized regression coefficients. The effect of a one *SD* increase in family income (at the *m*) corresponds to a 12.5% decline in the predicted probability of violent, compared to nonviolent-only offending. By this metric, the effect of family income was much larger than any of the other variables, including peer substance use.

It is important to point out that the control factors expected to predict violence did not all do so, and some of the variables that predicted variability in violent offending in the earlier model do not help us distinguish violent from nonviolent offenders. Thus, though violent offenders in this model were more likely to be male and to identify with a disadvantaged minority group, they were not significantly different in age; their friends were only marginally more likely to use alcohol or drugs, and they were not more likely to use drugs or alcohol themselves compared to nonviolent-only offenders.

In the second model, we limit the comparison of violent offenders to frequent, nonviolent-only offenders to address previous findings that have suggested that frequent offenders may not be distinguishable from violent offenders. In this model, we see that family incomes of violent offenders were significantly lower than those for frequent nonviolent-only offenders. We acknowledge, however, that the number of nonviolent-only offenders is not large (n = 103) and that a very strong majority of those who have committed nonviolent offenses have also committed violent ones in this sample.

As we can see from the remaining model statistics, the other predictors in the model fared poorly in making this fine distinction. Violent offenders are not different from frequent nonviolent-only offenders in their age, minority status, sex, peer substance use, or alcohol use, controlling for other factors. They do use a smaller variety of drugs than their nonviolent-only counterparts. Income was the only variable that significantly distinguished violent from nonviolent-only offenders in the predicted direction. This supports the contention made by Savage and Wozniak (2016) that poverty may be a good prospect in the differential etiology of violence.

Table 6 displays the binary logistic regression models using the dummy-coded indicator of poverty. The proportion of participants in poverty in the violent group was approximately 34% higher than the nonviolent-only group (OR = 1.34), but the difference was only marginally statistically significant with this reduced sample size. However the proportion in poverty was over

Table 6. Binary Logistic Regression Models of Comparing Poverty Rates among Violent and Nonviolent-Only Offenders.

	Any Violent v. Nonviolent			Any Violent v. Frequent Nonviolent-only Offenders		
	b (Exp[B])	$SS^{\Delta P}$	Wald	*b* (Exp[B])	$SS^{\Delta P}$	Wald
Poverty	.292+ (1.339)	.026	2.79*	.758* (2.13)	.034	5.02*
Age	−.086 (.917)	−0.016	1.20	−.084 (.919)	−.008	.432
Minority status	.515** (1.67)	.057	14.3**	.397+ (1.49)	.022	3.15+
Sex (1 = male 2 = female)	−.485** (.615)	−.055	14.5**	−.234 (.792)	−0.013	1.26
Community disorder	.000 (1.00)	0.00	.000	−.055 (.946)	−0.006	.269
	.044 (1.045)	.020	1.27	.043 (1.04)	.010	.456
Alcohol use (Wave 2)	.090+ (1.09)	.033	3.56+	−.014 (.987)	−0.003	.034
Drug use (Wave 2)	−.166+ (.847)	−0.032	3.26+	−.482** (.618)	−0.048	15.8**
N	1153			864		
Cox & Snell R^2	.034				.038	
−2 Log Likelihood		1308			864	

Note. $SS^{\Delta P}$ =
+ *p* # .10, **p* # .05, ***p* # .01.

twice as high in the violent group compared to the frequent nonviolent-only group in the final model (OR = 2.13). This is consistent with the differential etiology hypothesis, and the hypothesis that poverty distinguishes violent from even chronic, nonviolent offenders.

Conclusions

In this article, we examined the relationship between income and violent delinquency applying methods that Savage and Wozniak (2016) have recommended to test the differential etiology of violence thesis. We found a familiar pattern showing that violent offenders have low incomes—lower incomes than nonviolent offenders. Sometimes the differences are striking; the average family income among nonviolent-only delinquents in Wave 2 was $54,374 compared to the average among those with "any violent" offense, which was $43,051. The difference was smaller when we compare violent to frequent, nonviolent-only offenders, but still visually evident ($43,051 compared to $49,651). Among the 21 participants who reported committing 10 or more violent acts, the average family income was $25,857. A more conservative comparison using multivariate, binary logistic regression showed that violent offenders had significantly lower family income on average than nonviolent-only offenders. They also had significantly lower incomes than chronic, nonviolent-only offenders. The findings support the supposition that low income is an important predictor of violent behavior, not just general offending, and should be retained in future theories of violence. The findings are consistent with a few other studies where violent offenders were compared to nonviolent offenders (e.g., Farrington, 1978)

Analyses of this data set suggest that income is not associated with nonviolent offending. In fact, in this sample, nonviolent-only offenders' average income was higher than the average for nonoffenders. This is not the first article to report this finding (e.g., Deane et al., 2005; Dunaway et al., 2000; Felson et al., 2008). This dual effect has theoretical relevance as well as relevance for future empirical research; tests of strain theory, for example, may be likely to "miss" or underestimate an effect when general delinquency is used as a dependent variable if violent and nonviolent offending have opposite relationships with income.

The broader implications of the findings are in keeping with arguments made by Savage and Wozniak (2016). The first is a fundamental questioning of the state of knowledge about the etiology of violence. Although most criminologists would argue that we know a great deal about the risk factors for violence, very little research actually focuses on the specific prediction of violence, net of effects on nonviolent crime. In this study, we focused on one good prospect for testing their differential etiology thesis. We controlled for

frequency of nonviolent offending and used an approach tailored to answer this research question, so the associations we report between income and violence are independent of the effect that low income might have had on offending overall. Our findings provide an elucidation of a more nuanced relationship between income and offending than has heretofore been emphasized in the literature.

Secondly, the findings call into question the assumption of a unidimensional criminality implied in most criminological theories and statements to the contrary by numerous criminologists. Savage and Wozniak (2016) point to substantial evidence that a variety of factors, not just income, might distinguish between violent and nonviolent offenders. Such findings negate the assumption that the causes of violence are the same as those of frequent offending. They also put a new burden on theorists and the profession as a whole to defend "general" theories of crime as a worthy substitute for theories that would predict specific types of criminality. Because violent crimes exact a greater cost on victims and society, we believe that refinement of theories designed to predict violence is needed, and empirical tests of risk factors for violence ***per se***, are important for their applicability to policy. Other evaluations of the differential etiology of violence thesis have supported some of the other "good prospects" identified in the book (e.g., school factors [Savage & Ellis, in press], abuse victimization [Savage & Crowley, 2018], neglect [Savage & Murray, 2015], attachment [Savage, 2014]).

There are numerous limitations to conclusions that can be made from these findings. First, income data are subject to reliability and validity problems including but not limited to memory problems, lack of knowledge about annual income, and unwillingness to state income accurately. Some participants may have included income from welfare programs, child support, and other sources whereas others may not have done so. We attempted to ameliorate this by using data collected from parents during a time when participants were still living at home. The findings from this study are limited to teenagers. The association between family income and violence may be different for other age groups.

We used a conservative approach to model specification and the selection of control variables. Many of the control variables are thought to mediate the association between poverty and violence, but it is possible, too, that our estimates are attenuated due to common variance being deducted from the partial coefficient. Because of the theoretical importance of our hypothesis, we opted to use a conservative test. We also acknowledge that findings based on a national probability sample may not generalize to serious offenders.

Disclosure statement

No potential conflict of interest was reported by the authors.

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