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ORIGINAL ARTICLE

Do We Know Where We Stand? Neighborhood Relative Income, Subjective Social Status, and Health

Amanda L. Roy,[1] Erin B. Godfrey,[2] and Jason R.D. Rarick[2]

Abstract Bridging research on relative income and subjective social status (SSS), this study examines how neighborhood relative income is related to ones' SSS, and in turn, physical and mental health. Using a survey sample of 1807 U.S. adults, we find that neighborhood median income significantly moderates the relationship between household income and self-reported physical and mental health. Low-income individuals living in high-income neighborhoods (i.e., relative disadvantage) report better physical and mental health than low-income individuals living in low-income neighborhoods. In addition, high-income individuals living in low-income neighborhoods (i.e., relative advantage) report higher SSS (relative to neighbors), whereas low-income individuals living in high-income neighborhoods (i.e., relative disadvantage) also report higher SSS. We draw from social comparison theory to interpret these results positing that downward comparisons may serve an evaluative function while upward comparisons may result in affiliation with better-off others. Finally, we demonstrate that SSS explains the relationship between neighborhood relative income and health outcomes, providing empirical support for the underlying influence of perceived social position.

Keywords Relative income · Neighborhood · Health · Subjective social status · Social comparisons

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It has been well-established that having a higher income is associated with better health and well-being (see Adler et al., 1994 for a review). However, ecological theory highlights the importance of understanding individual health within environmental and societal context, with particular focus on the interdependence and interaction of individuals and settings (see McLaren & Hawe, 2005 for a review). As such, there is increasing interest in how the broader socioeconomic context, both at the societal level and within specific settings, may affect the relationship between income and health. As neighborhood is one of the most proximal settings in adults' lives, it is important to understand how an individual's income relative to the income of their neighborhood matters for health and well-being. Several empirical studies have shown the relationship between individual income and health to vary as a function of the economic status of the neighborhoods in which individuals live. This relationship has been shown for various indicators of physical and mental health, including adult mortality (Winkleby, Cubbin & Ahn, 2006) and cancer mortality rates (Chang et al., 2012), self-rated mental health (Fone, Dunstan, Williams, Lloyd & Palmer, 2007), life and financial satisfaction (Roy & Godfrey, 2016), depression (Aguilera, Leykin, Adler & Muñoz, 2012), and substance use (Chuang, Li, Wu & Chao, 2007).

Why might one's income relative to neighborhood income matter for health? One potential mechanism is perceptions of economic standing and accompanying psychological stress (e.g., Adler & Matthews, 1994; Wilkinson, 1996, 1997). The experience of living in lower (or higher) income neighborhoods can shape the way that individuals see their own economic standing, resulting in increases (or decreases) in psychological stress with implications for individual physical and mental health. For

example, low-income individuals living in high-income neighborhoods may perceive their social status as low, regardless of absolute income, resulting in higher levels of stress and adverse biological and behavioral consequences. However, social comparison theory suggests that individuals may be differentially motivated to compare themselves with higher versus lower status others (Collins, 1996; Taylor & Lobel, 1989). As such, while perceptions of economic standing may underlie the relationship between relative neighborhood income and health, important questions remain as to how individuals use social comparisons to evaluate and draw meaning about their position in the income distribution.

The Intersection of Individual and Neighborhood Income and Health

A growing body of work has demonstrated the influence of relative income, or an individual's income in the context of others, as a determinate of individual health (Chen & Meltzer, 2008; Firebaugh & Schroeder, 2009; Gravelle & Sutton, 2009; Miller & Paxson, 2006; Phillips, Wise, Rich-Edwards, Stampfer & Rosenberg, 2009; Turley, 2002; Wagstaff & Van Doorslaer, 2000). Prior studies on relative income vary in the geographic area used as a point of comparison, ranging from the state level to the more proximal neighborhood level. We choose to focus on the neighborhood level because it reflects the immediate context in which individuals experience their economic standing and because prior work has shown smaller units of analysis to provide more accurate measurements of neighborhood effects on health and well-being (e.g., Huie, 2001). There is also variability in how measures of relative income are calculated (Turley, 2002; Wagstaff & Van Doorslaer, 2000). In this study, we operationalize relative income as the interaction between household and neighborhood income which we term *neighborhood relative income*. This commonly used approach allows us to compare individuals in situations of relative disadvantage (i.e., having a lower income than the neighborhood average) and advantage (i.e., having a higher income than the neighborhood average).

Research that has used the interaction between family and neighborhood income to examine relationships with health have found situations of neighborhood relative income to be predictive of health, although the pattern of results varies across studies and outcomes. Some studies have found experiences of relative disadvantage to be detrimental for health outcomes, including smoking (Chuang et al., 2007), adult mortality rates (Winkleby et al., 2006), and cancer survival rates (Chang et al., 2012). However, other studies have found the experience of relative disadvantage to be protective for health outcomes, such as self-reported mental health (Fone et al., 2007) and life and financial satisfaction (Roy & Godfrey, 2016). In contrast, relative advantage has been found to be protective for depression (Aguilera et al., 2012) and drinking behavior (Chuang et al., 2007).

It has been posited that one way that neighborhood relative income may affect individual functioning is through perceived social status and its relationship to psychological stress (Wilkinson, 1996, 1997). This framework argues that individuals who are lower in the income distribution will compare themselves to higher income others, and as a result, they perceive themselves as having a lower social position or status. Perceiving oneself to be in a lower social position, in turn, will lead to increases in stress. In contrast, individuals who are higher in the income distribution will also view their social position as higher, resulting in lower levels of stress. Psychological stress, in turn, has been linked to disruptions in biological processes (McEwen, 1998), increases in poor health behaviors (Ng & Jeffery, 2003), and detriments to mental health (McEwen, 2003). Although perceived social status and psychological stress have been theorized to underlie the relationship between neighborhood relative income and health, little empirical work has tested this model. Moreover, some have argued that upward social comparisons may not always be detrimental for self-evaluation and downward social comparisons may not always be protective; rather different types of comparisons may serve different psychological needs such as affiliation with others or self-evaluation (Collins, 1996; Taylor & Lobel, 1989). As such, questions remain as to how objective experiences of neighborhood relative income shape individual perceptions of social status, and in turn, whether perceived social status explains the relationship between neighborhood relative income and health.

Subjective Social Status and Health

Parallel research on subjective social status (SSS) offers insight into the role that perceptions of social status play in determining individual health and well-being. SSS is commonly measured using the MacArthur Scale of SSS (Adler & Stewart, 2007), which was developed to capture individuals' sense of their place in the socioeconomic distribution. Respondents are presented with a visual depiction of a ladder representing where people in society stand: people on the top rung are the best off, with the most money, education, and respected jobs; and people on the bottom rung are the worst off. Respondents are then asked to rank their status relative to others. Multiple versions of the measure have been used, asking respondents to rate themselves relative to others in the United States, community, peers, and similar racial/ethnic groups. SSS, both at the United States and community levels, is a

strong predictor of adult physical (Adler, Epel, Castellazzo & Ickovics, 2000; Franzini & Fernandez-Esquer, 2006; Goodman, Huang, Schafer-Kalkhoff & Adler, 2007; Ostrove, Adler, Kuppermann & Washington, 2000; Singh-Manoux, Adler & Marmot, 2003; Singh-Manoux, Marmot & Adler, 2005) and mental (Demakakos, Nazroo, Breeze & Marmot, 2008; McLaughlin, Costello, Leblanc, Sampson & Kessler, 2012) health, with individuals with higher SSS having better health outcomes.

Researchers have also considered the predictive power of SSS when in combination with objective measures of household and neighborhood socioeconomic status (SES; Chen & Paterson, 2006; Senn, Walsh & Carey, 2014). For example, in a structural equation model, Senn et al. (2014) included objective indicators of individual SES, neighborhood SES, and SSS as predictors of perceived health with health compromising behavior and perceived stress as mediating pathways. By including objective economic indicators at multiple levels in predictive models with SSS, this approach models the independent contribution of each indicator to health. However, questions remain as to (a) the relationship between the joint influence of household and neighborhood SES and SSS and (b) whether SSS underlies the relationship between neighborhood relative income and health.

Objective Economic Indicators and SSS

Indicators of SES, such as income, educational status, and occupation status, are consistent predictors of SSS (Franzini & Fernandez-Esquer, 2006; Reitzel et al., 2010; Singh-Manoux et al., 2003); having a higher SES is positively related to SSS. One study also found living in a neighborhood with high rates of poverty, unemployment, and/or low levels of education to be negatively related to SSS (Reitzel et al., 2010). While related, SSS and objective indicators of economic standing are oftentimes only moderately correlated (Adler et al., 2000; Singh-Manoux et al., 2005), suggesting that SSS is not informed by absolute indicators of economic standing alone. Theoretical models have posited that SSS captures class standing, including dimensions of social rank and the experience of social inequalities and inequities (Adler et al., 2000; Franzini & Fernandez-Esquer, 2006; Reitzel et al., 2010). However, almost nothing is known about how neighborhood relative income shapes individuals' SSS. Given that neighborhood relative income captures an individual's household income in combination with the income of their neighborhood, it is likely that it is also a salient predictor of SSS. In addition, given the strong relationship between SSS and individual health, it may be that SSS explains the relationship between neighborhood relative income and health outcomes.

The Current Study

By bridging literatures on relative income and SSS, this work (a) contributes to the growing literature on relative income and health by testing the joint influence of household and neighborhood income on self-rated physical and mental health. In addition, we consider (b) whether neighborhood relative income is related to SSS. As such, this work tests the hypothesis that relative income shapes individuals' perceived social status. Rather than assuming that living in a situation of relative disadvantage (or advantage) leads to decreased (or increased) SSS, we empirically examine the nature of this relationship. Finally, this work considers (c) whether SSS explains the relationship between neighborhood relative income and individual physical and mental health. Although Demakakos et al. (2008) demonstrated that SSS mediates the relationship between indicators of SES and self-rated health, almost nothing is known about the role that SSS plays in explaining relationships between the interaction of household and neighborhood income and health. This is the case despite theoretical models that posit perceived social status as a key mediating mechanism.

Methods

Data and Sample

Data for this study come from a nationally representative sample of 2119 adults (18 years or older) who completed an online survey measuring attitudes on a variety of topics, including health, crime, politics, and technology. Of the 2119 individuals who completed the survey, 1835 provided valid information on their address of residence. These individuals make up the sample for this study. Of these, 56 resided in the same census block group or "neighborhood." Because of concerns that two individuals residing within the same block group may be in some way related, the decisions was made to select one respondent at random from each of these pairs to drop from the sample. As such, the final analytic sample is made up of 1807 respondents residing in 1807 distinct neighborhoods. The sample is predominately white (78%) and equally divided between men and women (Table 1). The majority of respondents have at least some college education (64%) and are currently employed (56%). On average, respondents are 50 years old (SD = 16.55, ranging from 18 to 91) and have a total household income of approximately $73,000 per year ($M$ = 72,879, SD = 46,740). Respondents live primarily in metropolitan statistical areas (84%) and are fairly equally distributed across the United States: Northeast (18%), Midwest (24%), South (36%), and West (22%).

Table 1 Sample descriptives

	N	Mean/%	*SD*
Individual health			
Physical health	1806	3.41	.96
Mental health	1804	3.69	.96
Income			
Household income	1807	72,851	46,740
Neighborhood income	1804	62,237	31,621
Subjective social status			
Neighborhood SSS	1791	5.36	1.92
Covariates			
R is white	1807	78%	
R is female	1807	50%	
R is married or cohabitating	1807	64%	
R is currently working	1807	56%	
R has some college or above	1807	64%	
R age	1807	50.08	16.55
Household has Internet	1807	83%	
R lives in the Northeast	1807	18%	
R lives in the Midwest	1807	24%	
R lives in the South	1807	36%	
R lives in the West	1807	22%	
Total NH population	1807	1715	1102
% NH population white	1807	.79	.22

R, respondent; NH, neighborhood.

Data collection was administered by Knowledge Networks (KN), a company specializing in online survey research. Respondents were part of KN's KnowledgePanel®, the only large-scale probability-based online panel in the United States allowing projectable results using web-based surveys. All panel members are actively recruited into the panel using either random digit dialing or address-based sampling; individuals do not have the option of self-selecting into the panel. If needed, participating households were provided with Internet access and a netbook computer, making the sample generalizable to both online and offline populations in the United States. KN provides respondents with modest incentives, including monthly Internet access and raffles for cash rewards, to encourage participation and create member loyalty. The current survey was administered in English and had a completion rate of 58%, which is typical in research of this kind. Data collection took place in March 2013, and the survey took approximately 30 min to complete. Research Triangle Institute International funded this work as a part of their 2012 crowdsourcing research challenge.

Measures

Health Outcomes

Two items are used to measure respondents' self-rated physical and mental health. Self-rated physical health was measured with the question "In general, would you say your health is…" rated on a scale from 1 (poor) to 5 (excellent). Self-rated health is a robust and reliable measure of overall health status (Ferraro, Farmer & Wybraniec, 1997) and a strong predictor of mortality (Idler & Benyamini, 1997). Self-rated mental health was measured with the question "During the past 4 weeks, how often did you feel fretful, angry, irritable, anxious, or depressed?" rated on a scale from 1 (almost always) to 5 (never). This item comes from the 6-item emotions subscale of the Health Utilities Index (Furlong, Feeny, Torrance, & Barr, 2001), which has been shown to be a valid measure of mental health in population surveys (Feeny, Huguet, McFarland, Kaplan, 2009).

Neighborhood Relative Income

Our indicator of relative income was created using measures of total household income and neighborhood income. Respondents' total household income was reported in 19 categories ranging from "Less than $5000" to "$175,000 or more" with the size of the category getting larger at the upper end of the distribution. In order to create a continuous variable, each individual was assigned the midpoint of their specified income category.

Respondents were asked to report their residential zip code and the cross streets nearest their residence. Addresses were geocoded using ArcGIS software (version 10; ESRI, 2011). Based on cross streets, we were able to geocode 58% (N = 1220) of the sample addresses. Using only zip codes (in the case of missing cross-street data), we were able to geocode an additional 615 cases. In using zip codes, we identify the geographic point located in the middle of the specified zip code, therefore sacrificing precision in estimating respondents' location of residence. However, in order to capitalize on as much data as possible, the decision was made to use all cases with any geographic information for analyses. Geocoded addresses were linked with 2010 census block group boundaries, and estimates of the median household income at the block group level were obtained from the American Community Survey 2008–2012 5-year estimates. This is our measure of neighborhood income. Both income variables were divided by 10,000 to avoid very small coefficients.

In all analyses, neighborhood relative income is represented as the interaction between the grand-mean-centered household income and neighborhood income variables. We use this approach to parallel prior work in this area (Aguilera et al., 2012; Chang et al., 2012; Chuang et al., 2007; Roy & Godfrey, 2016; Winkleby et al., 2006) and to compare individuals in situations of relative disadvantage (i.e., having a lower income than the neighborhood average) and advantage (i.e., having a higher income than the neighborhood average). Although high-income individuals tend to live in high-income neighborhoods

(r = .37), household and neighborhood income only share 14% of their variance. Although related, household and neighborhood income are not redundant, making it possible to use the interaction between the two variables.

Subjective Social Status

Subjective social status was measured with the MacArthur Scale of SSS. Respondents were presented with a pictorial representation of a 10-step "social ladder" and told "Please imagine a 10-step ladder where the poorest people in *your neighborhood* stand on the bottom (the first step) and the richest people in *your neighborhood* stand on the highest step (the tenth step). On which step are you today?" All items were coded so that a higher score indicates better perceived social position.

Covariates

All analytic models adjust for household and neighborhood income and include a set of covariates to increase the precision of the estimates. Respondent characteristics are represented with a set of binary indicators representing race (white vs. other), female, married or cohabitating, currently employed, and has some college or above. Models also adjust for continuous respondent age. Because the survey was administered via online survey, an indicator of whether the household has Internet access is also included. Geographic characteristics are represented with binary indicators representing respondents' location in the United States (Northeast, Midwest, and South, with West as the reference group). Neighborhood characteristics include a measure of the total population in each respondent's census block group (divided by 10,000 to avoid small coefficients) and the percentage of the population that is white. All covariates are grand mean centered.

Analytic Plan

Analytic models were run using structural equation modeling in Mplus version 7. In an initial model, household income, neighborhood income, and their interaction were modeled as correlated manifest variables with directional paths leading to physical health, mental health, and SSS. Directional paths were included from all covariates to the three outcome variables. In order to test the indirect relationship of the interaction between household and neighborhood income on health via SSS, a second model was estimated in which directional paths leading from SSS to physical and mental health were added to the original model. Following guidelines for testing moderated mediation (Muller, Judd & Yzerbyt, 2005), we also included the interaction between SSS and neighborhood income in this model with directional paths leading to both health outcomes. The indirect effect of the interaction between household and neighborhood income on health via SSS was tested using bias-corrected bootstrapped 95% CIs based on 5000 sample replicates (Preacher & Hayes, 2008). Across all models, model fit was assessed using traditional fit indices, including the comparative fit index (CFI), the Tucker-Lewis index (TLI; with good fit for both the CFI and TLI indicated by values >.95), and the root-mean-square error of approximation (RMSEA; with good fit indicated by p values <.05).

There is a small amount of missing data across all analytic variables ranging from 0% to 1% (Table 1). Analyses use full information maximum likelihood to estimate statistical parameters from data with missing values, allowing retention of the complete sample.

Results

Model 1: Neighborhood Relative Income, Health, and SSS

The path model fit the data well, $\chi^2(14, N = 1807) = 33.80$, $p < .05$, CFI = .98, TLI = .94, RMSEA = .03. Path estimates revealed the interaction between family and neighborhood income to be significantly related to physical health ($\beta = -.051$, $p < .05$), mental health ($\beta = -.057$, $p < .05$), and SSS ($\beta = -.065$, $p < .01$; Table 2). To examine the nature of these relationships, interactions were graphed at ± 1 standard deviation for each of the predictors (Figs 1–3; physical health, mental health, and SSS, respectively), and simple slopes calculated at ± 1 deviation were tested to determine if they were different from 0. Among low-income families, higher levels of neighborhood income was associated with higher levels of physical (A to B slope; $\beta = .077$, $p < .05$) and mental health (A to B slope; $\beta = .121$, $p < .01$). Although there was a similar relationship for SSS, the estimate did not reach statistical significance (A to B slope; $\beta = .053$, $p = .13$). Among high-income families, neighborhood income was not significantly related to physical (C to D slope; $\beta = -.02$, $p = .53$) or mental health (C to D slope; $\beta = .02$, $p = .53$) but was negatively associated with neighborhood SSS (C to D slope; $\beta = -.07$, $p < .05$).

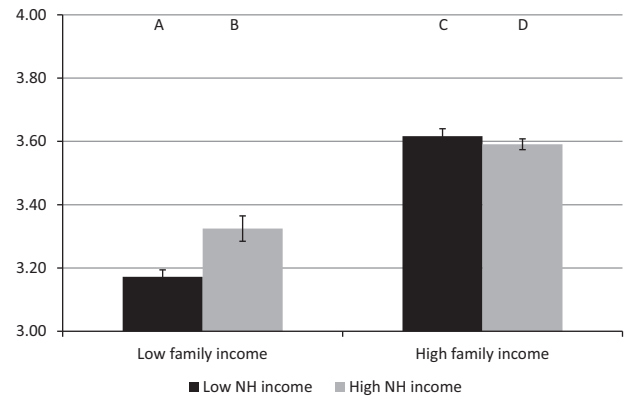
Model 2: The Explanatory Role of SSS

To test the explanatory role of SSS, directional paths between SSS and physical health and mental health were included in the model (Fig. 4). Directional paths from the interaction between SSS and neighborhood income and

Table 2 Interaction between household and neighborhood income predicting health and subjective social status

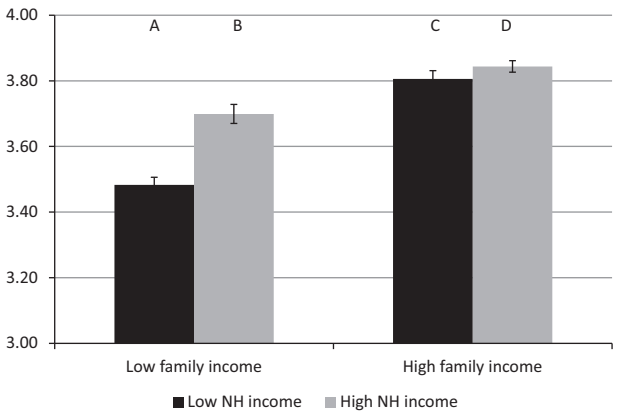
	Physical health			Mental health			Subjective social status		
	b	*SE*	β	*b*	*SE*	β	*b*	*SE*	β
Intercept	3.424	.022	**	3.708	.023	**	5.408	.041	**
Hhld income by NH income	−.003	.001	−.051*	−.003	.001	−.057*	−.008	.003	−.065**
Hhld income	.038	.007	.030	.025	.008	.069	.187	.014	−.005
NH income	.009	.005	.183**	.021	.006	.122**	−.003	.011	.455**
R is white	.018	.056	.008	−.140	.062	−.061*	−.055	.107	−.012
R is female	.018	.043	.009	−.234	.045	−.122**	−.061	.079	−.016
R is married or cohabitating	.038	.048	.019	.085	.050	.043†	.078	.091	.020
R is currently working	.146	.048	.075**	.106	.050	.055*	.083	.091	.021
R has some college or above	.231	.049	.115**	−.116	.050	−.058*	.238	.090	.059**
R age	−.006	.001	−.105**	.007	.001	.113**	.020	.003	.170**
Household has Internet	.132	.064	.052*	−.129	.067	−.050†	.091	.128	.018
R lives in the Northeast	.026	.066	.010	.029	.070	.011	.050	.124	.010
R lives in the Midwest	−.118	.065	−.053†	.095	.069	.042	.186	.120	.042
R lives in the South	−.022	.059	−.011	.084	.061	.042	.116	.108	.029
Total NH population	.170	.204	.019	.067	.195	.008	.106	.402	.006
% NH population white	.164	.107	.038	−.169	.118	−.039	.400	.207	.047†

R, respondent; Hhld, household; NH, neighborhood.
†$p < .10$; *$p < .05$; **$p < .01$.



Note: Error bars represent standard errors; NH = neighborhood
The AB slope compares lower-income individuals living in low- versus high-income neighborhoods
The CD slope compares higher-income individuals living in low- versus high-income neighborhoods

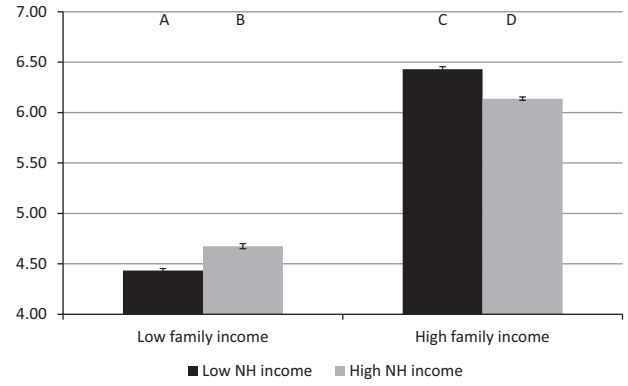
Fig. 1 Interaction between family and neighborhood income predicting physical health. Error bars represent standard errors; NH, neighborhood. The AB slope compares low-income individuals living in low- versus high-income neighborhoods. The CD slope compares high-income individuals living in low- versus high-income neighborhoods



Note: Error bars represent standard errors; NH = neighborhood
The AB slope compares lower-income individuals living in low- versus high-income neighborhoods
The CD slope compares higher-income individuals living in low- versus high-income neighborhoods

Fig. 2 Interaction between family and neighborhood income predicting mental health. Error bars represent standard errors; NH, neighborhood. The AB slope compares low-income individuals living in low- versus high-income neighborhoods. The CD slope compares high-income individuals living in low- versus high-income neighborhoods

outcomes were also included (not depicted in Fig. 4). The path model fit the data well, $\chi^2(16, N = 1807) = 42.49$, $p < .05$, CFI = .97, TLI = .92, RMSEA = .03. SSS was positively related to both physical (β = .249, $p < .01$) and mental (β = .188, $p < .01$) health. The interaction between SSS and neighborhood income was not related to either physical (β = .008, $p = .32$) or mental (β = −.094, $p = .21$) health. The inclusion of SSS in the models reduced the magnitude and significance of the coefficients for the interaction between family and neighborhood income. Keeping with the guidelines specified by Muller et al. (2005), we find support for the role of SSS as an explanatory mechanism between the interaction of household and neighborhood income and health: (a) there is a direct relationship between the interaction and both health outcomes, (b) the interaction is significantly related to SSS and SSS is significantly related to both health outcomes after adjusting for the interaction, and (c) the magnitude of the relationship between the interaction and health outcomes is reduced when SSS is included in the model. Finally, tests of indirect effects revealed a



Note: Error bars represent standard errors; NH = neighborhood
The AB slope compares lower-income individuals living in low- versus high-income neighborhoods
The CD slope compares higher-income individuals living in low- versus high-income neighborhoods

Fig. 3 Interaction between family and neighborhood income predicting subjective social status. Error bars represent standard errors; NH, neighborhood. The AB slope compares low-income individuals living in low- versus high-income neighborhoods. The CD slope compares high-income individuals living in low- versus high-income neighborhoods

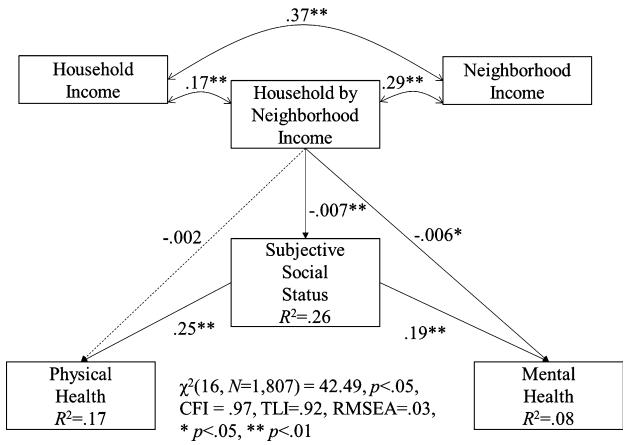


Fig. 4 Structural equation model depicting relationships between the interaction between household and family income, health, and subjective social status. The interaction between subjective social status and neighborhood income and covariates is included in the model. Standardized regression coefficients are reported. Dashed lines represent nonsignificant paths.

significant indirect influence of the interaction between household and neighborhood income on physical health through SSS ($\beta = -.016$, $p < .05$, 95% CI = $-.028$, $-.004$) and mental health ($\beta = -.012$, $p < .01$, 95% CI = $-.022$, $-.003$).

Sensitivity Analyses

Several sensitivity analyses were run to assess the robustness of and further clarify our results. First, we ran our analyses using only those cases with valid cross-street data ($N = 1211$), and results were not substantively different from results conducted with the full sample. (Details on these analyses are available on request from the first author.)

Although our test of indirect effects indicate that SSS plays an explanatory role between the interaction of household and neighborhood income and health, it does not tell us for whom SSS matters most. To further explore this relationship, we created two variables reflecting high (centered at 1 *SD* above the sample mean) and low (centered at 1 *SD* below the sample mean) household income which we then interacted with grand-mean-centered neighborhood income. We then ran two sets of analyses predicting the outcomes from (a) high-centered household income, neighborhood income, and their interaction and (b) low-centered household income, neighborhood income, and their interaction. In each of these models, the coefficient for neighborhood income represents the relationship between neighborhood income and outcomes for individuals with high and low household incomes. Directional paths from the interaction between SSS and neighborhood income and outcomes were included in these models, and tests of the indirect effects of neighborhood income on physical and mental health via SSS were calculated. When household income was high, SSS explained the relationship between neighborhood income and physical ($\beta = -.017$, $p < .05$, 95% CI = $-.031$, $-.002$) and mental ($\beta = -.012$, $p < .05$, 95% CI = $-.023$, $-.001$) health. However, when household income was low, the indirect effects between neighborhood income and physical ($\beta = .014$, $p = .13$, 95% CI = $-.004$, $.031$) and mental ($\beta = -.010$, $p = .14$, 95% CI = $-.003$, $.024$) health via SSS fell short of reaching statistical significance.

Discussion

There is growing evidence for the role of neighborhood relative income in determining individual health. Moreover, it has been theorized that one pathway underlying this relationship is individual perceptions of economic standing. Despite this theoretical framework and research demonstrating a robust relationship between SSS and individual health, to our knowledge, no prior empirical work has tested whether SSS explains the relationship between neighborhood relative income and health. As such, this work addresses several key gaps in the literature. First, it builds support for the role of neighborhood relative income, or the interaction between household and neighborhood income, in determining both physical and mental health. For low-income individuals, we find the experience of living in high-income neighborhoods to be protective for self-rated physical and mental health. Second, we find that neighborhood relative income predicts SSS;

living in a high-income neighborhood is related to increases in SSS among low-income individuals, while living in a high-income neighborhood is related to decreases in SSS among high-income individuals. Contrary to what we would expect given theory on relative income, this finding lends support to the idea that different individuals may use social comparisons in different ways such as to inform status or affiliate oneself with better-off others (Taylor & Lobel, 1989). Finally, this work provides empirical support for the role of SSS as an explanatory mechanism between neighborhood relative income and individual health.

Our findings contribute to the growing number of studies finding the experience of living in a high-income neighborhood to be protective for health outcomes among low-income individuals (Fone et al., 2007; Roy & Godfrey, 2016). Specifically, we find that low-income individuals living in high-income neighborhoods had better rated self-rated physical and mental health than low-income individuals living in low-income neighborhoods. Theory and research on relative income and health provides several potential interpretations of these findings. First, it may be that for low-income individuals, living with high-income others positively influences how they see themselves and raises economic aspirations, which, in turn, play a positive role in health (Easterlin, 2001, 2003; Firebaugh & Schroeder, 2009). Alternatively, it could be that living in a high-income neighborhood provides low-income individuals greater access to health-promoting resources, such as medical care, supermarkets, and parks (Chen & Meltzer, 2008; Jencks & Mayer, 1990). Similarly, living in a high-income neighborhood may provide low-income individuals additional social resources less available in low-income neighborhoods. For example, living in a high-income neighborhood is related to greater social integration among neighbors (Marcus, Echeverria, Holland, Abraido-Lanza & Passannante, 2015). In turn, social support from community members is protective for physical and emotional well-being (Heinze, Kruger, Reischl, Cupal & Zimmerman, 2015). Finally, it is possible that the findings are driven by selection; low-income individuals who are healthier may be better equipped to secure housing in high-income neighborhoods. It is also interesting to note that among high-income individuals, neighborhood income did not predict health. This suggests that having a higher income may make individuals less susceptible to health risks associated with low-income neighborhoods.

Keeping with theory on relative income, we would expect that neighborhood relative disadvantage would be related to lower SSS, while neighborhood relative advantage would be related to higher SSS (Wilkinson, 1996, 1997). Our results partially support this pattern. We find that high-income individuals living in low-income neighborhoods report higher SSS compared with their counterparts living in high-income neighborhoods. This suggests that in situations of relative advantage, individuals accurately use environmental cues to evaluate their position in the income distribution. In contrast, we find that low-income individuals living in high-income neighborhoods (i.e., relative disadvantage) report higher SSS compared with their counterparts in low-income neighborhoods. This suggests that in situations of relative disadvantage, individuals fail to recognize their lower economic position, rather using environmental cues to position themselves higher in the income distribution.

These findings can be interpreted in the context of social comparison theory (Festinger, 1954). It has been posited that upward social comparisons are detrimental for self-evaluations and downward comparisons are protective (e.g., Collins, 1996; Wheeler & Miyake, 1992). However, others have argued that upward and downward comparisons can serve different psychological purposes. Because humans have a strong desire to evaluate oneself against less fortunate others, downward comparisons may be an important component of self-evaluation. In contrast, a desire for information about and contact with those who are better off may mean that upward social comparisons result in perceived affiliation with better-off others and increased motivation and hope (Taylor & Lobel, 1989). Therefore, it may be that in situations of relative advantage, high-income individuals may contrast their economic standing against their low-income neighbors to make accurate evaluations about their own economic position which may in turn reduce financial strain and psychological stress. In contrast, in situations of relative disadvantage, low-income individuals may affiliate themselves with their high-income neighbors, resulting in increases in SSS and lower psychological stress, regardless of their objective economic position.

Finally, to our knowledge, this work provides the first empirical support for the explanatory role of SSS in the relationship between neighborhood relative income and self-rated physical and mental health. It is has been theorized that relative income influences health via one's perceived social position and accompanying psychosocial stress (Adler & Matthews, 1994; Wilkinson, 1996, 1997). Individuals whose income or social status is low relative to a salient reference group will compare themselves to better-off others and perceive themselves as being in a lower social position, which, in turn, will lead to higher levels of psychosocial stress and negative health outcomes. While we find support for the explanatory role of SSS in the link between neighborhood relative income and health, our findings suggest that this relationship is complex. Although we find living in high-income

neighborhoods to be related to increases in physical and mental health and SSS for low-income individuals, indirect effects for this group failed to reach statistical significance. Therefore, while living in a high-income neighborhood may increase low-income individuals' perceived social position, the benefits to health may be operating through an alternative explanatory pathway such as access to health-promoting resources. In contrast, while high-income individuals living in low-income neighborhoods report higher SSS, these individuals do not experience any direct health benefits associated with neighborhood income. However, we did find an indirect effect of neighborhood income on health via SSS. Therefore, while neighborhood income may not have a direct influence on health for high-income individuals, it may operate indirectly by shaping individual SSS. As a whole, this work lends support for theoretical models arguing that SSS underlies the relationship between neighborhood relative income and health (Adler & Matthews, 1994; Wilkinson, 1996, 1997). In addition, it highlights the need for future work to test additional underlying pathways and clarify how social comparison processes operate in situations of relative advantage versus disadvantage.

Limitations

Despite its empirical and theoretical contributions, this study has several limitations that should be mentioned. First, because the data are cross-sectional, causal inferences cannot be made. For example, it could be that healthier low-income individuals are better able to access housing in high-income neighborhoods, therefore explaining the higher levels of health identified for this group. Future research should capitalize on longitudinal data to better isolate the temporal nature of these relationships. Second, although prior work has calculated relative income using a variety of approaches (e.g., Miller & Paxson, 2006; Phillips et al., 2009; Wagstaff & Van Doorslaer, 2000), we focus on the interaction between household income and neighborhood income as our operationalization of the construct. We took this approach to consider the potential for differential patterns of results across situations of relative advantage and disadvantage. In addition, we chose to focus on the neighborhood because of prior work demonstrating more robust relationships with health. However, future work should consider different conceptualizations of the construct. Third, although we hypothesize that comparisons with neighbors underlie our pattern of results, we do not directly measure whether individuals compare themselves to their neighbors. Although future work should assess the degree to which individuals are aware of the economic standing of their neighbors, because social comparisons might be either conscious or unconscious (Hetts, Sakuma & Pelham, 1999; Stapel & Suls, 2004), we feel that these findings provide an important first step in understanding how relative income may shape SSS and health. Moreover, although we use social comparison theory as the framework for interpreting our results, future work should consider the explanatory role of other pathways. Finally, we rely on single-item, self-report measures of health as our dependent variables. Although single-item health measures are commonly used in population surveys and have been shown to be robust predictors of objective indicators of health (Feeny, Huguet, McFarland, Kaplan, 2009; Ferraro et al., 1997; Idler & Benyamini, 1997), they are not as comprehensive as other measures. Future work is needed to replicate these findings using more robust measures of health.

Conclusions

Despite these limitations, this work makes several important contributions to our understanding of the relationship between neighborhood relative income, SSS, and health. First, we provide additional evidence to support burgeoning work that living in a higher income neighborhood may be protective for health among low-income individuals. In addition, we identify SSS as a mechanism underlying this relationship. Moreover, our results suggest that low-income individuals living in high-income neighborhoods may use upward social comparisons to affiliate with high-income others and inflate one's perceptions of social standing. Alternatively, high-income individuals living in low-income neighborhoods may use social comparisons to accurately evaluate their position in the income distribution. Given the robust relationship between SSS and health, these increases in SSS may serve a protective function for individuals' physical and mental health. This finding lends support for policies aimed at increasing mixed income housing. By designating units for families falling below a certain income threshold, these developments may not only provide families with high-quality, affordable housing but also influence how individuals see themselves within the larger economic distribution.

Compliance with Ethical Standards

The research described here complied with APA ethical principles in the treatment of individuals participating in the research described in this article. The author's use of the data was approved by the University of Illinois–Chicago's Institutional Review Board.

Conflict of Interest

The author declares that they have no conflict of interest.

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