Income within context: relative income matters for adolescent social satisfaction and mental health

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Background: Previous research has shown that a mismatch between one’s own socioeconomic status (SES) and the SES of the surrounding context can lead to maladaptive outcomes, such as increased social stigma and low levels of belongingness (Johnson, Richeson, & Finkel, Journal of Personality and Social Psychology, 100, 2011, 838; Ostrove, The Journal of Social Issues, 59, 2003, 771). This study examines an adolescent population, as contextual comparisons should be especially salient at this time. Methods: Participants included over 900 adolescents at age 15 involved in a multisite longitudinal study. Results: Results showed that lower relative income status predicted increased social dissatisfaction, internalizing and externalizing problems, after controlling for family SES. Moreover, the effect of relative income was indirectly related to these problems through social dissatisfaction. Exploratory multigroup analyses by gender suggested that the adolescent girls may be driving the effects of relative income. Conclusions: Findings are discussed in regard to adolescent socioemotional functioning, as well as the implications for gender differences related to relative income status. Keywords: Social class; sex differences; adolescence; social environment; Child Behavior Checklist.

Introduction

Social class is a robust predictor of child and adolescent development, affecting general health, cognitive abilities, and socioemotional adjustment (Bradley & Corwyn, 2002). A growing body of research indicates that social class is multifaceted with objective, subjective, and contextual aspects (Fiske & Markus, 2012). In the present study, we aim to further the understanding of the influence of social class on development by considering a mismatch between the income of others and the income of an adolescent’s family. We call the position of income in relation to others’ income relative income. Biocultural theory posits that environmental systems exist within different proximities to a person (Bronfenbrenner & Morris, 2006). As such, examining how individual functioning relates to social class within proximate contexts (e.g., school, neighborhood) offers value above and beyond traditional research on the impact of social class based on less proximate contexts (e.g., societal definitions). In the present study, we considered relative income within neighborhoods. Much is known about the influence of relative income within educational settings. At elite universities, lower and middle class students report low levels of belongingness (Ostrove, 2003), as well as identity and academic issues (Granfield, 1991). Further, middle-class students at an affluent university report stigmatized identities based on their socioeconomic status (SES), and this leads to academic fit concerns and self-regulation problems (Johnson, Richeson, & Finkel, 2011). Within high schools, low-income adolescents who attend school with many high-income students experience increased negative self-image and lower achievement in comparison to students who attend schools with fewer high-income students (Crosnoe 2009).

The understanding of adolescents’ family income within neighborhoods is less complete. Recent research suggests that characteristics of an adolescent’s neighborhood can affect his or her mental health. For example, the presence of social disorder (i.e., gangs, drug sales) within an adolescent’s neighborhood may predict increased internalizing symptoms for girls (Browning, Soller, Gardner, & Brooks-Gunn, 2013). Within low-income neighborhoods, relative deprivation (defined as the difference between an adolescent’s household income and the mean income of households in the adolescent’s census tract) predicts increased mood disorders (McLaughlin, Costello, Leblanc, Sampson, & Kessler, 2012). According to the Moving to Opportunity (MTO) study, which followed families moving from high-poverty to low-poverty neighborhoods, adolescent girls fared better than boys on mental health and risk-taking problems after moving (Clampet-Lundquist, Edin, Kling, & Duncan, 2011; Kling, Liebman, & Katz, 2007). In addition, low-income boys raised in close proximity to affluent neighborhoods engage in more antisocial behaviors than those brought up in poor and working class neighborhoods (Odgers, Donley, Caspi, Bates, & Moffitt, 2015).

Other related evidence has emerged from studies examining subjective status, or a person’s perceptions of his or her social standing relative to others. Subjective SES (Kraus, Côté, & Keltner, 2010; Piff, Kraus, Côté, Cheng, & Keltner, 2010) and subjective...
sociometric status (Anderson, Kraus, Galinsky, & Keltner, 2012) can be manipulated by asking adults to compare themselves to those at either extremes of the ladder (i.e. those best or worst off). After comparing themselves to those highest up the ladder, adults report lower levels of subjective status and subjective well-being than after comparing themselves to the lowest on the ladder. In sum, cross-class interactions, measured by objective, subjective, and contextual indicators of social class, influence people in a variety of ways.

The present study aims to extend what is known about adolescents’ relative income within a neighborhood context. Previous research on neighborhood effects has traditionally focused on low-income neighborhoods and families (Browning et al., 2013; Clampet-Lundquist et al., 2011; Odgers et al., 2015). The present study considers family neighborhood income disparities across social classes. That is, by our measure of relative income (based on the adolescent’s family income in relation to the neighborhood income), we are able to consider the effect of income disparity for adolescents that are from lower class families living in middle-class neighborhoods, as well as middle-class families living in upper-class neighborhoods. Previous research has found that neighborhood affluence is related to emotional and behavioral well-being, as well as higher achievement, above and beyond other markers of families’ social class (Dupere, Leventhal, Crosnoe, & Dion, 2010; Leventhal & Brooks-Gunn, 2000). However, as social cognition becomes increasingly mature during adolescence (Burnett & Blakemore, 2009), adolescents become more perceptive to complex social cues, such as social class. For instance, the subjective SES of adolescents 15 years and older is highly related to their mothers’ subjective SES, while younger adolescents’ subjective SES tends to be higher than their mothers’ (Goodman et al., 2001). Moreover, peers become increasingly important during adolescence, including as a salient reference to the self (Harter, 2012; Hay & Ashman, 2003). Taken together, the benefits of affluent neighborhoods may become offset by the negative effects of cross-class interactions.

In the present study, we considered whether the position of adolescents’ family income relative to the typical incomes of their neighbors is related to their internalizing and externalizing problems, as well as loneliness and social dissatisfaction. We hypothesized that adolescents from families with low relative income will experience greater externalizing and internalizing problems than those from mid or high relative income families. Furthermore, we expected the effect of relative income would be indirectly related to externalizing and internalizing problems through loneliness and social dissatisfaction.

We also performed exploratory multigroup analyses across gender because much of the previous work on relative income has revealed different gender effects (Browning et al., 2013; Clampet-Lundquist et al., 2011; Kling et al., 2007; Odgers et al., 2015). Evidence also suggests social skills and social perceptions differ across genders (Cillessen & Bellmore, 1999; LaFontana & Cillessen, 1999), as does the influence of family income on problem behaviors (Bolger, Patterson, Thompson, & Kupersmidt, 1995).

### Method

#### Participants

The participants included American children recruited at birth and followed through age 15 who were enrolled in the NICHD Study of Childcare and Youth Development (SECCYD). New mothers and their infants were recruited from 24 hospitals in 10 data collection sites in 1991.1 When the study children were 15 years old, 1,009 of the families were still involved in the NICHD SECCYD study. Of these, 942 had valid data for the variables used to create relative income. Table 1 shows descriptive statistics. The adolescents in the final sample were mostly White (81.7% White, 11.8% African-American, 6.5% other). Although the sample is not nationally representative, it is one of the largest longitudinal studies of American schoolchildren ever conducted.

#### Table 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>Relative income status</th>
<th>Low</th>
<th>Mid</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>M (SD)</td>
<td>N</td>
<td>M (SD)</td>
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<tr>
<td>Internalizing problems</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Self-report</td>
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<td>50.42 (12.19)</td>
<td>442</td>
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<td>454</td>
<td>46.64 (9.69)</td>
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<tr>
<td>Self-report</td>
<td>102</td>
<td>52.73 (11.30)</td>
<td>442</td>
<td>49.78 (10.07)</td>
</tr>
<tr>
<td>Mother report</td>
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<td>48.69 (11.47)</td>
<td>454</td>
<td>46.34 (10.52)</td>
</tr>
<tr>
<td>Loneliness and social dissatisfaction</td>
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<td>27.94 (10.47)</td>
<td>443</td>
<td>26.21 (8.79)</td>
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<tr>
<td>Family income-to-needs ratio</td>
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<td>1.73 (1.35)</td>
<td>448</td>
<td>2.93 (1.53)</td>
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<tr>
<td>Mother’s education (1–10)</td>
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<td>3.71 (1.83)</td>
<td>453</td>
<td>3.72 (1.64)</td>
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<tr>
<td>Total N</td>
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<td>456</td>
<td>378</td>
<td></td>
</tr>
<tr>
<td>% Female</td>
<td>49.1</td>
<td>49.6</td>
<td>51.1</td>
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Table 2 Correlation matrices for adolescent girls and boys

<table>
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<th>4</th>
<th>5</th>
<th>6</th>
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<td></td>
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<tr>
<td>SES</td>
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<td></td>
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<tr>
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<td></td>
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<td></td>
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<tr>
<td>Self-report internalizing problems</td>
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<td>-.07</td>
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<tr>
<td>Self-report externalizing problems</td>
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<td>-.15***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother report internalizing problems</td>
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<td>-.09</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother report externalizing problems</td>
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<td>-.21***</td>
<td>.09*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SES, socioeconomic status.
Correlations for adolescent girls are below the diagonal; correlations for adolescent boys are above the diagonal.

**p ≤ .001; *p ≤ .01; *p ≤ .05.

Measures
Relative income. When study children were 15, mothers reported total family pretax income on a 27-point scale. The scale increased in increments of $5,000 (1 = less than $5,000 and 27 = more than $1,000,000). We operationalized relative income by comparing the total family income to the median income of the adolescents’ census block for that year. A census block is a subdivision of a census track that encompasses about 1,000 people in the immediate proximity of each household. We converted the median household income for each census block to match the 27-point scale the NICHD SECCYD used to measure family income. Relative income scores were computed by subtracting the median income for the census block from the family income. Scores ranged from −15 to 16. A high positive score indicated that a family’s income is highly above the median neighborhood income. A relative income score of 0 indicates that a family’s household income is the same as the median neighborhood income. And extremely negative score indicates that a family’s income is substantially below the median neighborhood income.

Self-reported internalizing and externalizing problems. Study children completed the Youth Self-Report (Achenbach, 1991) when they were 15 years old. This contains 119 items on a broad range of adolescent’s behavioral and emotional problems. For each item, the adolescent was asked how well that item describes him or her currently or within the last 6 months: 0 = Not True, 1 = Somewhat or Sometimes True, and 2 = Very True or Often True. Standardized scores were created for the internalizing scale, comprised of the withdrawn, somatic complaints, and anxious/depressed syndromes, as well as the externalizing scale, comprised of delinquent and aggressive behaviors.

Mother-reported internalizing and externalizing problems. When study children were 15 years old, mothers reported on their adolescent’s internalizing and externalizing problems using the Child Behavior Checklist (Achenbach, 1991), a widely used measure to assess problem behaviors of children 4–18 years old. Items are rated on 3-point scales from 0 (not true) to 2 (very true). Standardized scores (T-scores) were created for the internalizing scale (i.e. withdrawn, somatic complaints, and anxious/depressed syndromes) and the externalizing scale (i.e. delinquent and aggressive behaviors). Our sample does not represent a clinical population; the proportion of participants with T-scores above 63 (the beginning of the clinical range; Van den Bergh & Marceno, 2004) is 5% for the internalizing and 5.3% for the externalizing scale.

Loneliness and social dissatisfaction. At age 15, study children were asked to complete a 25-item questionnaire designed to assess feelings of loneliness and social dissatisfaction. Sixteen items were taken from the Loneliness and Social Dissatisfaction Questionnaire (Asher, Hymel, & Renshaw, 1984), and focused on the adolescent’s feelings of loneliness, feelings of social adequacy, subjective estimations of peer status, and appraisals of whether important relationship provisions are being met. The remaining items were fillers. Responses were scored on a 5-point Likert scale ranging from 1 = ‘Not at All True’ to 5 = ‘Always True’, and some items were reverse coded. Items included ‘I don’t have any friends’, ‘It’s hard to get other kids to like me’, and similar prompts.

Socioeconomic status. A family SES composite variable was computed using maternal educational attainment and the family income-to-needs ratio when adolescents were 15 years old. Family income-to-needs ratios were created by dividing the poverty threshold for the household size by reported family income. The SES composite was created by averaging the z-scores of each measure. The mean SES composite score for the sample was 0.002 (SD = 0.845; range = −1.68 to 6).

Results
Correlations between all measures, within gender, are reported in Table 2. We used Structural Equation Modeling to examine the effects of relative income on adolescents’ internalizing and externalizing problems, as well as indirect effects through loneliness and social dissatisfaction. All models were estimated using Mplus version 7.31, which uses Full Information Maximum Likelihood to impute missing values (Muthén & Muthén, 1998–2010).

We created latent variables for both internalizing and externalizing problems from the self and mother report of each, respectively. Confirmatory factor analysis suggested that these bifactor latent variables were appropriate [model fit indices: $\chi^2(2) = 3.19$, $p = .20$; CFI = .99; SRMR = .03; RMSEA = .02 ($C.I_{90} = 0.00–0.07$)]. Models controlled for effects of family SES on loneliness and social dissatisfaction, internalizing problems, and externalizing problems. This allowed us to investigate whether relative income predicts adolescents’ social support and emotional problems above and beyond SES. The covariance between exogenous variables (i.e. SES and relative income) was freely estimated. Indirect paths were tested using the Sobel test and bias-corrected bootstrap estimation (MacKinnon, 2008; Sobel, 1982). We used a large number of bootstraps (10,000) in order to ensure high precision.

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Fit indices suggest that the model for internalizing problems represented a good fit to the data: $\chi^2(2) = 7.59, p = .02; CFI = .99; SRMR = .02; RMSEA = .05 (CI_{90} = 0.02–0.10);$ and moderate fit for externalizing problems: $\chi^2(2) = 18.64, p < .001; CFI = .93; SRMR = .03; RMSEA = .09 (CI_{90} = 0.06–0.14)$. Figure 1 summarizes the model structure and the standardized coefficients of significant paths of the internalizing (Figure 1a) and externalizing (Figure 1b) models.

For the internalizing model (Figure 1a), relative income was a negative predictor of loneliness and social dissatisfaction ($\beta = -.10, p < .05$), controlling for family SES. Lower levels of relative income status were associated with higher levels of loneliness and social dissatisfaction. The negative relation between relative income and internalizing problems trended toward significant ($\beta = -.08, p = .07$), after controlling for SES. Tests of the indirect effect showed that low relative income status was indirectly related to internalizing problems through loneliness and social dissatisfaction, with a standardized indirect effect of -.07 (Sobel’s $z = -2.47, p = .01, CI_{95} = -.108$ to -.014).

The externalizing model followed a similar pattern as the internalizing model (see Figure 1b). Relative income negatively predicted loneliness and social dissatisfaction ($\beta = -.10, p < .05$) and internalizing problems ($\beta = -.18, p < .01$), after controlling for family SES. Indirect effect tests showed that the effect of low relative income status was indirectly related to internalizing problems through loneliness and social dissatisfaction, with a standardized indirect effect of -.03 (Sobel’s $z = -2.36, p < .05, CI_{95} = -.082$ to -.011).

Additional models were run for both externalizing and internalizing problems with the addition of an interaction term of family SES relative income, in order to examine if the effect of relative income differed across social class. The interaction term was not a significant predictor of externalizing ($\beta = .11, p = .11$) or internalizing problems ($\beta = .01, p = .80$).

**Gender differences**

Although chi-square tests suggested that a multigroup model is not more statistically appropriate than a single group model, we performed exploratory multigroup models by gender based on previous findings demonstrating important gender differences in social perception and family income effects, and for theoretical considerations. Fit indices suggest that the model for internalizing problems represented a good fit to the data: $\chi^2(6) = 8.76 (\chi^2$ contribution by group: girls = 6.43, boys = 2.34), $p = .19; CFI = .99; SRMR = .02; RMSEA = .03 (CI_{90} = 0.00–0.07);$ as well as the model for externalizing problems: $\chi^2(6) = 21.29 (\chi^2$ contribution by group: girls = 13.51, boys = 7.78), $p = .002; CFI = .93; SRMR = .03; RMSEA = .07 (CI_{90} = 0.04–0.11)$.

Figure 1 Results of structural equation modeling (SEM) analysis on the effect of relative income on internalizing problems (A) and externalizing problems (B), with indirect effects through loneliness and social dissatisfaction, and controlling for family socioeconomic status (SES). Single-headed arrows represent paths of influence. Solid lines indicate significant effects, and dashed lines indicate nonsignificant effects. Standardized coefficients are shown. ****$p \leq .001$, ***$p \leq .01$, **$p \leq .05$, *$p \leq .08$, $^t p \leq .08$, $^m p \geq .08$
Figure 2 shows that for girls, relative income status negatively predicted loneliness and social dissatisfaction ($\beta = -.14$, $p < .01$). Lower relative income status tended to be associated with high levels of loneliness and social dissatisfaction. The negative relation between relative income and internalizing problems trended toward significant ($\beta = -.09$, $p = .08$), after controlling for SES. Testing the indirect effect showed that the effect of low relative income status was indirectly related to internalizing problems through loneliness and social dissatisfaction, with a standardized indirect effect of $-.09$ (Sobel’s $z = -2.94$, $p < .01$, CI$_{95} = -0.15$ to $-0.02$). For boys, relative income status did not predict loneliness and social dissatisfaction or internalizing problems.

The models predicting externalizing problems followed a similar pattern for the girls (see Figure 3). Controlling for SES, relative income status negatively predicted loneliness and social dissatisfaction ($\beta = -.13$, $p < .01$) and externalizing problems ($\beta = -.19$, $p < .05$) for girls. The standardized indirect effect of relative income on externalizing problems through loneliness and social dissatisfaction was $-.06$ (Sobel’s $z = -2.51$, $p < .05$, CI$_{95} = -0.12$ to $-0.02$). For boys, on the other hand, relative income had a significant and negative direct effect on externalizing problems ($\beta = -.15$, $p < .05$), but no effect on loneliness and social dissatisfaction.

**Discussion**

Using data from a 10-site, longitudinal study of U.S. children, the present study shows that adolescents’ socioemotional and behavioral problems are related to their relative income status, such that those from families with lower incomes than their neighbors experienced greater internalizing and externalizing problems, as determined by both self- and mother-report. This relation was found even after controlling for family SES. Moreover, relative income was indirectly related to internalizing and externalizing problems through its influence on loneliness and social dissatisfaction. That is, adolescents with lower relative income status reported greater loneliness and social dissatisfaction, which, in turn, was related to greater internalizing and externalizing problems. The inverse of these effects suggests that high relative income status may be a protective factor against socioemotional maladjustment. These findings extend the growing body of research on the relative and subjective nature of social class.

The operationalization of relative income presented in the current study offers a useful way to further the understanding of the mismatch between a person’s own social class and the typical social class within a given context. It is unknown whether the lower relative income adolescents in the present study perceived themselves to be of a lower income status than their neighbors. McLaughlin et al. (2012) used a measure of relative deprivation similar to our operationalization of relative income, and found that relative deprivation and subjective SES were not related. However, while adolescents may not consider their SES explicitly, they may perceive underlying differences based on SES that contribute to their social dissatisfaction. Evidence has indicated that greater material resources and family wealth can elevate peer status (Keltner, Gruenfeld, & Anderson, 2003; LaFontana & Cillessen, 1999). Perhaps relative income status is related to adolescents’ peer status in part by function of engaging in normative social activities, with lower relative income adolescents lacking the resources to do so.

The present study further suggests that girls drove the effects of relative income, which is consistent with findings by Browning et al. (2013), who found adolescent girls’ internalizing symptoms increased with high levels of social disorder within their neighborhood block. The mechanisms of this gender difference are unknown. Based on evidence that girls are more socially perceptive, have greater social sensitivity, and greater awareness of status than boys (Benenson, Apostoleris, & Parnass, 1998; Cillessen & Bellmore, 1999; LaFontana & Cillessen, 1999), one possibility is that adolescent girls are more aware of their relative position in their neighborhood’s social class hierarchy than are adolescent boys. It is also possible that economic resources are more salient for adolescent girls, as it...
is more costly to be a woman in the United States, based on the number of products and services used, as well as higher pricing for women than men on functionally comparable products (Bessendorf, 2015; Duesterhaus, Grauerholz, Weichsel, & Guit-
tar, 2011). Another explanation relates to gender norms. Obtaining social status tends to be based on achieving dominance for males and demonstrating beauty for females (Adler & Adler, 1998; Ispa-Landa, 2013; Pellegrini & Long, 2003). As such, affluence may be more salient in obtaining status for females, as wealth can afford girls the opportunity to enhance their appearance.

Several studies suggest that relative income has more pernicious effects for boys (Clampet-Lundquist et al., 2011; Kling et al., 2007; Oggers et al., 2015). A recent study examining contextual income effects in England and Wales (Oggers et al., 2015) reported that low-income boys who grew up alongside affluent neighbors tended to engage in more antisocial behaviors than those who grew up among poor and working-class neighbors. They did not find this effect for girls. It is worth noting that Odgers et al. (2015) measured antisocial behaviors using specific items of the Child Behavior Checklist (Achenbach, 1991) externalizing scale completed by the children’s mothers and teachers. Thus, their measure of anti-
social behaviors is similar to, but distinct from, the present study’s measure of externalizing problems. Differences in the participants’ age and culture could also account for the contrasting results.

In addition, findings from the MTO project indicate that moving from high poverty to lower poverty neighborhoods is related to positive psychological outcomes for adolescent girls, but not boys (Clam-
ippet-Lundquist et al., 2011; Kling et al., 2007). However, adolescents within the MTO project are distinct from the present participants in important ways. The MTO participants experienced a context shift in regard to residence, whereas our participants did not. In addition, participants in the MTO study initially resided in lower income, high-risk settings and then moved to lower poverty neighborhoods. Qualitative investigation of this transition indicated adolescent girls who moved to lower poverty neigh-
borhoods fared better than the boys because these girls saw increased safety and reduced risk factors, whereas the boys were subjected to more scrutiny from police and neighbors in their new neighbor-
hoods (Clampet-Lundquist et al., 2011).

Our study indicates that SES does not predict internalizing problems in the presence of relative income, although SES did still predict externalizing problems. Previous studies that controlled for SES alongside different forms of relative income have found that SES remains influential. Oggers et al. (2015) found that SES still predicted antisocial behavior for boys in addition to neighborhood poverty. McLaughlin et al. (2012) controlled for par-
et education and family income separately, and found that parental education was associated with anxiety disorders alongside subjective social status. Future research is needed to better understand how objective SES and relative income are related.

Some limitations should be addressed. First, vari-
able were all assessed at age 15, which limits any causal interpretations. The NICHD benefits from multiple phases of data collection. However, the NICHD has a wide gap between the wave at age 15 and the previous wave, which occurred 5 years ear-
ier. We chose to examine relative income as a process within adolescence, as what is known about adoles-
cent social cognition led us to believe that they should be more perceptive of the complex, subtle, and abstract signals of SES (Harter, 2015; Keating, 2004; Ricco, 2015). We believe the present study offers a distal snapshot of the proximal relation between relative income, social dissatisfaction, and internalizing and externalizing problems. Nonetheless, this study is limited as data are correlational. Future research should explore these processes ear-
ier in childhood, as well as longitudinally. In addition, we examine neighborhood effects only, and not other social contexts, such as peers at school. Future studies may do well to examine this, as well as explore neighborhood and school effects comparatively.

Conclusion
While the effects of poverty on development have been well explored, less research has considered the effect of SES within adolescents’ social contexts. The findings of the present study show that adolescents whose income falls below what is normative for their neighborhood experienced more internalizing and externalizing problems, after controlling for SES. Furthermore, lower relative income was indirectly related to internalizing and externalizing problems through loneliness and social dissatisfaction. Taken together, the results of the present study indicate the value of considering contextual factors when inves-
tigating adolescents’ social functioning and socioemotional well-being. Moreover, study findings illustrate the value in examining social class beyond traditional measures, and indicate that individuals who may be objectively considered middle or upper class can still experience detriment when engaging with those who are more affluent.

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Key points

- Lower income status relative to neighborhood families was related to increased internalizing and externalizing problems compared to those adolescents whose family income were similar or higher than their neighbors.
- The effect of relative income status on internalizing and externalizing problems was mediated through loneliness and social dissatisfaction.
- Multigroup analyses suggest that the adolescent girls in the sample were driving the effects of relative income status on socioemotional outcomes.

Notes

1. Mother-infant dyads were excluded from the study if the mother was younger than 18 years old, could not speak English, was not healthy, or refused; if the infant had a serious medical condition; or if the family planned to move out of the area within a year, or lived in a neighborhood that police said was too dangerous to send two unescorted research assistants. Based on the criteria, the sample was reduced to 5,416 mother-infant dyads. A conditional random sampling plan was used to select 3,015 mother-infant dyads. Of that group, 1,364 families met the inclusion criteria, were successfully recruited, and completed the 1-month interview. (Further details can be found at https://sec.rti.org).
2. Following the guidelines of Kline (2011), we tested for collinearity between SES and relative income in several ways. First we calculated the squared multiple correlation ($R^2_{smc}$) between each variable and all other variables. The $R^2_{smc}$'s were all under .31. The criterion for extreme multivariate collinearity is .90 (Kline, 2011). We also calculated tolerance. Tolerance values under .10 indicate multivariate collinearity (Kline, 2011). No tolerance values were under .70 suggesting no multivariate collinearity. Finally, we calculated the variance inflation factor (VIF). Values over 10 suggest redundancy (Kline, 2011). No values were over 1.5. In sum, there was no evidence for multivariate collinearity as tested by the $R^2_{smc}$, tolerance, and VIF.
3. In order to examine whether the multi-group analyses by gender were an appropriate fit for the data, chi-square statistics from the unconstrained model (with all paths freely estimated across groups) and the constrained model (with all paths constrained to be equal across groups) were compared in order to determine the difference in fit. No means or intercepts were estimated. For internalizing problems, the unconstrained model, $\chi^2(6) = 8.762$, $p = .187$ did not fit the data significantly better than the constrained model, $\chi^2(20) = 19.057$, $p = .518$, according to a chi-square difference test, $\chi^2(14) = 10.295$, $p = .740$. For externalizing problems, the unconstrained model, $\chi^2(6) = 21.3$, $p = .002$, did not fit the data significantly better than the constrained model, $\chi^2(20) = 33.669$, $p = .029$, according to a chi-square difference test, $\chi^2(14) = 12.369$, $p = .577$. When no difference is found in fit between models, it suggests that the most parsimonious model (i.e. the single group model) should be used.

References


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