SOCIOECONOMIC-STATUS AND MENTAL HEALTH IN A PERSONALITY DISORDER SAMPLE: THE IMPORTANCE OF NEIGHBORHOOD FACTORS

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This cross-sectional study examined the associations between neighborhood-level socioeconomic-status (NSES), and psychosocial functioning and personality pathology among 335 adults drawn from the Collaborative Longitudinal Personality Disorders Study. Participants belonged to four personality disorder (PD) diagnostic groups: Avoidant, Borderline, Schizotypal, and Obsessive Compulsive. Global functioning, social adjustment, and PD symptoms were assessed following a minimum two-year period of residential stability. Residence in higher-risk neighborhoods was associated with more PD symptoms and lower levels of functioning and social adjustment. These relationships were consistent after controlling for individual-level socioeconomic-status and ethnicity; however, the positive association between neighborhood-level socio-economic risk and PD symptoms was evident only at higher levels of individual-level socio-economic risk. Our findings identify NSES as a candidate for explaining some of the variability in symptoms and functioning among PD individuals.

Personality disorders (PD) are considered to be relatively stable and enduring (American Psychiatric Association, 1996). This stability makes it particularly important to identify factors external to the individual which might affect the well-being of people with PD. Socioeconomic-status has long been recognized as an important exogenous determinant of well-being, and numerous studies have identified inverse relationships between socioeconomic-status and diverse health outcomes (Faris & Dunham, 1939; Hollingshead & Redlich, 1958; O'Campo, Salmon, & Burke, 2009). However, the influence of socioeconomic-status on PD has not been comprehensively examined. In the present study we aim to elucidate this relationship by examining cross-sectional associations between *neighborhood-level socioeconomic-status* (NSES), level of functioning, and PD symptomology among a clinical PD sample.

There is no single definitive measure of socioeconomic-status; however, much health research has used composites of individual differences in education, income, and employment to estimate *individual-level socioeconomic-status* (ISES; e.g., Hollingshead & Redlich, 1958). An alternative approach to operationalizing socioeconomic-status has focused on neighborhood-level characteristics such as concentrated poverty and unemployment (Sampson, Morenoff, & Gannon-Rowley, 2002; Silver, Mulvey, & Swanson, 2002). In the present examination, we use the term socioeconomic-status to refer to the broader construct, ISES to refer to indices based on individual education and employment, and NSES to refer to indices based on neighborhood factors. Although there is a robust relationship between NSES and ISES, both predict important outcomes over and above what is predicted by either index alone, and therefore both constructs warrant distinct examination (Silver et al., 2002). However, most relevant literature has emphasized ISES, and substantial gaps remain in the appreciation of the association between NSES and psychopathology.

Several studies have identified inverse associations between ISES and rates of common psychiatric conditions such as depression, anxiety, and schizophrenia (Driessen, Gunther, & Van Os, 1998; Kohn, Dohrenwend, & Mirotznik, 1998; Leventhal & Brooks-Gunn, 2000; Mair, Diez Roux, & Galea, 2008). However, relatively few studies have examined associations between socioeconomic status and PD. Studies that have directly examined PD implicate lower familial ISES in the development of personality and disruptive disorders (Johnson, Cohen, Dohrenwend, Link, & Brook, 1999; Lahey, Loeber, Burke, & Applegate, 2005). Lower individual ISES also appears to be inversely related to Antisocial Personality Disorder (ASPD) and to the antisocial deviance elements of psychopathic personality (Hare, 2003). Further, psychopathy has been found to be more predictive of criminal violence among lower, relative to higher, ISES European American (EA) jail inmates (Walsh & Kosson, 2007). The lone prior study of NSES and PD provides preliminary evidence of an association between NSES and externalizing pathology, in that residents in neighborhoods with higher levels of concentrated poverty demonstrated relatively higher

levels of psychopathy (Silver, Mulvey, & Monahan, 1999). In sum, evidence suggests that lower socioeconomic-status is generally associated with higher rates of psychopathology, and more specifically with the development and expression of externalizing disorders such as ASPD and psychopathy.

Research that has examined associations between socioeconomic-status and PD other than APD and psychopathy points to a similar but somewhat more nuanced pattern of associations. With a few exceptions, socioeconomic-status has been inversely associated with the development and prevalence of PDs. In a large European community sample ISES was inversely related to nine of thirteen DSM III personality disorders (Torgersen, Kringlen, & Cramer, 2001), and a large U.S. epidemiological study indicated that lower income was associated with six of seven PD categories (Grant et al., 2004). Further, a recent longitudinal study suggested an etiological influence of lower family ISES on the adult development of Borderline Personality Disorder (BPD) and Schizotypal Personality Disorder (STPD) symptoms (Cohen et al., 2008). However, the inverse relationship between PD and socioeconomic-status appears to vary across PD categories; positive associations have been reported between Obsessive Compulsive Personality Disorder (OCPD) and indices of ISES, and between narcissistic PD and financial success (Grant et al., 2004; Torgersen et al., 2001).

Two compatible models provide a framework for understanding the association between socioeconomic-status and psychopathology. *Social stress* models (e.g., Faris & Dunham, 1939; Silver, 2000; Silver et al., 2002) posit that lower socioeconomic-status is associated with the pathogenic combination of increased exposure to stressful life events and low levels of social support. This combination results in poor adaptation, which finds expression in psychopathological symptoms and poor functioning. In contrast, *social selection* models propose that psychopathology leads to lower socioeconomic-status by complicating attempts to access and maintain employment, education, and other factors that underlie socioeconomic advancement (Dunham, 1965). Studies that have compared these hypotheses have identified differential relationships across classes of psychopathology. In general, there is evidence for social stress with regard to depression and anxiety, and equivocal support for social selection for schizophrenia (Dohrenwend et al., 1992; Miech, Caspi, Moffit, Wright, & Silva, 1999; Wadsworth & Achenbach, 2005). With regard to PD, a large epidemiological study reported evidence consistent with social stress in the relationship between ISES and ASPD among adults (Dohrenwend et al., 1992). A naturalistic study also reported findings consistent with social stress, in that rates of oppositional defiant disorder and conduct disorder were reduced in children whose families moved out of poverty (Costello, Compton, Keeler, & Angold, 2003).

Ethnic differences have been noted in socioeconomic-status and health outcomes, and in the prevalence of diverse forms of psychopathology (Breslau et al., 2006). With regard to PD, evidence of associations between

ethnicity and psychopathology are scarce and equivocal; a study of a sample that partially overlaps with the present study found higher rates of BPD among Latino Americans (LA), and higher rates of STPD among African Americans (AA; Chavira et al., 2003). In contrast, a recent meta-analysis identified relatively lower rates of PD among Black compared to White patients, but also noted substantial limitations of extant literature (McGilloway, Hall, Lee, & Bhui, 2010). The relationship between socioeconomic-status and ethnicity is complex and difficult to disentangle, and as such the concurrent examination of both constructs may help to avoid misplaced emphasis on ethnic differences (Thurston & Matthews, 2009).

We predict that, in general, NSES will be inversely related to functioning and number of symptoms, and that these relationships will hold across the BPD, Avoidant Personality Disorder (AVPD) and STPD groups. Descriptions of BPD include maladaptive responses to stress (Linehan, 1993), and lower levels of social support (Clifton, Pilkonis, & McCarty, 2007); as such, social stress effects might be accentuated among BPD. Prior finding of social stress effects on anxiety and depression (Dohrenwend et al., 1992; Miech et al., 1999) suggest that lower socioeconomic-status might also exacerbate dysfunction among PD characterized by negative affect such as AVPD and BPD. With regard to STPD individuals, prior studies have reported that social selection effects underlie the inverse association between ISES and schizophrenia (Dohrenwend et al., 1992; Miech et al., 1999), and we expect that similar effects will be observed for NSES. Given prior findings that broad patterns of relationships between socioeconomic-status and psychopathology might not apply to OCPD (Grant et al., 2004; Torgersen et al., 2001), we make no predictions regarding OCPD. We also examined interactions between NSES and ISES; based on a social stress model, we predict that lower levels of one construct might accentuate the negative effects of the other. Finally, given ethnic differences in NSES we examined the stability of associations across ethnicity.

METHODS
PARTICIPANTS

This cross-sectional study drew data from the Collaborative Longitudinal Personality Disorders Study (CLPS), which is a multi-site, naturalistic, longitudinal study of PD. A comprehensive account of the study is presented elsewhere (Gunderson et al., 2000). Participants between the ages of 18 and 45 ($M = 33.61$, $SD = 7.88$) who met diagnostic criteria for OCPD, BDPD, STPD, and AVPD were recruited in two cohorts from treatment clinics and media advertisements. Assessments were conducted by trained interviewers at baseline, 6 months, 1 year, and then annually, for a total of 10 years for the first cohort, and four years for the second cohort. Of the 408 PD participants with complete data on residential, demographic, and

mental health variables, 335 (82.11%) met the requirement of 2 years of residential stability. Of those included in the study 55.82% had at least 4 years of stability, 16.72% had 3 years, and 27.46% were stable for 2 years. Participants excluded due to residential instability did not differ from the study participants with regard to Global Social Adjustment (GSA), Global Assessment of Functioning (GAF), PD symptoms or ISES (all Fs < 1.5, ps > .10). The period of assessment for residential stability comprised the full four years for the second cohort and the final four years for the original cohort (i.e., years 7–10), therefore the final assessment was year-10 for the original cohort and year-4 for the second cohort. Membership in mutually exclusive PD groups was STPD = 40 (11.9%), BPD = 106 (31.6%), AVPD = 83 (24.8%), and OCPD = 106 (31.6%). There were 227 (67.8%) females in the sample. There were 236 (70%) European American (EA) participants, 44 (13%) African American (AA) participants, and 47 (14%) Latino American (LA) participants. An additional 8 participants (2.4%) belonged to ethnic groups other than EA, LA, AA or identified as multi-ethnic. See Table 1 for descriptive statistics.

MEASURES

Neighborhood Socioeconomic-Status. Neighborhood SES (NSES) was based on census tract of residence at the final assessment. Census tracts are geographic subdivisions that are widely used to delineate neighborhood units (Sampson et al., 2002). Prior research has identified a single factor which provides a valid index of NSES composed of proportion of households receiving public assistance, proportion of individuals unemployed, proportion of families living below the poverty line, and median household income (Kubrin & Stewart, 2006). A principal components analysis with varimax rotation indicated that, in our sample, these variables loaded strongly on a single factor that accounted for 76.38% of the variance (eigenvalue = 3.06; all loadings >.80). The distribution of NSES was such that in the highest quartile neighborhoods, the average median income

TABLE 1. Sample Characteristics by Ethnicity

	EA (*N* = 236)		AA (*N* = 44)		LA (*N* = 47)		
	M	SD	*M*	SD	*M*	SD	F^t
NSES	.35[AL]	.75	−1.02[E]	1.00	−.88[E]	1.00	81.40**
ISES	52.77[A]	14.74	43.86[E]	13.99	47.52	18.16	7.49**
GAF	61.11[A]	13.58	55.91[E]	14.35	59.91	11.57	2.80
GSA	2.94[A]	1.03	3.43[E]	1.11	3.13	.99	4.33*
PD-SX	4.42[A]	4.45	6.75[E]	5.81	6.21	5.63	6.03**

Notes. M = Mean; SD = Standard deviation; *F* = value for cross-group comparisons; ISES = Scores on Hollingshead measure of socio-economic status; NSES = Aggregate index of neighborhood socioeconomic status; GAF = Global Assessment of Functioning; GSA = Global Social Adjustment; PD-SX = Symptoms of Personality Disorder. Lower-case superscript letters indicate between-group differences; E = difference from the EA group, A = difference from the AA group, L = difference from the LA group.
Eight participants (2.4%) belonged to ethnic groups other than EA, LA, AA or identified as multi-ethnic.
[t]For NSES, GAF & GSA *N* = 335; for ISES *N* = 325; for PD-SX *N* = 332.
* = p < .05; ** = p < .01.

was \$73020.70 (SD = 17929.25), and the mean proportion of individuals below the poverty line was 3.45% (SD = 1.69), compared to the lowest NSES quartile where the mean median household income was \$22910.43 (SD = 5866.96) with 34.18% (SD = 7.55) of individuals below the poverty line.

Individual Socioeconomic-Status. Individual socioeconomic-status (ISES) was rated using the Hollingshead Index (Hollingshead & Redlich, 1958), based on weighted estimates of educational and occupational achievement.

Personality Disorder. Initial diagnoses and assignments to PD categories were made at baseline using the Diagnostic Interview for DSM-IV Personality Disorders (DIPD-IV; Zanarini, Frankenburg, Sickel, & Yong, 1996), and were acceptably reliable (Zanarini et al., 2000). Convergent support for DIPD-IV diagnoses was obtained from either self-report or independent clinician-ratings. When more than one PD was present, group assignment was determined by severity. *Symptom count* was an index of general PD pathology at the final assessment based on a summation of symptoms of all four PD.

Functioning. Level of functioning was assessed at final assessment using the 6-point GSA index, and the 100-point GAF scale from the Longitudinal Interval Follow-Up Evaluation (LIFE-PS; Keller et al., 1987). Lower GAF reflects worse functioning, whereas higher GSA reflects maladjustment.

ANALYTIC PLAN

Multiple regressions were conducted to examine associations between NSES and ISES, and GAF, GSA, and PD symptoms. These analyses were conducted hierarchically, with NSES entered in the first step, ISES entered in the second step, and the interaction between NSES and ISES entered in the third step. Supplementary analyses examined the stability of associations across ethnicity and diagnostic groups. In each of these analyses, dichotomous variables that reflected membership in the three ethnic groups and four diagnostic groups were entered together with NSES and the respective interaction terms.

RESULTS

Ethnic groups differed on all study variables, and differences were most pronounced for NSES. Higher ISES and NSES, better functioning, and fewer symptoms were demonstrated among EA relative to AA (Table 1). Latino Americans evinced lower NSES than EA, but did not otherwise differ from EA or AA. A medium-size correlation was identified between ISES and NSES, $r = .33$, $p < .01$. Differences among diagnostic groups were evident for ISES, $F(3, 321) = 12.33$, $p < .01$, and approached significance for NSES, $F(3, 331) = 2.47$, $p = .06$. Post-hoc tests indicated that these differences reflected higher socioeconomic-status among OCPD, relative to STPD and BPD.

Multiple regression analyses (Table 2) indicated that lower NSES was associated with more PD symptoms and worse GAF and GSA. These associations remained significant after accounting for variance associated with ISES. The interaction between ISES and NSES was associated with PD symptoms such that the effects of NSES were accentuated at lower levels of ISES. Simple slope analyses indicated that NSES was inversely associated with PD symptoms at lower ISES; $\beta = -.99$, SE = .33, $t = -3.03$, $R^2 = .03$, $p < .01$, but was not associated with PD symptoms at medium ISES; $\beta = -.51$, SE = .27, $t = -1.87$, $R^2 = .01$, $p = .06$, or at higher ISES; $\beta = -.03$, SE = .40, $t = -.07$, $R^2 < .01$, $p = .94$. Similarly, the inverse association between ISES and PD symptoms was stronger at lower NSES; $\beta = -.12$, SE = .02, t = -4.78, $R^2 = .06$, $p < .01$, and medium NSES; $\beta = -.08$, SE = .02, $t = -4.60$, $R^2 = .06$, $p < .01$, relative to higher NSES; $\beta = -.05$, SE = .02, $t = -2.05$, $R^2 = .01$, $p = .04$.

Analyses of the stability of effects across ethnic groups identified an interaction with EA/non-EA status such that NSES was more predictive of PD symptoms among non-EA participants, $\beta = -1.12$, SE = .54, $t = -2.10$, $R^2 = .04$ relative to EA participants, $\beta = -.33$, SE = .39, $t = -.85$, $R^2 < .01$, $p = .40$. In light of the relationships between ISES and ethnicity, we conducted a follow up analysis to determine whether this interaction was redundant with the NSES × ISES relationship. A hierarchical regression in which NSES was entered in the first step and EA/non-EA status, ISES, EA/non EA × NSES interaction term, and the ISES × NSES interaction term were entered in a stepwise manner on the second step. The final model was the same as presented in Table 2; NSES, ISES, and the ISES × NSES interaction term were retained and variables related to ethnicity were excluded from the model. No interactions were identified between NSES and diagnostic category; however, trends were identified in comparisons of OCPD to other groups in predicting PD symptoms, $\beta = -.93$, SE = .55, $t = -1.71$, $R^2 = .01$, $p = .09$, such that associations with NSES

TABLE 2. Multiple Regressions: Associations Between Socioeconomic-Status and PD Symptoms and Functioning

		β	(SE)	t	$R^{2\Delta}$
PD Symptoms					
Step One	NSES	−1.03**	.26	−3.91	.05
Step Two	ISES	−.08**	.02	−4.68	.06
	NSES	−.62*	.27	−2.29	.02
Step Three	NSES × ISES	.03*	.02	2.00	.01
Global Assessment of Functioning					
Step One	NSES	3.20**	.72	4.42	.06
Step Two	ISES	.35**	.05	7.50	.14
	NSES	1.44*	.71	2.03	.01
Step Three	NSES × ISES	−.04	.04	1.10	<.01
Global Social Adjustment					
Step One	NSES	−.27**	.06	−4.83	.07
Step Two	ISES	−.02**	<.01	−6.87	.12
	NSES	−.14**	.06	-2.60	.02
Step Three	NSES × ISES	<.01	<.01	-.65	<.01

Note. NSES = Neighborhood Socioeconomic Status; ISES = Individual Socioeconomic Status. * = $p < .05$; ** = $p < .01$.

were attenuated among OCPD participants relative to other diagnostic groups. Given our findings of higher ISES among the OCPD group, we conducted a follow up analysis to determine whether this interaction was redundant with the NSES × ISES interaction. The PD group × NSES interaction no longer approached significance when the NSES × ISES interaction was included in the equation which indicates that the apparent variability across PD groups is best understood as reflecting differences in ISES.

DISCUSSION

Our findings indicate that residence in a lower socioeconomic-status neighborhood is associated with poorer functioning and more PD symptoms among PD individuals. This is consistent with prior studies of community samples that have identified inverse associations between NSES and psychological well-being (Driessen et al., 1998; Leventhal & Brooks-Gunn, 2000; Mair et al., 2008), and is also broadly consistent with studies of the pathogenic effects of ISES (Faris & Dunham, 1939). To our knowledge, this is the first study to examine the impact of NSES among a clinical PD sample, and as such, our findings extend those of prior community studies by demonstrating the adverse effects of lower socioeconomic-status within a clinical population.

Neighborhood socioeconomic-status was uniquely associated with global functioning, social adjustment, and PD symptomology after controlling for ISES. In light of the considerable shared variance between ISES and NSES this represented a relatively stringent test of these associations. Indeed, the unique associations between NSES and diverse outcomes identify neighborhood features among external factors that may have a distinct impact on mental health. Moreover, the attenuation of associations between NSES and outcome variables after controlling for ISES does not necessarily diminish the heuristic value of NSES, as the relationship between ISES and NSES is likely bidirectional (Silver et al., 2002), such that NSES constrains the vocational and educational opportunities that are indexed by ISES, whereas the limited resources association with lower ISES exert a downward influence on NSES. This bi-directionality, together with our findings of unique associations between NSES and several indices of mental health, suggests an important role for NSES and further suggests that prior estimates of the influence of socioeconomic-status that have focused entirely on ISES may have underestimated the true impact of socioeconomic-status on the expression, maintenance, and exacerbation of personality pathology.

The association between NSES and PD symptoms varied across levels of ISES such that NSES was not associated with PD symptoms when ISES was held constant at a relatively higher level. This suggests that individual resources may be protective for the deleterious effects of NSES, and conversely, neighborhood-level factors may be particularly harmful among

individuals with lower levels of educational and vocational achievement. This pattern of effects was not evident for the indices of global functioning and social adjustment, and was not explicitly predicted for PD symptoms and as such interpretation of the interaction between NSES and ISES tentative. Nonetheless, these interactive effects further highlight the importance of considering both indices in studies of socioeconomic-status and psychopathology.

Interactive effects of NSES and ISES in the prediction of PD symptoms accounted for apparent interactions between NSES and ethnicity and NSES and diagnostic group. With regard to ethnicity, this is consistent with prior reports that apparent ethnic differences may be attenuated after accounting for socioeconomic factors (e.g., Cornelius, Fabrega, Cornelius, Mezzich, & Maher, 1996; see also Smith, 2000). The attenuated association between NSES and well-being among OCPD also appeared to be attributable to higher ISES among this group, which further illustrates the complex ways socioeconomic factors find expression in mental health outcomes. In sum, the apparent explanatory power of socioeconomic status beyond what was predicted by ethnic differences highlights the importance of considering socioeconomic and community factors when examining putative ethnic differences (Chavera et al., 2003), whereas the relative consistency of relationships across diagnostic categories adds to findings of commonalities across PDs (Sanislow et al., 2009).

Our findings may be pertinent to the debate regarding the endurance of PD; whereas traditional conceptualizations of PD have highlighted stability, recent findings have noted temporal inconsistency in symptoms and functioning (Sanislow et al., 2009; Skodol et al., 2005). Given that PD individuals may reside in relatively diverse neighborhoods across the lifespan, the present findings suggest that NSES should be considered among the dynamic factors that may impact the expression of PD across time. Our findings may also elucidate the pathways by which socioeconomic-status influences mental health. Specifically, the combination of increased exposure to stressors and reduced access to supports described by social stress theory provides a context for understanding how lower NSES exacerbates the expression of psychopathology. In contrast, a social selection process by which individuals with higher levels of dysfunction gravitate or are directed to lower socioeconomic-status neighborhoods is somewhat less compelling. However, the present study was not designed to test between social stress and social selection models, and it is possible that both social stress and social selection processes underlie the present results.

This study has several limitations. First, NSES was based on an aggregation of commonly employed census variables; however, the chosen indicators are not exhaustive, and an alternative index might have yielded different results. Moreover, important aspects of neighborhoods such as informal social control and social cohesion (Sampson, Raudenbush, & Earls, 1997) are not captured by the census. Second, although our mea-

sure of ISES is widely used and correlates well with other indices of social status (Deonandan, Campbell, Ostbye, Tummon, & Robertson, 2000) it is nonetheless limited and has been criticized for poor construct validity (Oakes & Rossi, 2003). Finally, the cross-sectional nature of our analyses does not permit directional inferences, and the associations among pathology, neighborhoods, and functioning are likely polydirectional. These limitations are balanced by several strengths including a large clinical sample, comprehensive assessments of psychopathology, and a minimum two years of residential stability to ensure an adequate window within which neighborhood effects might operate.

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