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Stressful Social Comparisons and Daily Stressors: Examining Their Role as Psychosocial Explanations in Socioeconomic Health Disparities

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Stressful Social Comparisons and Daily Stressors: Examining Their Role as Psychosocial

Explanations in Socioeconomic Health Disparities

A dissertation in partial satisfaction of the

requirements of the degree Doctor of Philosophy

in Health Policy & Management

by

Jeremiah Robert Garza

2015

ABSTRACT OF THE DISSERTATION

Stressful Social Comparisons and Daily Stressors: Examining Their Role as Psychosocial

Explanations in Socioeconomic Health Disparities

by

Jeremiah Robert Garza

Doctor of Philosophy in Health Policy & Management

University of California, Los Angeles, 2015

Professor Frederick Zimmerman, Chair

My dissertation examines particular psychosocial pathways—subjective social status, daily hassles, and daily interpersonal stressors—underlying health disparities. Subjective social status, a measure of stressful social comparisons, constitutes an important, yet understudied mechanism linking socioeconomic status and health. Few studies have examined the effects of subjective social status among U.S. Latinos, the nation's largest and one of its fastest growing ethnic-minority groups.

Stress research has focused on major events and chronic stress, largely overlooking the effects of daily hassles, particularly among African Americans—a group disproportionately burdened by high levels of stress and poverty. A majority of daily hassles involve interpersonal conflict. Individuals experiencing chronic pain may be especially susceptible to the effects of interpersonal conflict as arguments with significant others could result in increased emotional

reactivity and compromised symptom management. Prior studies have relied on an aggregate measure of interpersonal stress, potentially obscuring important variability in health effects. Thus, my research, through three studies, investigates whether subjective social status, daily hassles, and interpersonal stress serve as health determinants and potential mediators of the status-health relationship among racial/ethnic minorities and chronic pain populations.

The first study among U.S. Latinos found a strong inverse relationship between subjective social status and poor health, especially among immigrant Latinos. This finding supports the prevailing notion that stressful social comparisons robustly influence health and partially account for the status-health relationship. The second study among whites and African Americans, found that daily hassles do not mediate the status-health relationship. Rather, traumatic events are more closely tied to status and have the greatest impact on health. The third study among rheumatoid arthritis patients found a positive association between status and exposure to spouse/partner conflicts, a result that substantially nuances existing literature documenting a general inverse status-stress relationship. This study also found that increases in negative interpersonal spouse/partner events result in a significant rise in emotional reactivity.

Future socioeconomic health disparities research should account for relative status, a meaningful measure for examining how social disadvantage causes stress. These investigations should also focus on the effects of interpersonal spouse/partner conflicts and strategies to reduce their frequency and incidence. Researchers may wish to incorporate multiple stressors, paying attention to the effects of early life challenges and their particular implications in forming the context for experiencing and responding to chronic stressors and daily hassles. This research furthers our understanding of the intermediate, psychosocial chain of events that lead to poor health.

The dissertation of Jeremiah Robert Garza is approved

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University of California, Los Angeles

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DEDICATION

To my wife, Ivy,

for your unwavering love and support,

my daughter, Mikayla,

for the joy in my heart,

my parents, Cris and Jane,

for your patience and encouragement, and

the Chang family,

for welcoming me into your home and being wonderful grandparents to Mikayla.

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Finally, I would like to thank my family for their love, support, and sacrifices. For my parents who raised me to be kind and respectful no matter the circumstances. For my loving and patient wife Ivy who has shouldered more than her fair share of parenting burdens while I pursued this degree. Lastly, to my daughter Mikayla, you are my everything and I am so happy to have you in my life. I hope my pursuit of this degree demonstrates the importance of following your professional dreams and, at the same time, being an involved parent and supportive partner.

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CHAPTER 1:

Introduction to the Dissertation

This dissertation consists of three studies that seek to unravel particular psychosocial pathways—stressful social comparisons, daily hassles, and daily interpersonal stress—underlying health disparities. The first study addresses whether subjective social status, a measure of stressful social comparisons, is robustly associated with health among Latinos in the United States (U.S.). Stressful social comparisons have been proposed as a key psychosocial pathway linking socioeconomic status and income inequality with health. The increasing gap between the rich and poor in the U.S. makes the examination of the health implications of subjective social status even more important, especially among U.S. Latinos, the nation's largest and one of its fastest growing racial/ethnic groups. The second study investigates whether daily hassles—relatively minor, everyday stressors—help explain the association between low socioeconomic status and poor health among a racially diverse U.S. adult sample. The third study examines whether daily interpersonal stressors from multiple life domains (e.g., work, friends, family, spouse) are differentially patterned by socioeconomic status and have variable health effects among a rheumatoid arthritis sample. Such an investigation within a chronic pain sample is needed, as there is the potential for chronic pain and pain-related disability to influence social standing and for social standing to influence exposure to interpersonal conflict. The following describes the importance of examining psychosocial factors in socioeconomic-related health disparities and summarizes key theoretical perspectives regarding the status-stress and stress-health relationships. The chapter concludes with a brief description of each study.

The Value of Examining Psychosocial Factors in Socioeconomic Health Disparities Research

Researchers have begun exploring psychosocial risk factors such as stress to help explain health and health disparities, and with good reason. Stress is one of the central ways that differences in health are produced. Research shows that people's experience of stress varies by socioeconomic status and, to some extent, ethnicity, with low status individuals and ethnic minorities exhibiting relatively high psychosocial risk (1–8). Moreover, stress is associated with a wide array of health outcomes (9). Closer examination of the psychosocial chain of events that lead to socioeconomic disparities in health is warranted as U.S. health inequities are pervasive, expensive, and expected to persist with projected increases in immigrants, racial/ethnic minorities, and income inequality (5,10–15). This dissertation seeks to resolve unanswered questions regarding how different types of stress determine or serve as mechanisms through which poor health is produced among disadvantaged populations (e.g., low status, racial/ethnic, chronic pain sufferers). The results of this research may help inform prevention and intervention efforts to address socioeconomic health disparities.

Theories Underlying the Links Between Stress and Health

Current understanding of the stress-health link is influenced by three broad traditions for assessing the role of stress in health—environmental, psychological, and biological. The environmental tradition focuses on environmental events or experiences that are normatively (objectively) associated with substantial adaptive demands (16). The psychological tradition emphasizes perception, appraisal, and response processes, while the biological tradition concentrates on activation of biological processes in response to stress (17,18).

These traditions and subsequent hypothesized pathways by which stress leads to poor health have been tested, refined, and integrated by several stress theorists and researchers. Some

of the more notable research include Folkman and Lazarus' work on stress, appraisal, and coping; McEwen and colleagues' research on ongoing stress and the deleterious effects of prolonged activation of the stress response; work by Conway and colleagues, Lloyd and Turner, and Ng and Jeffery who have examined the predictive quality of stress on maladaptive behavior; as well as Cohen, Kessler, and Gordon's heuristic model of the stress process (19–23).

Folkman and Lazarus' "Transactional Model of Stress" incorporates the environmental and psychological traditions placing equal emphasis on stressful events, coping, and emotional response (17). In this model they postulate that not all challenges produce a stress response. Rather, only events perceived as threatening and beyond an individual's psychological coping resources (e.g., self-esteem, social support) elicit a physiological stress response (i.e., allostasis), otherwise known as the fight-or-flight response (19,24).

Embracing the biological tradition, McEwen and colleagues extended research on allostasis, a protective process in the short run (e.g., alert and ready to avoid danger), to identify the adverse effects of allostatic load (i.e., the prolonged wear and tear on physiologic systems) that can emerge in the face of repeated or prolonged stress (20,25,26).

Taking into account all three traditions, research by Conway and others, Lloyd and Turner, and Ng and Jeffery provide evidence that behavioral responses to stress also heighten risk for poor health (21–23). Individuals under stress are more likely to engage in maladaptive behaviors, including poor eating and physical activity habits as well as excess consumption of alcohol, tobacco, and other substances (21–23).

Cohen, Kessler, and Gordon's heuristic model of the stress process (Figure 1--1) integrates these three traditions into a unifying conceptual model showing that environmental

stressors can result in physiological and behavioral responses that increase one's risk for poor

health, with the appraisal of demands and coping resources as mediating factors (17,27).

Given this collective research, most stress-health models incorporate the three broad

traditions and suggest a physiological, behavioral, and psychological link between stress and

health. This theoretical framework has influenced how disparities researchers conceptualize how

stress exposure leads to socioeconomic disparities in health.
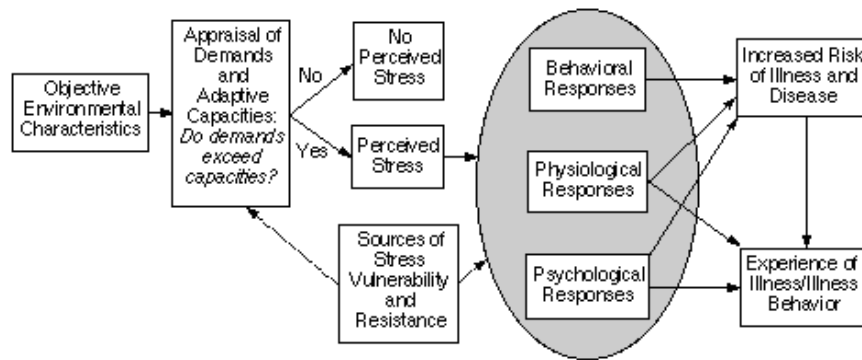
Figure 1--1. Conceptual Model Linking Stress Exposure to Poor Health, Cohen et al., 1997

Socioeconomic Status and Stress

The prevailing understanding behind the status-stress relationship is that lower status

individuals experience more frequent, numerous (e.g., acute and chronic), and intense stress

compared to their higher status counterparts (28–31,27,32–35). Social context and psychological

factors (e.g., coping resources) are also hypothesized to influence the likelihood of encountering

stress and successfully resolving it. Lower status individuals are more likely to live in poorer,

stressful settings characterized by more frequent exposure to chronic and toxic environmental

stressors (36,37,1). In addition to experiencing a greater frequency of stress, lower status

individuals have less access to instrumental and psychological resources to avoid and/or

effectively manage stressful experiences (3,32). Status also influences appraisals in ways that

exacerbate the stress burden experienced by disadvantaged individuals. Lower status individuals

have been shown to interpret even ambiguous events as stressful (38). Moreover, as described

by Adler & Stewart (2010), the cascade of effects resulting from social disadvantage has been

shown to begin early in life and cumulates over a lifetime (25). Thus, over time, increased stress

exposure coupled with inadequate coping resources result in higher levels of stress (i.e.,

increased vulnerability), subsequently leading to poorer health for those at the lower end of the

socioeconomic hierarchy (1,39,40).

The "Reserve Capacity Model" developed by Gallo and Matthews illustrates the unequal

distribution in stress exposure, psychosocial resources, appraisal, and vulnerability driven by

differences in socioeconomic status (32,40). The "Reserve Capacity Model" (Figure 1-2) also

incorporates the aforementioned biological and behavioral pathways along with reference to the

differential cumulative effect of stress associated with socioeconomic disadvantage (32).
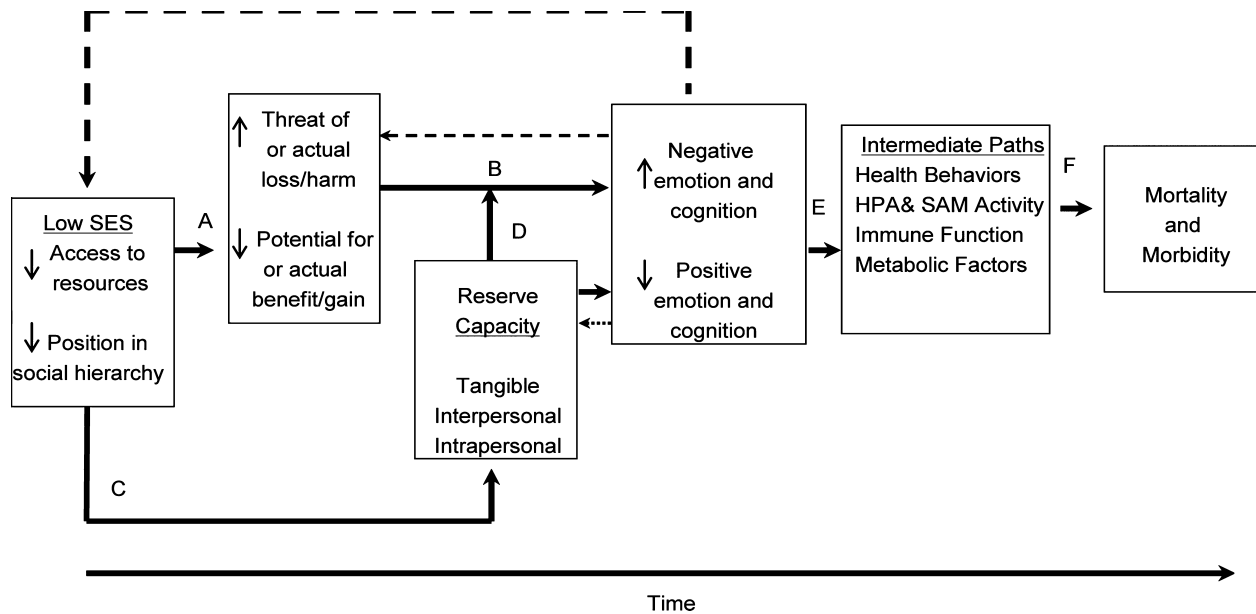
Figure 1-2. The reserve capacity model, Matthews et al., 2010
HPA: hypothalamic-pituitary-adrenocortical; SAM: sympathetic adrenal-medullary

All together these theories and models provide a conceptual framework for examining the

status-health pathway that leads from social disadvantage, to intermediate psychosocial factors,

to biological and behavioral pathways, and ultimately to health. These conceptualizations also

underscore the fact that there is not one type of stressor that fully explains the status-health relationship. Rather multiple types of stressors, especially those tied to social disadvantage, tend to co-occur. Therefore, approaches that examine the health effects of one type of stress (e.g., daily stress, major events, chronic stress) or stress appraisal in isolation may overestimate the effect of any given stressor and/or conceal which specific stressors are more strongly linked to status and health. Stressful experiences—including both ongoing everyday hassles and more acute events like job loss, with inadequate resources to cope—tend to compound to create higher levels of stress over a person's lifetime (41,42). Subsequently, this dissertation research focuses on multiple types of stressors in an effort to tease apart the psychosocial link between status and health. It is my hope that by including multiple types of stressors and stress appraisal will allow a clearer understanding of the roles that each of these types of stressors have in the status-health relationship.

Subjective Social Status, Stress, and Latino Health

As reflected on the far left of the "Reserve Capacity Model," lower status individuals are hypothesized to experience greater stress due to experiencing both absolute deprivation (i.e., having less material and psychological resources) and relative deprivation (i.e., feeling lower in status). Yet, many studies have relied more heavily on absolute/objective measures (i.e., income, education, occupation), omitting the more affective and psychological experience associated with status. An individual's subjective perception of their rank in society (i.e., subjective social status) has also been shown to impact health (even after accounting for objective measures) and may constitute a more appropriate and meaningful measure of social position for examining how living on the edge causes stress (43–46).

The "Reserve Capacity Model" also illustrates that low subjective social status is hypothesized to increase stress, resulting in health-damaging negative emotions such as shame and mistrust (15,47–49). Furthermore, the influence of subjective social status on health has been shown to vary, in part, by race/ethnicity (44,50–52,46). Few studies have tested the relevance of subjective social standing among Latinos, the United States' largest ethnic minority and immigrant group and one of its fastest growing (13, 18–20). This is an important research gap as U.S. Latinos, a multi-ethnic population (e.g., Mexican, Puerto Rican, Salvadorans, and Cubans), are disproportionately burdened by high poverty rates (55). The two studies examining the relationship between subjective social status and health among Latinos have yielded mixed results (44,45).

There is also a need to examine how nativity might influence the association between subjective social status and Latino health. The health impact of subjective social status may be particularly strong among Latino immigrants as self-rated social status is likely to capture the perceived benefits and costs associated with migration and the immigrant experience; experiences which can influence social standing and impact health. Prior research has found that immigrant Latinos who experience downward social mobility are at elevated risk of major depression (56). Additional research is needed in this area as the major life changes typically associated with the Latino immigrant experience can affect one's perceived social standing and health, above and beyond objective indicators of socioeconomic status.

Daily Stressors and Health

Individuals at the lower rungs of the socioeconomic ladder experience multiple types of stressors (e.g., acute, chronic, and episodic challenges), each of which can trigger an unhealthy stress response (57–62). Yet much of the status-stress research has focused on dramatic life

events or chronic stress (27,63–66). Though less examined, daily hassles or relatively minor daily stresses (e.g., working two jobs, being fearful of losing a job, having unreliable transportation, having stressful financial dealings with friends, or living in a deteriorating neighborhood), have been shown to independently influence physical and mental health and may serve as a mechanism by which socioeconomic disparities in health are produced (67–70,33,31,71,40,72).

The paucity of research on daily hassles as a meditational pathway is an important gap in the literature as the frequency and type of daily hassles experienced are said to provide a better and more proximal explanation for associated psychological and somatic health outcomes than major life events or chronic stressors (73,68,74–78,33,79). Daily hassles and major and minor life events are assumed to interact with chronic stressors, like financial hardship, to impact health (73,80). However, only a few studies have explicitly tested this hypothesis (71,81–83).

While any number of such commonplace challenges can disrupt daily life, a majority of daily stressors involve interpersonal conflicts and it is these day-to-day interpersonal stressors that are particularly unhealthy (84–92). At the same time socioeconomic status is believed to influence rates of interpersonal conflict. Specifically, lower status individuals are hypothesized to experience more negative social interactions with family, friends, co-workers, and community members compared to their higher status counterparts (93). Nevertheless, there is little evidence to support this inverse status-interpersonal conflict hypothesis nor is there any testing whether this relationship varies based on the type of interpersonal stress involved (e.g., spouse/partner, family, friends, co-workers). Testing this general inverse status-stress exposure hypothesis in a chronic pain sample is needed as some of the greatest socioeconomic inequalities in stress and health are found among people with arthritis and other musculoskeletal disorders (94–96). This

research among a chronic pain sample is made all the more important given both the potential for chronic pain and pain-related disability to influence social standing and social standing to influence exposure to interpersonal stress (94,95,97–99).

Interpersonal conflict arising from different domains may also result in varied health effects. Individuals likely weigh interpersonal stressors from multiple life domains differently. For example, the regularity and intensity of interpersonal conflict concerning expenses and other day-to-day challenges between spouses/partners may be greater compared to that among family, friends, or co-workers. Subsequently, interpersonal tensions stemming from different relationships may have varying health effects. Yet prior studies examining the daily interpersonal stress-health relationship have tended to aggregate these stressors into a summary measure of interpersonal conflict (100–102,99,103,98,86). Such practice may potentially obscure important differential effects of daily interpersonal stress on emotional reactivity.

Dissertation aim & research studies

Theory suggests that a portion of the socioeconomic status effects on health and well-being is due to status being inversely related to stress. However, this notion and the hypothesis that stress is a significant and meaningful health correlate, may not apply for all types of stressors implicated in the status-health pathway. That said, this dissertation consists of three studies that investigate whether stressful social comparisons, daily hassles, and/or interpersonal stress, potentially mediate the observed association between status and health. This research involved analyses among multiple samples, including a nationally representative sample of U.S. Latinos, a community sample of blacks and whites, and a sample of rheumatoid arthritis patients. To the fullest extent possible, confounding, mediating, and modifying variables featured in the

aforementioned status-stress and stress-health conceptual models, were adopted in specifying each study's hypotheses.

Study 1: Subjective Social Status and Latino Health (Hypotheses)

The first study investigated the relationship between subjective social status and health among a diverse, non-institutionalized, U.S.-born ($N = 924$) and foreign-born ($N = 1,629$) Latino population using the National Latino and Asian American Study (NLAAS), one of the largest population-based surveys of Latinos in the U.S. This study examined two hypotheses. First, it was hypothesized that subjective social status would be related to self-reported physical and mental health controlling for socioeconomic (i.e., income, education, and occupation) and demographic factors including age, gender, ethnicity, marital status, nativity status, English proficiency, and years in the U.S. Second, this study hypothesized that subjective social status ratings would be more strongly related to self-reported physical and mental health among immigrant Latinos than among U.S.-born Latinos, controlling for socioeconomic (i.e., income, education, and occupation) and demographic factors including age, gender, ethnicity, marital status, English proficiency, and years in the U.S. This last hypothesis was based on research suggesting that major life changes are often tied to the Latino immigrant experience and may affect one's perceived social standing and health, above and beyond socioeconomic status. For these reasons, we expected subjective social status would be a stronger health correlate among Latino immigrants compared to U.S.-born Latinos.

Study 2: The Contribution of Daily Stressors to Socioeconomic Health Disparities (Hypotheses)

The second study investigated the role of daily stressors in socioeconomic health disparities using a convenience sample of 310 low and middle-socioeconomic black and white adults recruited from outpatient primary care medical clinics throughout the metro Atlanta area.

This study tested three hypotheses. First, it was hypothesized that daily hassles would partially mediate the socioeconomic status and health association, controlling for demographic characteristics (e.g., age, gender, race/ethnicity, marital status, and parental status), other stress exposures (i.e., traumatic events), and stress appraisal (i.e., perceived stress). Second, this study hypothesized that daily hassles would modify the health effect of chronic and acute major life events, traumatic events, and perceived stress controlling for demographic characteristics (e.g., age, gender, race/ethnicity, marital status, and parental status). Studies have shown that daily hassles interact with other stress exposures to affect health, but additional research is needed to test this hypothesis in a socioeconomically and racially diverse sample (71,81–83). Third, this study hypothesized that daily hassles would modify the effect of chronic and acute major life events and traumatic events on perceived stress controlling for demographic characteristics (i.e., age, gender, race/ethnicity, marital status, and parental status). This hypothesis was based on literature suggesting that given a backdrop of traumatic events or enduring chronic strains, it is possible that daily hassles might tip the scales, resulting in higher perceived stress and ultimately worse health.

Study 3: The Effects of Daily Negative Interpersonal Events on Emotional Reactivity and Their Potential Role in Socioeconomic Health Disparities

The third study examined whether a disaggregated measure of daily interpersonal stress provides a significant and more nuanced perspective on the status-stress and stress-emotional health relationship. This study used data from a survey of 117 adults with a physician-confirmed diagnosis of rheumatoid arthritis recruited throughout the Phoenix metropolitan area. This study tested four hypotheses. First, this study hypothesized that socioeconomic status (i.e., education) would be inversely associated with daily negative interpersonal events controlling for demographic characteristics (i.e., age, gender, and work status). Second, this study tested the

hypothesis that daily negative interpersonal events occurring on one day would be associated with next-day negative affect, controlling for illness symptoms (i.e., pain, fatigue), demographic characteristics (i.e., age, gender), personal attributes (i.e., neuroticism, pain coping capacity), and prior-day's negative affect. Third, this study hypothesized that daily negative interpersonal events occurring on one day would be associated with next-day unpleasant mood, controlling for illness symptoms (i.e., pain, fatigue), demographic characteristics (i.e., age, gender), personal attributes (i.e., neuroticism, pain coping capacity), and prior-day's unpleasant mood. Fourth, this study hypothesized that daily negative interpersonal events occurring on one day with one's spouse/partner would be more strongly associated with next-day emotional reactivity compared to other interpersonal stressors, controlling for illness symptoms (i.e., pain, fatigue), demographic characteristics (i.e., age, gender), personal attributes (i.e., neuroticism, pain coping capacity), and prior-day's emotional reactivity.

Dissertation Contribution to the Literature

Research suggests that psychosocial factors contribute to socioeconomic health disparities, but by how much? Theory suggests that a portion of the socioeconomic effects on health and well-being is due to status being inversely related to stress. However, this inverse notion may not apply equally to all types of stressors. Moreover, what is meant by stress? My research seeks to resolve these unanswered questions paying close attention to subjective social status, daily hassles, and daily interpersonal stress. The results of this research may help inform prevention and intervention efforts to address socioeconomic disparities in health. This research adds to the socioeconomic gradient-health literature in three important ways.

First, it examines the understudied contribution of perceived social status in a large, diverse sample of native- and foreign-born Latinos in the U.S. Prior research into the subjective

social status-health relationship among Latinos produced mixed results. Second, it uniquely

dissects the stress process in a racially and socioeconomically diverse sample, paying special

attention to daily hassles, to gain insight into the complex, stress-related processes that connect

low socioeconomic status to poor health. Third, it advances the status-stress and stress-health

literature by examining the previously unexamined health impact of daily interpersonal stress

from multiple life domains in a socioeconomically diverse sample of rheumatoid arthritis

patients. Previous research had employed an aggregated measure of interpersonal stress,

potentially obscuring a more nuanced perspective into the status-stress and stress-health

relationships. Differential exposure to interpersonal stress based on socioeconomic status may be

compounded by stress associated with chronic pain, rendering chronic pain sufferers particularly

vulnerable to the adverse emotional effects of stress on health. Hence, there is a strong need to

better understand the influence of socioeconomic status on interpersonal stress among a

rheumatoid arthritis sample. All together, this research contributes to the knowledge base for

advancing policy development and designing innovative interventions to close the health gaps

that divide rich and poor.

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CHAPTER 2

Subjective Social Status and Health Among Latinos

Introduction

A socioeconomic gradient in health is well established with individuals higher on the socioeconomic ladder exhibiting better health (1–7). While many public health researchers examining this gradient in health conceptualize and assess socioeconomic status with objective indicators (e.g., income, education), these measures fail to capture a person's subjective social status. Subjective social status is defined as an individual's sense of their place or rank in the social hierarchy (8–10). Interest in the health effects of relative social rank has grown as stressful social comparisons constitute an important, yet understudied psychosocial pathway between health and both socioeconomic status and income inequality (11,5,12,4,13–15). The influence of subjective social status on health has been shown to vary, in part, by race/ethnicity (16–20). Few studies have tested the relevance of subjective social standing among Latinos, the United States' largest ethnic minority and immigrant group and one of its fastest growing (13, 18–20). This is an important research gap as U.S. Latinos, a multi-ethnic population (e.g., Mexican, Puerto Rican, Salvadorans, and Cubans), are disproportionately burdened by high poverty rates (24). The two studies examining the relationship between subjective social status and health among Latinos have yielded mixed results (16,21). For these reasons, this study investigates the relationship between subjective social status and health among a diverse U.S.- and foreign-born Latino population using the National Latino and Asian American Study (NLAAS), one of the largest population-based surveys of Latinos in the U.S. (25).

How Subjective Social Status Affects Health

Three hypotheses have been proposed to explain the relationship between subjective social status and health. First, subjective social status is thought to be a more inclusive measure of social position capturing multiple dimensions of socioeconomic status as well as current and future socioeconomic prospects (9,10,26). Thus, compared to income or education alone, a person's self-rated social standing is uniquely and potentially more strongly related to health. A growing number of studies show that subjective social status is predictive of health even after controlling for conventional socioeconomic indicators (e.g., income, education) (8,16,21,20). Second, subjective social status taps into stressful social comparisons or relative deprivation, a negative psychosocial consequence of perceiving oneself lower by social comparison, and a mechanism linking both socioeconomic status and income inequality with health (5,7,26,11,27,15,28–30). Relative deprivation theory in sociology and the relative hierarchy thesis in health psychology suggest that status inconsistency, or having different status rankings on different dimensions of social positions, produces conflicting expectations and experiences that lead to frustration and uncertainty, increasing psychological stress (31–33). In accordance with a psychological perspective on health inequities, the increased stress and feelings of shame and distrust tied to lower subjective social status, results in poorer health (5,14,15,34). The chronic stress, anxiety, and negative emotions of feeling lower in status relative to others is believed to compromise health via a direct (e.g., neuroendocrine) and/or indirect (e.g., maladaptive behaviors such as smoking and drug use) pathway (7,26,10,29,35,8). Widening economic disparities warrant additional research into the association of subjective social status and health, particularly among Latinos, a group disproportionately impacted by income inequality and represented among the poor (4,6,36–38). Third, the subjective social status-health

relationship may be confounded by response bias, yielding biased estimates away from zero (24).

In other words, the observed subjective social status-health association could be explained by an

individual's tendency to engage in socially desirable responding, ranking themselves high

compared to others and also reporting better health (9).

Subjective Social Status and Latino Health

Although subjective social status is associated with a range of health outcomes, with the

strongest and most consistent being with global self-rated health, the two studies which have

examined this relationship among Latinos have produced conflicting results (16,21). After

accounting for socioeconomic status, Ostrove et al. (2000) did not find a significant association

between subjective social status and self-rated health among low-income pregnant Latina women

(16). Conversely, Franzini and Fernandez-Esquer (2006) observed a subjective status association

with self-reported health among low-income adults of Mexican-origin while holding

socioeconomic status constant (21). Given that the relationship between subjective social status

and health remains unclear among Latinos, we investigate the subjective social status-health

association among U.S.-born and immigrant Latinos, controlling for socioeconomic status. We

also build on prior work examining the effect of subjective social status on global self-rated

health by distinguishing the effect of perceived social rank on self-rated physical and self-rated

mental health.

Subjective Social Status and Latino Health – Relevance of Comparison Group

One's choice of reference group in determining social rank may contribute more or less

to the stress of feeling lower in hierarchical status and subsequent health. Ethnic minority,

nativity, and socioeconomic status are thought to influence reference group selection. Social

comparison theory and research suggest that individuals, particularly low-status (stigmatized)

individuals, prefer comparisons with referents of similar status and with the self in the past over cross-group comparisons for self-protective reasons because similar group members are less likely than non-similar group members to be higher in status (39,40). This notion seems to hold true for Latinos as those who highly identify with their ethnic identity feel more deprived, economically and socially, compared to Non-Hispanic whites (41). A similar result was observed among low-income Mexican adults in Texas as they considered themselves poorer on average than people in the U.S. and Anglo Americans, but richer than people in Mexico and Mexican immigrants (21). Thus, although Latinos are apt to choose referent groups similar to themselves, feeling lower in the social hierarchy is likely if asked to compare themselves with perceived higher-status groups such as other people in the U.S. Given this prior research, we expect Latinos will report low subjective social status if asked to rate their self-perceived social status relative to other people in the U.S. and these ratings will be positively associated with poor self-rated health.

This study adds to the literature by examining the relationship between perceived social status and health while holding socioeconomic status constant using two well-respected measures of subjective social status—namely, an individual's self-rated standing relative to others in the U.S. and relative to others in the community. Comparing the utility of different reference groups may be especially important in poorer communities where individuals may have low income or education but maintain high standing within their community's social or religious circles (9). Latino immigrants, many of whom reside in economically poor ethnic enclaves, may rate themselves differently in their own community versus the nation as a whole (42). This is one of the first studies to examine the relationship between subjective social status and health relative to both one's community and nation as a whole among a nationally

representative group of native-born and immigrant Latinos consisting of Mexicans, Puerto Ricans, Cubans and other Latinos (43).

Subjective Social Status and Latino Health – Salience of Nativity Status

Even after controlling for traditional socioeconomic indicators, compared to U.S.-born Latinos, the health impact of subjective social status may be particularly strong among Latino immigrants as self-rated social status is likely to capture the perceived benefits and costs associated with migration and the immigrant experience that affect social class and impact health. A major driver of Latino immigration is economic opportunity and the hope for a better life for oneself and one's children (44). This perceived benefit of immigration is likely captured by subjective social status' sensitivity to current and future prospects (10). At the same time, subjective social status may tap into migration or immigrant-related stressors likely to affect perceptions of relative worth and health, such as discrimination and economic hardship (45,46). Immigrant Latinos consider discrimination based on appearance, English proficiency, and documentation status, as a major problem in the U.S. (45,47). This has health implications as discrimination is associated with poor physical and mental health among Latino immigrants (45,48–50). Subjective social status is hypothesized to capture the psychosocial consequences of such discrimination (9). Additionally, Latino immigrants, particularly the undocumented, experience substantial economic hardship. In immigrating to the U.S., many face drastic life changes such as leaving one's home and losing material and social support from extended family, factors which may exacerbate the economic stress of starting a new life in a new country. Furthermore, many low-skilled immigrants take on multiple low-paying jobs with little-to-no benefits or job security. At the other end of the spectrum, some high-skilled immigrants may contend with discrimination against foreign-earned education resulting in downward social

mobility upon migration. Research analyzing the same data as our study found Latino

immigrants who experience downward social mobility are at elevated risk of major depression

(31). All together such major life changes are often tied to the Latino immigrant experience and

may affect one's perceived social standing and mental and physical health, above and beyond

socioeconomic status. For these reasons, we expect subjective social status will be a stronger

health correlate among Latino immigrants compared to U.S.-born Latinos.

Research Hypothesis

Based on this literature we propose the following hypotheses:

Hypothesis 1: *Subjective social status will be related to self-reported physical and mental health controlling for socioeconomic (i.e., income, education, and occupation) and demographic factors including age, gender, ethnicity, marital status, nativity status, English proficiency, and years in the U.S.*

Hypothesis 2: *Subjective social status ratings will be more strongly related to self-reported physical and mental health among immigrant Latinos than among U.S.-born Latinos, controlling for socioeconomic (i.e., income, education, and occupation) and demographic factors including age, gender, ethnicity, marital status, English proficiency, and years in the U.S.*

Methods

Data Source

Data for this study were obtained from the 2002-2003 National Latino and Asian

American Study (NLAAS), a nationally representative household survey of 2,554 Latinos

(Puerto Ricans, Mexican Americans, Cubans, and other Latinos) and 2,095 Asian Americans

(Chinese, Vietnamese, Filipinos, and other Asians) developed and fielded by the University of

Michigan Survey Research Center (25,51,52). As described elsewhere, the NLAAS is based on a

multistage, stratified area probability sample design with oversampling of areas with a moderate-

to-high density of targeted Latino and Asian American households in the U.S. (25,51,52). For the

Latino households, interviews were conducted in English and Spanish according to the

respondent's preference, by trained interviewers between May 2002 and November 2003.

Weighted response rates were 75.5% for the Latino sample (25,51,52). All respondents were 18

years or older from the non-institutionalized population residing in the U.S. This study used only

the Latino sample ($N = 2,554$) of the survey and stratified all analyses using the full Latino

sample, the native-born sample ($N = 924$), and the immigrant sample ($N = 1,629$).

Measurement

Self-rated physical and mental health: Respondents rated (separately) their overall

physical and mental health (excellent, very good, good, fair and poor). Consistent with prior

studies, these categories were collapsed into a dichotomized outcome for physical and mental

health separately, with one indicating "poor" or "fair" health and zero otherwise ("good" to

"excellent" as reference) (53–57).

Subjective social status: This construct was assessed with two questions based on the

MacArthur Scale of Subjective Social Status (58). Respondents were shown a pictorial format of

a ladder with rungs ranging from "0" (lowest) to "10" (highest) and asked to rank their status

relative to the rest of society (58). One question assessed respondents' ratings of their U.S.

standing while the second assessed respondents' ratings of their community standing (58). These

measures have been shown to be a strong predictor of adult physical health (10,26,58–62).

Socioeconomic status: Household income, education, and occupation were used to assess

this construct. Household income was estimated as the sum of total self-reported earnings,

income from social security retirement benefits, government assistance, and pensions,

investments, child support for all household members. This variable was log transformed to more

closely meet the assumptions of a normal distribution. Education was measured by years and

categorized into less than 12 years (referent group), 12 years (i.e., high school diploma), 13–15

years, and more than 16 years (i.e., college graduate). Occupation was assessed by participants'

self-reported work status and job titles based on the Bureau of Labor Statistics Major

Occupational Groups (MOGs) (U.S. Census Bureau and Bureau of Labor Statistics, 2002).

Consistent with Gong et al. (2012), five categories were created in the order from high-to-low

socioeconomic status: managerial occupations, occupations related to sales, clerical, service

sectors, physical labor workers (i.e., personal/protective service worker, trades workers,

operators, and performs routine tasks), other occupations such as armed forces, and the non-

employed (20).

 Controls and Confounders: Analyses also included measures for age in years (specified

as linear and quadratic), gender (reference=male, 1=female), ethnicity (reference=Other Latinos,

1=Cuban, 2=Puerto Rican, 3=Mexican), marital status (reference=married or cohabitating,

1=widowed/separated/divorced, 2=never married), nativity status (reference=foreign-born,

1=U.S.-born), length of residence in the U.S. (reference=U.S.-born, 1=0-5yrs, 2=6-10yrs,

3=11=20yrs, 4=21+yrs), and English-language proficiency (1="poor" to 4="excellent").

Statistical Analyses

 The analysis consisted of two parts. First, weighted univariate descriptives (Table 2-1)

were generated to examine the distribution of all variables, with means and standard deviations

presented for continuous variables and percentages for categorical variables. Second, Table 2-2

tested our *Hypotheses*, which had posited that subjective social status would predict health

outcomes, controlling for socioeconomic and demographic factors and be particularly relevant

for immigrant health. Survey weights were used to adjust for complex sampling design and to

make the estimates representative of the broader populations of Latinos in the U.S. (51). The

final multivariate models were tested for effect modification by nativity status. As documented in

Table 2-2, a Chow test showed significant effect modification, thus stratified analyses were performed (63). All analyses were conducted using Stata version 13 and employed a statistical significance level of p < .05. Where appropriate, variables of interest were standardized (i.e., rescaled to have a mean of 0 and a standard deviation of 1) for comparison of relative strength and ease of interpretation.

Supplementary analyses (Appendix) examined whether the estimated health effect of subjective social status was different depending on the reference group used to judge one's social standing (i.e., community versus U.S.).

Results

Table 2-1 presents weighted descriptive statistics of the full Latino ($N = 2,554$), native-born ($N = 924$), and immigrant adult samples ($N = 1,629$). Respondents on average were about 38 years of age, about half (48%) were female, and over 64% reported being married or in a cohabitating relationship (native born = 57%; immigrant = 70%). A majority of the full sample (55%) were of Mexican ancestry and self-identified as immigrant (58%).

Regarding objective and subjective measures of social status, 45% of Latino respondents had less than a high school degree (native born = 29%; immigrant = 55%) and worked in physical labor (native born = 40%; immigrant = 49%). Respondents had an average income less than $42,500 (native born = $49,963.44, SD = $36,948.54); immigrant = $37,020.72, SD = $33,505.49). Among all Latinos, the average score for reported subjective social status relative to others in the U.S. was a little over 5 (SD = 1.70), and about 6 (SD = 1.71) when the comparison group was the community (on a scale of 0-10).

28% and 12% of respondents reported having poor or fair physical health and mental health, respectively. 20% had experienced physical discomfort in the past month at least some of

the time and 11% on average reported a low level of psychological distress (on a 0-24.5 scale)

(64).

Table 2-1. Sample weighted characteristics of Latino adult participants

Class of variable	Variable	Full Latino Sample (n=2553)	Native-born Sample (n=924)	Latino Immigrant Sample (n=1629)
		%/mean (SD)[a]	%/mean (SD)[a]	%/mean (SD)[a]
Outcomes	Poor self-rated physical health	28.4%	24.3%	31.3%
	Presence of physical discomfort	19.9%	19.5%	20.3%
	Poor self-rated mental health	11.8%	9.0%	13.9%
	Psychological distress (0 – 24.5)	11.35 (4.71)	11.45 (4.34)	11.26 (4.96)
Subjective SES	Subjective SES relative to people in the U.S. (0 = low, 10 = high)	5.48 (1.70)	5.68 (1.50)	5.35 (1.83)
	Subjective SES relative to people in the community (0 = low, 10 = high)	6.12 (1.71)	6.23 (1.53)	6.04 (1.83)
SES	Household income ($0 - $181497.5)	$42,464.16 ($35,884.61)	$49,963.44 ($36,948.54)	$37,020.72 ($33,505.49)
	Education			
	Less than high school degree	44.5%	29.4%	55.1%
	High school degree	24.5%	30.9%	20.0%
	Some college	20.8%	27.7%	16.0%
	College degree	10.2%	11.9%	9.00%
	Occupation			
	Professional/Managerial/Technical	16.8%	23.1%	12.3%
	Sales/Clerical/Service workers	14.2%	17.6%	11.8%
	Physical labor force	45.2%	39.7%	49.1%
	Other occupation	16.7%	14.3%	18.4%
	Not employed	7.1%	5.3%	8.4%
Demographics	Age (18 – 97)	38.05 (13.02)	36.68 (12.68)	39.04 (13.11)
	Female	48.4%	48.5%	48.5%
	Ethnicity			
	Cuban	4.6%	1.5%	6.8%
	Puerto Rican	10.0%	13.3%	7.7%
	Mexican	56.6%	58.6%	55.2%
	All Other Hispanic	28.7%	26.5%	30.3%
	Marital status			

Class of variable	Variable	Full Latino Sample (n=2553)	Native-born Sample (n=924)	Latino Immigrant Sample (n=1629)
		%/mean (SD)[a]	%/mean (SD)[a]	%/mean (SD)[a]
	Divorced/Separated/Widowed	14.6%	14.9%	14.3%
	Never married	21.0%	28.6%	15.5%
	English proficient	50.7%	86.3%	25.5%
	Immigrant	58.5%	0%	100%
	Years in U.S.			
	US born	41.6%	100%	0%
	<5 years	9.7%	-----	16.6%
	5-10 years	9.1%	-----	15.6%
	11-20 years	18.4%	-----	31.5%
	20+ years	21.2%	-----	36.3%

Notes: SD = standard deviation.

[a] Numbers may not add up due to rounding.

Table 2-2 shows results of the multivariate associations between U.S. subjective social status and self-reported physical and mental health outcomes, stratified by nativity status. A Chow test showed significant effect modification by nativity status for both self-reported physical and mental health, $F(17, 41) = 5.25$, $p = .00$ and $F(17,41) = 2.35$, $p = .01$, respectively. Overall, the results in our full Latino sample are supportive of *Hypothesis 1*, which had posited that subjective social status would predict health outcomes among Latino adults, controlling for socioeconomic and demographic factors. All else equal, a respondents' subjective rank relative to others in the U.S. is significantly protective against poor health outcomes. Among all Latinos, for a one-unit increase in the U.S. standing ladder, the odds of reporting poor physical health decreases by 12% (OR = .88; 95% CI: .83, .93), and the odds of reporting poor mental health decreases by 6% (OR = .94; 95% CI: .88, .99).

Results from the full sample also indicate that few objective measures were significant predictors of health outcomes, with the exception of years of education on self-rated physical and mental health. Respondents with a college degree or higher had less than half the odds of reporting poor or fair physical health, compared to those with less than a high school degree (OR = .43; 95% CI: .29, .62). Similarly, those with a college degree or higher reported less than half the odds of poor or fair mental health, relative to those with less than a high school degree (OR = .45; 95% CI: .25, .80).

A comparison of the standardized coefficients indicate that the relative impact of subjective and socioeconomic measures for the full sample were mixed for self-rated physical and mental health. The standard deviation effect (SD effect) of perceived social standing in the U.S. on self-reported physical health (SD effect = -.27) was 1.69 times as large as household income (SD effect = -.16) but 1.52 times less than years of education (SD effect = -.41).

Similarly, the standard deviation effect of U.S. subjective social standing on self-reported mental health (SD effect = -.12) was only slightly larger (1.09 times) than household income (SD effect = -.11) but 4.42 times less than years of education (SD effect = .53).

Results in Table 2-2 are also supportive of Hypothesis 2, as there is a notable difference in the effect of subjective social status on health due to nativity status. Among native-born Latinos, socioeconomic status, specifically, annual household income, was significantly associated with both self-reported physical health (OR = .78; 95% CI: .69, .89) and self-reported mental health (OR = .79; 95% CI: .67, .94) while U.S. subjective social status was significantly associated with only self-reported physical health (OR = .89; 95% CI: .80, .99). Conversely, among immigrant Latinos, subjective social status relative to others in the U.S. was significantly associated with both self-rated physical (OR = .88; 95% CI: .83, .92) and mental health (OR = .92; 95% CI: .85, .99) while none of the socioeconomic status indicators were significantly associated with either health outcome.

Comparisons of the standardized coefficients indicate that the relative impact of subjective measures for the native-born sample was lower than socioeconomic measures for self-rated physical and mental health. The standard deviation effect (SD effect) of perceived social standing in the U.S. on self-reported physical health (SD effect = -.24) was 1.21 times less than household income (SD effect = -.28) and 1.42 times less than years of education (SD effect = -.34). Similarly, the standard deviation effect of U.S. subjective social standing on self-reported mental health (SD effect = -.04) was less (7.5 times) than household income (SD effect = -.30) and 9.25 times less than years of education (SD effect = -.37).

For the immigrant sample, comparisons of the standardized coefficients indicate that the relative impact of subjective and objective measures were mixed for self-rated physical and

mental health. The standard deviation effect (SD effect) of perceived social standing in the U.S. on self-reported physical health (SD effect = -.29) was 3.22 times as large as household income (SD effect = -.09) but 1.24 times less than years of education (SD effect = -.36). Similarly, the standard deviation effect of U.S. subjective social standing on self-reported mental health (SD effect = -.18) was larger (9 times) than household income (SD effect = .02) but 2.72 times less than years of education (SD effect = -.49).

Table 2-2. Estimated effect of US subjective social status (predictor) on health outcomes

Full Latino Sample (n=2554)

Variable	Poor self-rated physical health		Poor self-rated mental health	
	Odds ratio	95% CI	Odds ratio	95% CI
US subjective social status	.88***	.83, .93	.94*	.88, .99
Socioeconomic status (SES)				
Annual household income (log)	.86**	.80, .92	.90	.79, 1.02
Partial F test	$F = 19.59***, p = .00$		$F = 2.90, p = .09$	
Education (ref: < high school degree)				
High school degree	.71*	.53, .94	.54**	.38, .76
Some college	.49***	.36, .66	.28***	.17, .46
College and above	.43***	.29, .62	.45**	.25, .80
Partial F test	$F = 13.71***, p = .00$		$F = 9.71***, p = .00$	
Occupation (ref: professional)				
Not employed	1.69	.99, 2.89	2.94*	1.29, 6.72
Physical labor force	1.65*	1.11, 2.45	2.27*	1.15, 4.45
Sales/Clerical/Service workers	1.26	.77, 2.06	1.07	.38, 2.97
Other occupation	1.32	.90, 1.93	1.95	.86, 4.40
Partial F test	$F = 1.95, p = .12$		$F = 2.52, p = .05$	
SES Partial F test	$F = 9.11***, p = .00$		$F = 4.89***, p = .00$	
Age	1.03**	1.01, 1.04	1.01	1.00, 1.01
Female (ref: male)	1.39**	1.14, 1.70	.96	.71, 1.30
Ethnicity (ref: other Hispanics)				
Cuban	.80	.57, 1.10	1.36	.81, 2.30
Puerto Rican	1.61**	1.18, 2.22	1.49	.90, 2.48
Mexican	1.82*	1.25, 2.66	1.52*	1.03, 2.25
Marital status (ref: married)				
Divorced/Separated/Widowed	1.49*	1.06, 2.10	1.83**	1.22, 2.74
Never married	.78	.57, 1.07	1.51*	1.02, 2.23
Years in U.S. (US born ref)				
<5 years	.71	.13, 4.03	.41	.04, 4.25
5-10 years	.82	.16, 4.16	.43	.05, 3.90
11-20 years	.72	.14, 3.65	.44	.04, 4.51
20+ years	.77	.16, 3.60	.51	.06, 4.59
US born	.71	.15, 3.37	.37	.04, 3.64
R^2	0.14		0.12	

Notes: US subjective social status was standardized to have a mean of 0 and a standard deviation of 1. Chow test showed significant effect modification by nativity status for both self-reported physical and mental health, $F(17, 41) = 5.25, p = .00$ and $F(17,41) = 2.35, p = .01$, respectively.
*p < .05; **p < .01; ***p < .001.

Latino Native-born Sample (n=924)				
	Poor self-rated physical health		Poor self-rated mental health	
Variable	Odds ratio	95% CI	Odds ratio	95% CI
US subjective social status	.89*	.80, .99	.98	.86, 1.11
Socioeconomic status (SES)				
Annual household income (log)	.78***	.69, .89	.79**	.67, .94
Partial F test	$F = 14.98***, p = .00$		$F = 7.88*, p = .01$	
Education (ref: < high school degree)				
High school degree	.87	.59, 1.29	.44**	.26, .75
Some college	.58	.31, 1.08	.43*	.22, .85
College and above	.57*	.35, .91	.45	.18, 1.14
Partial F test	$F = 3.73*, p = .02$		$F = 3.27*, p = .03$	
Occupation (ref: professional)				
Not employed	1.89	.72, 4.94	2.09	.63, 6.89
Physical labor force	1.63	.97, 2.74	2.50*	1.11, 5.61
Sales/Clerical/Service workers	1.11	.56, 2.20	.82	.27, 2.46
Other occupation	1.29	.75, 2.20	1.55	.46, 5.18
Partial F test	$F = 1.51, p = .21$		$F = 1.84, p = .13$	
SES Partial F test	$F = 5.84***, p = .00$		$F = 8.59***, p = .00$	
Age	1.01	1.00, 1.03	1.00	.99, 1.01
Female (ref: male)	1.16	.84, 1.62	1.17	.73, 1.89
Ethnicity (ref: other Hispanics)				
Cuban	1.33	.43, 4.15	.88	.23, 3.31
Puerto Rican	1.11	.62, 1.98	.85	.44, 1.64
Mexican	1.58	.91, 2.72	.74	.43, 1.28
Marital status (ref: married)				
Divorced/Separated/Widowed	2.16**	1.35, 3.47	1.90	.73, 4.97
Never married	.63	.34, 1.16	1.07	.47, 2.44
R^2	0.10		0.10	

Notes: US subjective social status was standardized to have a mean of 0 and a standard deviation of 1.
*p < .05; **p < .01; ***p < .001.

Latino Immigrant Sample (n=1629)				
	Poor self-rated physical health		Poor self-rated mental health	
Variable	Odds ratio	95% CI	Odds ratio	95% CI
US subjective social status	.88***	.83, .92	.92*	.85, .99
Socioeconomic status (SES)				
Annual household income (log)	.92	.82, 1.03	.98	.85, 1.13
Partial F test	$F = 2.36, p = .13$		$F = .06, p = .80$	
Education (ref: < high school degree)				
High school degree	.70	.47, 1.05	.75	.48, 1.16
Some college	.51**	.34, .76	.18***	.08, .37
College and above	.44*	.20, .95	.67	.22, 2.02
Partial F test	$F = 6.15**, p = .00$		$F = 7.16***, p = .00$	
Occupation (ref: professional)				
Not employed	1.43	.57, 3.64	3.02	.92, 9.97
Physical labor force	1.33	.57, 3.12	1.86	.74, 4.68
Sales/Clerical/Service workers	1.31	.50, 3.43	1.26	.43, 3.72
Other occupation	1.09	.53, 2.24	1.94	.71, 5.31
Partial F test	$F = .24, p = .91$		$F = .93, p = .45$	
SES Partial F test	$F = 3.04*, p = .01$		$F = 3.13*, p = .01$	
Age	1.03***	1.02, 1.05	1.01	.99, 1.02
Female (ref: male)	1.56**	1.21, 2.02	.90	.62, 1.32
Ethnicity (ref: other Hispanics)				
Cuban	.72	.49, 1.07	1.73	.94, 3.21
Puerto Rican	2.46***	1.53, 3.98	2.45**	1.29, 4.64
Mexican	1.99**	1.35, 2.93	2.14**	1.24, 3.69
Marital status (ref: married)				
Divorced/Separated/Widowed	1.14	.79, 1.66	1.87*	1.07, 3.27
Never married	.90	.63, 1.30	1.81*	1.06, 3.05
Years in U.S. (ref: <5 years)				
5-10 years	1.14	.67, 1.94	1.07	.50, 2.27
11-20 years	1.03	.71, 1.51	1.20	.59, 2.42
20+ years	1.04	.61, 1.77	1.38	.64, 2.97
English proficiency	.43**	.26, .72	.35**	.19, 1.14
R^2	0.18		0.13	

Notes: US subjective social status was standardized to have a mean of 0 and a standard deviation of 1.
*p < .05; **p < .01; ***p < .001.

Supplementary Analysis (Appendix)

Supplementary analyses in Appendix 2-1 indicate that the effect of one's subjective social status relative to their community operates in a similar, protective fashion, against poor self-rated health as subjective social status relative to the nation as a whole.

Discussion

This analysis contributes to the socioeconomic gradient-health literature by examining the understudied contribution of perceived social status in a large, diverse sample of native- and foreign-born Latinos in the U.S. The results show a strong inverse relationship between self-rated social standing and health, particularly among immigrant Latinos.

Overall, subjective social status (relative to others in the U.S.) was consistently associated with self-reported physical and mental health, controlling for conventional socioeconomic measures and demographic factors. Higher U.S. subjective ranking was linked to better self-reported physical and mental health. These findings are generally consistent with studies showing that subjective social status is independently related to self-rated health among Latinos (21,65). In contrast, Operario et al. (2004), in a study among Hispanics, did not find an association between subjective social status and self-rated health after adjusting for income (65). In addition, while Franzini and Fernandez-Esquer (2006) identified a subjective status link with mental health and self-rated health, they did not observe such a connection with self-reported physical health among low-income Mexicans (21).

Our overall findings also indicate that the relationship between subjective social status and health are sensitive to the reference group used for social comparisons. Specifically, while self-perceived social standing in the community was significantly correlated with self-rated physical health, its effects did not also extend to self-reported mental health as they did with U.S. subjective social status. The broad health effect of U.S. subjective social status observed in our data is consistent with research conducted by Wolff et al. (2010) with a diverse sample including Latinos which found the strongest subjective social status-health association lay with the more distal referent of others in American society (43).

Our stratified results by nativity status suggest that the association between subjective social status and health is stronger among immigrant than U.S.-born Latinos. This finding conflicts with prior studies among Latinos indicating that objective socioeconomic measures (i.e., income and work status) are more consistently and strongly associated with self-reported health than perceived social status (16,21). In our study, socioeconomic status (i.e., income and education) seems to matter more for health than subjective social status among U.S.-born Latinos. The strong predictive quality of socioeconomic status (i.e., income and education) among U.S.-born Latinos is consistent with the well-established association between socioeconomic status and health (4,6,66,67). However, the picture is mixed among immigrant Latinos, with subjective social status more strongly predictive of health than income but less so than education.

Subjective social status may play a more prominent role than income among immigrant Latinos because it reflects important and relevant aspects of social status held among immigrants not explicitly captured by conventional socioeconomic measures, such as economic opportunity or the stressful experiences of financial hardship, downward social mobility, and/or discrimination. Moreover, such stressful experiences may dampen the social and economic returns typically attributed to income. In their study among Asian immigrants, Takeuchi and colleagues had similarly surmised that objective measures may not represent the same amount or type of resources for immigrants due to discrimination related to foreign-earned education, migration-altered career paths, and having large portions of earned income sent to family in one's home country (19,20). The strong predictive quality of education among immigrants underscores the well-documented importance that Latino immigrants place on education and educational opportunity (68).

Though this study provides an important perspective on the effect of subjective social status on health among Latinos it is important to note its limitations. First, while we control for a number of important socioeconomic and demographic variables, we did not control for response bias due to social desirability. It could be that individuals who rate themselves subjectively high also report better health because of a response set (9). While this is possible, studies have shown that such response bias does not strongly account for an association between subjective social status and health (26,65). Second, the data are cross-sectional, making it difficult to determine the temporal order among the variables, allowing for the possibility of reverse causality. For example, poor self-rated physical and mental health could contribute to low ratings of subjective social status. While prior longitudinal studies provide evidence to the causal path from subjective social status to health, additional prospective studies are needed to provide insight into causality, particularly among ethnic minority populations (26). Finally, findings from this Latino sample may not be generalizable to other ethnic minorities in the U.S.

Despite these limitations, findings from this study highlight the importance of subjective social status as a socioeconomic measure. It is the first study to examine this relationship using one of the largest and most socioeconomically and ethnically diverse Latino samples in the U.S. In addition, it is one of the first to show that subjective social status is robustly associated with self-reported physical and mental health outcomes among Latinos, particularly immigrant Latinos. Subjective social status may tap into stressful immigrant experiences that affect one's perceived self-worth and capture the psychosocial consequences and health-damaging features of social disadvantage left out by conventional socioeconomic measures. This finding lends support to the hypothesized psychosocial mechanism (i.e., stressful social comparisons) through which socioeconomic deprivation and income inequality are thought to affect health (15). Future

research should seek to untangle the subjective social status-health pathway among minority

populations.

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Appendix 2

Appendix 2-1 Estimated effect of community subjective social status (predictor) on health outcomes

Full Latino Sample (n=2554)

	Poor self-rated physical health		Poor self-rated mental health	
Variable	Odds ratio	95% CI	Odds ratio	95% CI
Community subjective social status	.90***	.86, .93	.96	.89, 1.03
R^2	.14		.12	

*p < .05; **p < .01; ***p < .001. Regressions adjusted for age, sex, ethnicity, income, education, occupation, marital status, nativity status, and years in the US

Latino Native-born Sample (n=924)

	Poor self-rated physical health		Poor self-rated mental health	
Variable	Odds ratio	95% CI	Odds ratio	95% CI
Community subjective social status	.92*	.85, .99	1.02	.87, 1.19
R^2	.10		.23	

*p < .05; **p < .01; ***p < .001. Regressions adjusted for age, sex, ethnicity, income, education, occupation, and marital status

Latino Immigrant Sample (n=1629)

	Poor self-rated physical health		Poor self-rated mental health	
Variable	Odds ratio	95% CI	Odds ratio	95% CI
Community subjective social status	.89**	.84, .96	.96	.87, 1.07
R^2	.17		.13	

*p < .05; **p < .01; ***p < .001. Regressions adjusted for age, sex, ethnicity, income, education, occupation, marital status, years in the US, and English proficiency.

CHAPTER 3

The Contribution of Daily Stressors to Socioeconomic Health Disparities

Introduction

The enduring and pervasive nature of socioeconomic disparities in health warrant continued public health research and intervention into their underlying causal mechanisms (1–7). A growing number of studies have begun focusing on psychosocial factors as a pathway linking low socioeconomic status and poor health (3,8–14). From this perspective, the leading explanations for socioeconomic health inequalities are differential stress exposure and/or differential appraisal (15–17,9,10). Consistent with the "Transactional Model of Stress," which posits the importance of both stress exposure and stress appraisal/reactivity, individuals in disadvantaged circumstances are more likely to experience stressors and additional vulnerability than their higher-ranking counterparts (18–26). Over time, increased exposure and/or vulnerability may activate physiological, behavioral, and psychological processes that place individuals of lower socioeconomic standing at heightened risk for illness and disease (11,27). Despite the widespread assumption that socioeconomic differences in stressors exist and that stress is a key mediator linking socioeconomic status and health, few studies have comprehensively tested this hypothesis (3,11,27). This gap in the stress-health literature has much to do with the evolution of the sensitivity and comprehensiveness of stress measures. Today several measures exist that assess exposure to different types of events or the subjective evaluation of stressors (28).

The Evolution of Stress-Health Research

The earliest population studies of the health impacts of stress exposure predominantly relied on life event checklists, such as the Social Readjustment Rating Scale developed by

Holmes and Rahe in 1967 (10,29). These instruments were designed to capture major stressful events that occur in people's lives (usually in the past year), such as death of a spouse, divorce, and detention in jail or other institution (29,30). These checklists are founded on the premise that the higher the number of major stress events reported, the greater the stress experienced and greater likelihood for poor physical and mental health outcomes. Though initially popular, reliance on these instruments has since waned due in part to their weak-to-modest effect on health outcomes (31). Today, it is generally accepted that there is no life-event instrument that is appropriate for all populations (30,32). Rather, tailored and more comprehensive stress measures are thought to best capture the stress-health relationship (10,33,23). This concern for the appropriateness and comprehensiveness of stress measures, particularly among the socially disadvantaged, has inspired the development of the cumulative-stress-burden perspective.

The Value of the Cumulative-Stress-Burden Perspective

Beyond major life events, the cumulative stress burden perspective emphasizes a more complete assessment of the stress process within the framework of a life-course perspective. Such an approach has resulted in a more substantial health impact as well as a clarification of the relative contributions of particular stressors (10,23,34–36). Turner and Lloyd found that the effect of more chronic and enduring stressors on mental health were stronger than specific or discrete negative life events and traumas (10,34). They also found that childhood and adult traumas increased individuals' reported experiences of subsequent stressful events and strains (10,34). Perhaps most importantly, they learned that events, strains, and traumas together explain far more variance in mental health outcomes than negative life events occurring in the past year alone (10,36). Another study, using data analyzed in the current report, found that a stress exposure composite of daily hassles, major life events, and traumatic events accounts for more

variance in stress-related illness burden than any one type of stress exposure, with perceived

stress accounting for additional variance (37). Research demonstrates that stressors often co-

occur, such that examination of one type of stressor at a time may overestimate the health effect

of any given stressor (38–40). All told, these findings support the cumulative adversity

perspective and suggest that assessing one type of stressor in isolation may not accurately reflect

the impact of stressors on health.

Gaps in the Literature – The Role of Daily Hassles

Relatively minor stressful events occurring on a daily basis, such as concerns about

transportation problems, have significant effects on physical and mental health (41–48,19,49–

53). Yet, most research examining whether differential stress exposure and vulnerability account

for the uneven socioeconomic distribution of poor health has focused on major life events and

chronic stressors, overlooking daily stressors (10,16,19,41,54–56). The frequency and type of

daily hassles experienced are said to provide a better and more proximal explanation for

associated psychological and somatic health outcomes than major life events or chronic stressors

(54,57–64). Major and minor life events are also assumed to interact with chronic stressors, like

financial hardship, to impact health (41,54). However, only a few studies have explicitly tested

this hypothesis (49,65–67).

While a handful of studies have explored the role of daily hassles in the socioeconomic

status-health relationship, many are limited to interpersonal-related daily events, focused on

psychological health outcomes, and/or based on a predominantly white sample (19,46,49).

Emphasis on interpersonal tensions may not fully capture the true health effect of daily hassles as

daily hassles often encompass events beyond simple arguments between people, and across

multiple life circumstances, such as loss of or major reduction in health insurance/benefits and

receiving a ticket for violating the law. Focusing on one type of outcome may obscure meaningful health impacts as the co-occurrence and interaction of stressors can result in a variety of physical and mental health problems (10,34,38,49,68). Finally, the health effect of daily hassles remains largely uncertain among racial-ethnic minorities. Thus, this study addresses these gaps in the stress-health literature by examining whether daily hassles mediate the status-health relationship and/or magnify the health effect of other stress exposures and perceptions in a socioeconomically and racially-diverse community sample of adults (19,46,49). In addition, this study is one of the first to determine if daily hassles moderate the effect of major life and traumatic events.

To date, no studies have accounted for other types of stressors in assessing whether daily stressors help explain the status-health relationship. Different types of stressors (e.g., daily hassles, chronic stress, life events, and traumatic events, etc.) are believed to co-occur. Thus, by not adjusting for other types of stressors, prior studies may have produced findings that overstate the role of daily stressors and/or conceal any differential health effects held by other types of stressors. As illustrated in the aforementioned theoretical models, each type of stress exposure and perceived stress represent different aspects of the stress process. Much like daily hassles differ from chronic stress or infrequent life events, traumatic events differ from other types of stress in terms of their severity and duration of emotional effect (34). Consistent with the cumulative stress burden perspective, studies incorporating multiple types of stressors show that different types of stress have independent effects and together constitute more of the variance in health outcomes relative to their respective individual contributions alone (10,34,36,69). While paying close attention to the role of daily hassles, this study's inclusion of multiple stress exposures and perceived stress advances this literature and constitutes an effort to provide a more

complete assessment of the potential intermediate role of stress in the status-health pathway. The inclusion of multiple stress exposures and perceived stress allows for a comparison of impact of each type of stressor on various health outcomes.

Conceptual Framework

The conceptual framework **(**Figure 3-1**)** guiding this study's examination of the mediating role of stress in the socioeconomic status and health relationship is founded on the aforementioned exposure-appraisal and cumulative stress burden perspectives. It serves as the basis for subsequent analytical models on the chain of events that leads from socioeconomic status, to stress exposures, to perceived stress, to physiological, behavioral, and psychological responses (not shown but referenced earlier), and ultimately, to health.
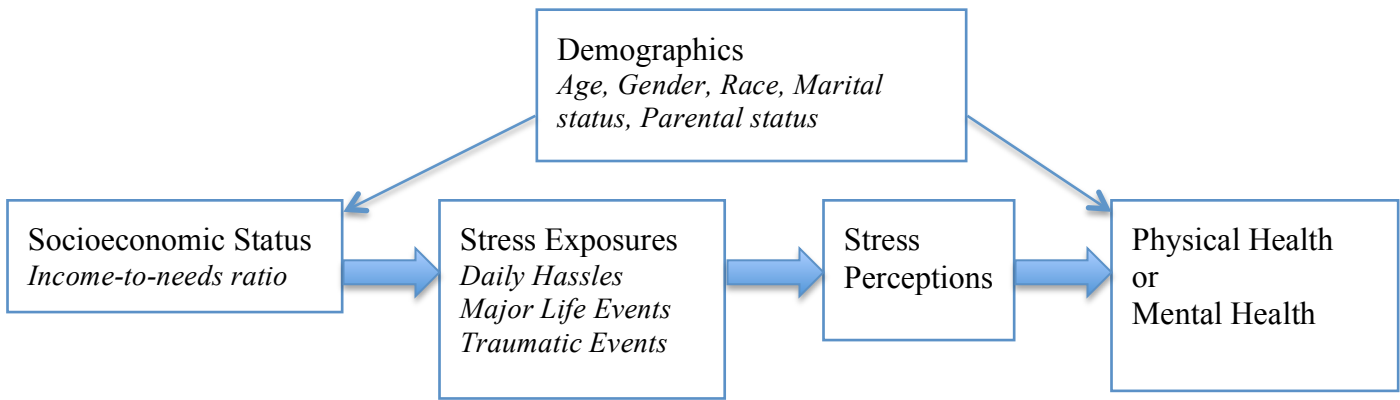
Figure 3-1. A conceptual framework for understanding how stress exposure and perception mediate the relationship between socioeconomic status and health

The framework assumes a unidirectional path as the arrows pointing to the right represent the proposed psychosocial pathway between socioeconomic status and physical and mental health outcomes. A direct arrow represents the effect of exposure and appraisal from socioeconomic status to health outcomes. The thinner arrows represent potential demographic confounders between socioeconomic status and health. Demographic confounders include gender, age, race, marital status, and whether or not one has children, as females, young adults,

racial-ethnic minorities, divorced and widowed persons, as well as single parents experience

more chronic difficulties and face more cumulative burden (10,70,35,36,23,71).

Empirical Framework

Following the chain of events depicted in this conceptual framework, the present study

teases out the health effects of a range of stress exposures and perceptions, with emphasis on the

understudied role of daily hassles. This study explores three empirical models **(**Figure 3-2**)** for

understanding the link between multiple stress exposures and stress perception as well as their

relationship to physical and mental health. More specifically, in **(**Figure 3-2**)**, Model 1 first

examines whether daily hassles have an independent mediating effect on the status-health

relationship, controlling for other stress exposures, perceived stress, and demographic

characteristics. Model 2 then explores whether daily hassles modify (indicated by a dashed line)

the mediating effect of other stress exposures on the status-health association, taking into account

perceived stress and demographic characteristics. A few studies have shown that daily hassles

interact with other stress exposures to affect health (49,65–67). Nevertheless, new research is

required to examine whether the combined effects of stress exposures account for the

socioeconomic status and health relationship in a socioeconomically and racially diverse sample.

The final model includes perceived stress as the outcome variable to investigate an assumed

earlier sequence of events reflected in our conceptual framework. That is, that stress exposure

leads to stress appraisal, which then leads to changes in health outcomes. Given traumatic events

or enduring chronic strains, it is possible that daily hassles may tip the scales, resulting in higher

perceived stress and ultimately worse health. Accordingly, Model 3 determines whether daily

hassles exacerbate or increase (indicated by a dashed line) the mediating effect of other stress

exposures on perceived stress, taking into account socioeconomics and demographics.
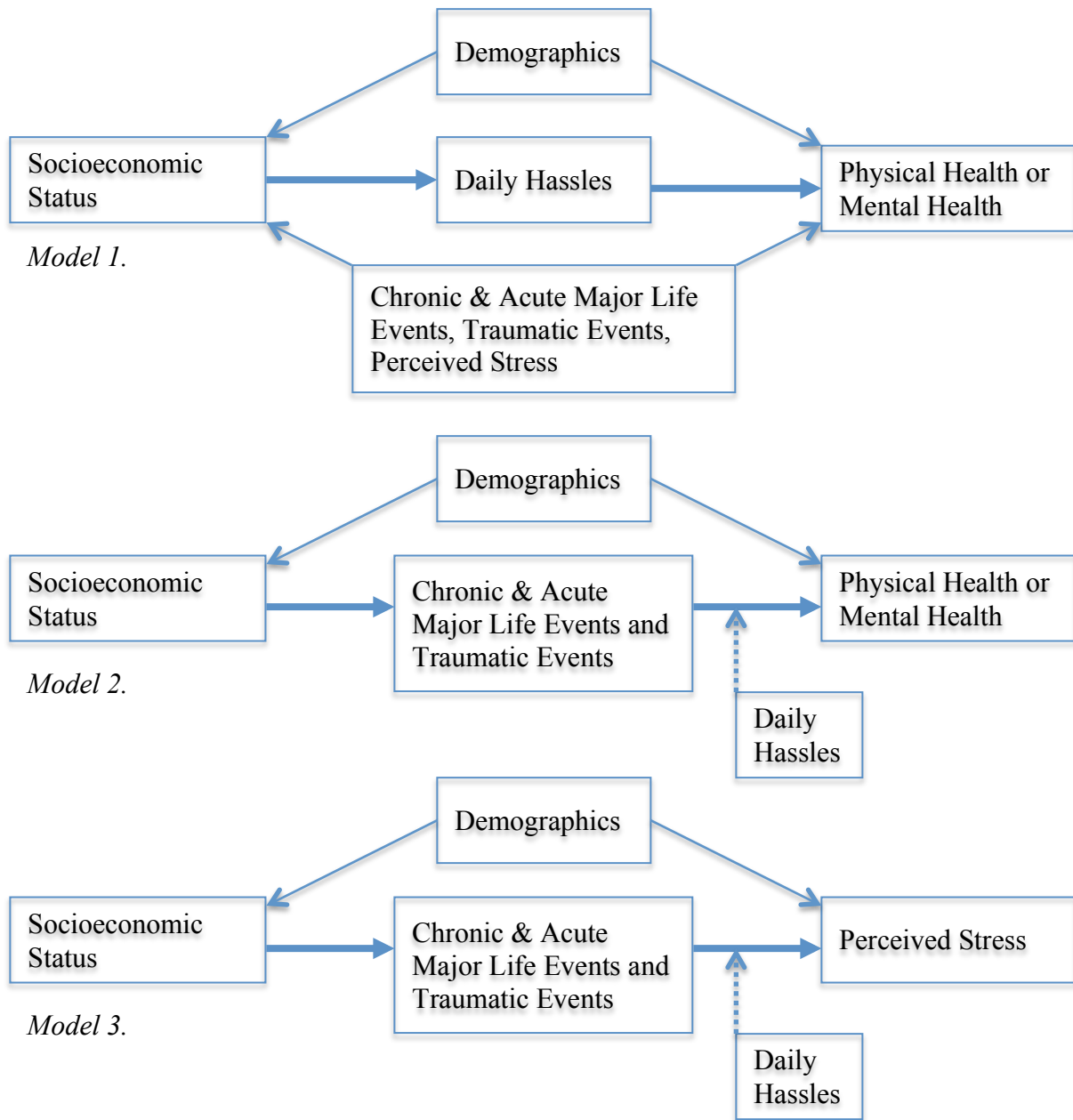
Figure 3-2. Empirical models examining the role of stress exposure and perception in the relationship between socioeconomic status and health

Research Hypotheses

Based on these empirical models, this study proposes the following hypotheses:

Model 1 Hypothesis: *Daily hassles will partially mediate the socioeconomic status and health association.*

Model 2 Hypothesis: *Daily hassles will modify the health effect of chronic and acute major life events, traumatic events, and perceived stress.*

Model 3 Hypothesis: *Daily hassles will modify the effect of chronic and acute major life events and traumatic events on perceived stress.*

In this study, we dissect the stress process in a diverse sample, paying special attention to daily hassles, to gain insight into the complex, stress-related processes that connect low socioeconomic status to poor health.

Methods

Data Source

This study uses data from a May-August 2006 survey of 310 individuals residing within the metro Atlanta area. The dataset consists of a convenience sample of low and middle-socioeconomic black and white adults recruited through outpatient primary care medical clinics from four targeted counties (37). Collected via in-person interviews, the dataset includes information on demographics, race, and socioeconomic status, multiple stress scales, and self-reports of current stress-related illness. The goals of the original study were to assess how much variance in stress is accounted for by race and socioeconomic status and how much of the variance in stress-related illness is accounted for by exposure to stressors and perceived stress. The sampling methodology has been described in detail elsewhere (37). Examination of missing data found 3 cases missing data on an important stress measure. Therefore, this study analyzes 307 individuals in the dataset. The data were examined for collinearity, outliers, influential points, and transformations prior to analysis.

Measurement

A note about measurement: Exploratory factor analysis (EFA) with promax rotation was conducted for all applicable measures where composite (aggregate) scores were created. The Kaiser-Guttman latent root procedure (i.e., Kaiser's criterion or eigenvalue rule) and Catell's scree test were used to determine the suggested factor structure of each measure (72–74). Factor inclusion criteria consisted of having an eigenvalue greater than 1.0 and item factor loadings greater than or equal to .40. A combination of EFA results, theory, and prior research were used to determine the final aggregate measure. Cronbach's alpha was computed to assess the internal reliability of the scales once the dimensionalities of the scales were determined (72,75). More information regarding EFA results and the decision-making process for employing specific factor structures in analyses can be found in **Appendices 3-2** through **3-5**.

To evaluate model fit of the associated confirmatory factor analysis (CFA) results, I used the following recommended goodness-of-fit indices: Chi-square test, the comparative fit indices (CFI), and root mean square error of approximation (RMSEA) (76,77). For the chi-squared test, values closer to zero or non-significant indicate a better fit, particularly for those studies with smaller sample sizes, as is the case in the current study (78). CFI values range from o to 1, with values greater than .90 generally considered to indicate an acceptable model fit. The RMSEA ranges from 0 to 1, with values less than .05 indicative of a close approximate fit, values between .05 and .08 denoting an acceptable fit, and values between .08 and .10 representing a mediocre model fit (79)."

Physical health: This was measured using a composite total of current stress-related outcomes which include high blood pressure, heart disease, diabetes, asthma, and obesity for which there is an established stress-health association (80,81). Respondents reported whether

they had ever been told by a doctor or other health professional that they have any of these conditions. Yes/No follow-up questions were asked regarding high blood pressure, asthma, and obesity, to determine whether respondents still had these conditions. For example, "If yes, do you still have high blood pressure?" Responses to these follow-up questions for high blood pressure, asthma, and obesity were used to produce the composite total. A total score, with a range of 0 to 5, was calculated for each respondent by summing their responses to each stress-related physical illness to determine their current number of stress-related physical health ailments. Examination suggested this is Poisson distributed.

Mental health: This construct was measured using a composite total of current depression and anxiety. One question (Yes/No) asked respondents whether they had ever been told by a doctor or other health professional that they have depression and a second, similar question asked about anxiety. Yes/No follow-up questions were asked to determine whether respondents still had depression and/or anxiety. A total score, with a range of 0 to 2, was computed for each respondent by summing their responses to the current depression and anxiety questions to determine their current mental health score. Examination suggested this mental health composite be treated as an ordinal variable.

Socioeconomic status: This construct was measured using an income-to-needs ratio. Responses to total family income, number of adult family members in a household, and number of children under the age of eighteen in the household were compared against the U.S. Census Bureau's 2005 Poverty Thresholds. To obtain an income-to-needs ratio, each respondent's total family income was divided by the corresponding federal poverty threshold and household size.

Chronic and acute major life events: This construct was measured using a modified version of the revised Social Readjustment Rating Scale developed by Hobson et al (1998) (82).

The revised instrument used in this study asked respondents to report which of a list of 51 major life events happened to them in the previous 12 months (82,83). Examples of events include death of a loved one, loss of a job, and being divorced. Hobson and Delunas (2001) found a disappointing eighteen-factor structure among a nationally representative sample of adult Americans (83). No reference was made to the themes identified; nor have any subsequent studies examined the revised scale's factor structure in a nationally representative sample. The results of the EFA conducted for this study sample yielded a 5-factor structure with eigenvalues greater than 1.0 (see Appendix 3-2). Given prior use of all items in a single scale, a confirmatory factor analysis (CFA) was also conducted to examine whether a 1-factor structure was appropriate. CFA was unable to converge on a 1-factor model, warranting future research into the EFA-suggested 5-factor structure. Nevertheless, based on recommendations from the architects of the revised scale, I decided to retain a 1-factor structure (i.e., a single overall scale) of stressful life events (37,83). This composite average of the total was square root transformed and standardized (i.e., rescaled to have a mean of 0 and a standard deviation of 1) to provide a better fit to the data and for comparison with other stress measures (37). In this sample, the scale demonstrates high internal consistency (Cronbach's $\alpha = .75$).

Daily hassles: This construct was measured using a modified 97-item Daily Hassles-only version of the Daily Hassles and Uplifts Scale (57). Daily hassle items have been shown to be significantly positively correlated with ill health and psychological symptoms associated with stress (54,57). The modified scale captures the frequency of exposure to environmental stressors rather than the perceived severity of an event (36,37,84). As used in Dr. Holly's original dissertation research, this helps in comparing daily hassles with the chronic and acute major life events and traumatic events and prevents confounding with stress perception. Respondents were

asked, "How many times, in the past month, were you hassled by each of the following things?" Examples include, "too many responsibilities", "neighborhood deterioration," and "traffic." Among a sample of undergraduate students at Ohio University, Holm and Holroyd (1992) found that the modified Daily Hassles scale produced a 7-factor model consisting of inner concerns, financial concerns, time pressures, work hassles, environmental hassles, family hassles and health hassles (84). EFA results conducted for this study sample produced a 8-factor model with eigenvalues greater than 1.0 (see Appendix 3-3). Given prior use of all items in a single scale, a confirmatory factor analysis (CFA) was also conducted to examine whether a 1-factor structure was appropriate. A CFA was unable to provide meaningful results for the 1-factor model suggesting future research is needed to examine the 8-factor structure. However, given the amount of cross-loadings and prior use of all items in a single scale, I decided to retain a one-factor structure (i.e., a single overall scale of daily hassles). This composite average of the total was square root transformed and standardized (i.e., mean of 0 and standard deviation of 1) for analysis. In this data the scale demonstrates high internal consistency (Cronbach's α = .96).

Traumatic events: This construct was measured using a 20-item checklist that asked whether or not (Yes/No) the respondent had experienced a traumatic stressor in their lifetime (34). The events may have happened in childhood or many years prior to the completion of the survey. Examples include parental divorce, physical abuse, and whether the respondent had ever seen something violent happen to someone or seen someone killed. Significant associations between experienced traumatic events and both psychological distress and psychiatric disorder have been observed (34,85). EFA and CFA results (see Appendix 3-4) demonstrated a 1-factor structure. Based on these results as well as prior use of all items as a single scale, this study uses a composite total (i.e., the sum) of traumatic events reported in the 20 items for analysis. A

composite average was standardized (i.e., mean of 0 and standard deviation of 1) for analysis. In this dataset, the scale demonstrates moderate internal reliability (Cronbach's α = .70).

Perceived stress: This construct was measured using a 10-item version of the Perceived Stress Scale. This scale assesses the degree to which situations in one's life are appraised as stressful in the last month (28,86). Examples include, how often the respondent has been upset because of something that happened unexpectedly and how often they felt that they were on top of things. Widely used, this scale has been shown to be predictive of physical and depressive symptomatology, social anxiety, and health care use (28,86–88). In the current sample, EFA and CFA results (see Appendix 3-5) suggest a 1-factor model. Based on these results as well as prior use of all items in a single scale, this study employs a composite average of all 10 items. A total composite average was obtained by first reversing the scores on four positively stated items and then summing across all 10 items. The composite average was standardized (i.e., mean of 0 and standard deviation of 1) for analysis. This scale demonstrates high internal reliability (Cronbach's α = .88).

Controls and confounders: Analyses also include measures for years of age (specified as linear and quadratic) (10,17), gender (reference=male, 1=female), dichotomous race/ethnicity (reference=White, 1=African-American), dichotomous marital status (reference=married/in relationship, 1=not), and whether or not respondents have children (reference=not, 1=yes).

Statistical Analyses

Univariate descriptives were generated first to examine the distribution of all variables, with means and standard deviations presented for continuous variables and percentages for categorical variables. Bivariate correlations were then conducted to assess the strength of the associations among the predictor (i.e., income-to-needs ratio), outcomes (i.e., physical and

mental health), and stress variables (i.e., exposure and perception). Poisson regression models were used to assess the association between predictor variables and the physical health outcome with incident rate ratios calculated for ease of interpretation. These models adjusted for age, gender, and race. Ordered logistic regression models were run to examine the association between predictor variables and the mental health outcome with proportional odds ratios generated for ease of interpretation. These mental health models adjusted for age, gender, race, marital status, and parental status. Assessment of the data also led to log transformation of the income-to-needs ratio and the square root transformations of daily hassles and major life events, respectively. Since each individual stress scale differed in range in their original units, for comparison, each stress measure was rescaled (standardized) to have a mean of zero and a standard deviation of one. The commonly used four step-mediation approach by Baron and Kenny (1986) was employed to calculate the hypothesized indirect effect (i.e., regression coefficient for the indirect effect) of stress on the relationship between socioeconomic status and health (89,90). This was followed by structural equation modeling (covariance structure analysis) to formally test the significance of the indirect pathway, that is, whether stress exposure partially mediates the relationship between socioeconomic status and health and whether stress exposures partly mediate the relationship between socioeconomic status and perceived stress (91–96). All analyses were conducted using Stata version 13 and statistical significance was set at $P < .05$.

Results

Table 3-1 presents demographics of the sample of 307 adults. On average participants were 44 years of age. About 60% were female and just less than half (43%) self-identified as African American. Over three-quarters of participants reported being married or in a relationship and a majority (76%) reported having children. Of the entire sample, 64% reported suffering

from one or more physical health ailments and 39% reported suffering from one or more mental

health ailments (i.e., anxiety and/or depression).

Table 3-1. Description of adult participants in the 2007 Chronic Stress Study, n=307

Class of variable	Variable	Unweighted %/mean (SD)[a]	Range
Outcomes	Number of physical health ailments		
	0	36.5%	
	1	31.3%	
	2	19.5%	
	3	10.8%	
	4	1.6%	
	5	0.3%	
	Number of mental health ailments		
	0	61.6%	
	1	19.9%	
	2	18.6%	
Socioeconomic status	Income-to-needs ratio	3.38 (3.11)	[0.41, 22.94]
Demographics	Age	44 (13.99)	[18, 83]
	Gender		
	Male	40.7%	
	Female	59.3%	
	Race		
	White	56.7%	
	Black	43.3%	
	Married or in a relationship		
	Yes	76.9%	
	No	23.1%	
	Have children		
	Yes	76.2%	
	No	23.8%	
Stress measures	Daily hassles	2.45 (2.66)	[0, 9.27]
	Acute & chronic major life events	.62 (1.10)	[0, 4.53]
	Traumatic events	6.01 (3.37)	[0, 16]
	Perceived stress	1.92 (0.71)	[0.1, 3.4]

Notes: SD = standard deviation. [a] Numbers may not add up due to rounding.

For results of the bivariate assessment of the strength of the associations among the

primary predictor (i.e., income-to-needs ratio), stressor variables (i.e., daily hassles, major life

events, traumatic events, and perceived stress), and the outcome variables (i.e., number of

physical health and mental health ailments), please see Appendix. In sum, the stress measures

positively correlated with one another and each demonstrated an inverse association with

socioeconomic status. The association of daily hassles with major life events and perceived stress

were particularly high. The remaining tables present analyses corresponding to the aforementioned empirical models and associated hypotheses. Major life events, as measured by the revised Social Readjustment Rating Scale as well as the quadratic age term were found to be highly non-significant in most regressions and thus were removed to produce informative, parsimonious models.

Table 3-2 and Table 3-3 include nested regressions to test the *Model 1 Hypothesis*, which stated that daily hassles would partially mediate the socioeconomic status and health association. Regression 1 in each table represents the unadjusted association between income-to-needs and physical health and mental health, respectively. Regression 2 adds the demographic variables and Regressions 3 through 6 add the stress exposure and perception variables. Comparison of Regressions 1 and 2 with Regressions 3 through 6 of the analysis tested for possible mediating effects of stress exposure and perception on physical and mental health, respectively. While our focus is on the proposed indirect effect of daily hassles on the socioeconomic status-health relationship (Regression 3), we also test whether other stress exposures and stress perception (Regressions 4 & 5) serve a mediating role to more fully untangle the stress pathway between socioeconomic status and health. Regression 6 includes all stress measures at once while controlling for demographic variables. Structural-equation modeling techniques were then used to test the significance and formulate confidence intervals for the hypothesized indirect effect of daily hassles as well as those possibly held by other stress exposure and stress perception variables (91–96).

Table 3-2, using Poisson regression with incidence rate ratios, shows a significant socioeconomic status and physical health association in Regression 1, but it disappears when other demographics are controlled (Regression 2). Age predicts an increased risk for physical

health ailments in all regressions, holding all other variables constant (Regressions 2-6). In

contrast, all stress measures are not significantly associated with an increased risk of reporting

physical health problems, assuming everything else is equal. All together, based on this analysis

and the number of current stress-related physical health ailments reported, we do not find support

for the *Model 1 Hypothesis*. Specifically, there is no indication that daily hassles play a

mediating role on the socioeconomic status and physical health relationship. Structural equation

modeling confirmed this finding producing a non-significant indirect effect for daily hassles ($\beta =$

-.005, $P>|z| = .41$).

Table 3-2. Estimated mediating effect of daily hassles on the relationship between physical health (outcome) and socioeconomic status (predictor): Poisson regression with incident rate ratios, n=307

Variables	Reg 1 IRR (CI)	Reg 2 IRR (CI)	Reg 3 IRR (CI)	Reg 4 IRR (CI)	Reg 5 IRR (CI)	Reg 6 IRR (CI)
Income-to-needs ratio	.85** (.76-.96)	.94 (.83-1.06)	.95 (.84-1.08)	.95 (.84-1.08)	.94 (.83-1.06)	.95 (.84-1.08)
Age		1.03*** (1.02-1.03)	1.03*** (1.02-1.03)	1.03*** (1.02-1.03)	1.03*** (1.02-1.03)	1.03*** (1.02-1.03)
Female		1.16 (.93-1.44)	1.16 (.93-1.45)	1.17 (.93-1.46)	1.16 (.93-1.44)	1.17 (.94-1.47)
Black		1.10 (.89-1.36)	1.11 (.90-1.38)	1.11 (.90-1.37)	1.10 (.89-1.36)	1.11 (.90-1.37)
Daily hassles			1.06 (.96-1.17)			1.06 (.94-1.20)
Traumatic events				1.07 (.96-1.19)		1.06 (.94-1.20)
Perceived stress					1.00 (.91-1.11)	.96 (.85-1.08)

Notes: n=307 people. Physical health is a composite total of current stress-related physical outcomes, high blood pressure, heart disease, diabetes, asthma, and obesity. Female (ref: male). Black (ref: white). *p < .05; **p < .01; ***p < .001

In contrast, Table 3-3, using ordered logistic regression with proportional odds ratios,

shows a significant and robust negative association between socioeconomic status and the

number of mental health ailments reported. The negative association between socioeconomic status and mental health problems reported disappears only after of all stress measures are included in Regression 6. Across all regressions, females (as opposed to males) are associated with greater odds of reporting both current anxiety and depression versus either/none, given the other demographic and stress measures are held constant. On the other hand, blacks (as opposed to whites) are associated with lower odds of reporting both current anxiety and depression versus either/none, all else equal.

With respect to the mental health effect of stress measures, daily hassles is no longer positively significantly associated with mental health problems when traumatic events and perceived stress are added in Regression 6. Regression 6 also suggests possible mediation by traumatic events and/or perceived stress as the socioeconomic status and mental health relationship is no longer statistically significant when they are included in the analysis. However, structural equation modeling techniques did not result in a significant ($P < .05$) indirect effect by daily hassles ($\beta = .007$, $P > |z| = .62$), traumatic events ($\beta = -.06$, $P > |z| = .07$), or perceived stress ($\beta = -.14$, $P > |z| = .12$) on the socioeconomic status and mental health association. Hence, as observed for the number of physical health ailments reported above, we do not find support for the *Model 1 Hypothesis* as it pertains to our mental health outcome. Nevertheless, a moderately significant indirect effect by traumatic events does suggest that part of the socioeconomic status and mental health relationship is explained by terrible events experienced in childhood or in early adulthood.

Table 3-3. Estimated mediating effect of daily hassles on the relationship between mental health (outcome) and socioeconomic status (predictor): Ordered logistic regression with proportional odds ratios, n=307

	Reg 1	Reg 2	Reg 3	Reg 4	Reg 5	Reg 6
Variables	OR	OR	OR	OR	OR	OR
	(CI)	(CI)	(CI)	(CI)	(CI)	(CI)
Income-to-needs ratio	.65**	.58**	.63**	.67*	.74	.80
	(.50-.86)	(.42-.80)	(.45-.88)	(.48-.93)	(.52-1.03)	(.57-1.14)
Age		1.00	1.00	.99	1.01	1.01
		(.98-1.02)	(.98-1.02)	(.97-1.01)	(.99-1.03)	(.99-1.03)
Female		2.26**	2.27**	2.40**	2.24**	2.39**
		(1.32-3.88)	(1.32-3.91)	(1.40-4.09)	(1.28-3.93)	(1.35-4.23)
Black		.34***	.36***	.37***	.39**	.40**
		(.20-.57)	(.22-.60)	(.22-.61)	(.22-.69)	(.23-.71)
Marital status		1.57	1.67	1.70	2.01	2.10
		(.85-2.89)	(.89-3.14)	(.90-3.21)	(.98-4.14)	(.99-4.42)
Have children		1.13	1.10	1.08	1.40	1.35
		(.60-2.10)	(.56-2.14)	(.56-2.06)	(.71-2.75)	(.67-2.73)
Daily hassles			1.69***			.92
			(1.33-2.14)			(.67-1.25)
Traumatic events				1.89***		1.50**
				(1.47-2.44)		(1.12-2.01)
Perceived stress					4.06***	3.86***
					(2.85-5.80)	(2.61-5.73)

Notes: n=307 people. Mental Health is a composite total of current depression and anxiety. Female (ref: male). Black (ref: white). Marital status (ref: married/in a relationship). Parental status (ref: yes).
*p < .05; **p < .01; ***p < .001

Nested regressions in Table 3-4 through Table 3-7 test our *Model 2 Hypothesis*, which had posited that daily hassles modifies the effect of traumatic events or perceived stress on physical and mental health, respectively. In Table 3-4 and Table 3-5 the exponentiated coefficients in Regression 2 remain fairly similar after testing for effect modification by daily hassles. In fact, Table 3-4 and Table 3-5 indicate that the affect of traumatic events or perceived

stress on the expected count of physical health problems does not statistically significantly

change as the number of reported daily hassles changes.

Table 3-4. Estimated modifying effect of daily hassles on the relationship between physical health (outcome) and traumatic events (predictor): Poisson regression with incident rate ratios, n=307

Variables	Reg 1 IRR (CI)	Reg 2 IRR (CI)
Income-to-needs ratio	.94 (.83-1.06)	.96 (.85-1.09)
Age	1.03*** (1.02-1.03)	1.03*** (1.02-1.03)
Female	1.16 (.93-1.44)	1.18 (.94-1.47)
Black	1.10 (.89-1.36)	1.11 (.90-1.38)
Stress measures		
Traumatic events X Daily hassles		1.02 (.93-1.11)
Traumatic events		1.05 (.93-1.19)
Daily hassles		1.04 (.92-1.16)

Notes: n = 307 people. Physical health is a composite total of current stress-related physical outcomes, high blood pressure, heart disease, diabetes, asthma, and obesity. Female (ref: male). Black (ref: white). *p < .05; **p < .01; ***p < .001

Table 3-5. Estimated modifying effect of daily hassles on the relationship between physical health (outcome) and perceived stress (predictor): Poisson regression with incident rate ratios, n=307

	Reg 1	Reg 2
Variables	IRR	IRR
	(CI)	(CI)
Income-to-needs ratio	.94	.95
	(.83-1.06)	(.83-1.08)
Age	1.03***	1.03***
	(1.02-1.03)	(1.02-1.03)
Female	1.16	1.17
	(.93-1.44)	(.93-1.46)
Black	1.10	1.11
	(.89-1.36)	(.89-1.39)
Stress measures		
Perceived stress X Daily hassles		1.02
		(.90-1.16)
Perceived stress		.96
		(.81-1.14)
Daily hassles		1.03
		(.77-1.37)

Notes: n = 307 people. Physical health is a composite total of current stress-related physical outcomes, high blood pressure, heart disease, diabetes, asthma, and obesity. Female (ref: male). Black (ref: white).
*p < .05; **p < .01; ***p < .001

      Similar results were found for mental health. Table 3-6 and Table 3-7 show that the affect

of traumatic events or perceived stress on the odds of reporting both anxiety and depression

versus either/none does not change as the number of daily hassles changes.

Table 3-6. Estimated modifying effect of daily hassles on the relationship between mental health (outcome) and traumatic events (predictor): Ordered logistic regression with proportional odds ratios, n=307

Variables	Reg 1 OR (CI)	Reg 2 OR (CI)
Income-to-needs ratio	.58** (.42-.80)	.69* (.49-.97)
Age	1.00 (.98-1.02)	.99 (.97-1.01)
Female	2.26** (1.32-3.88)	2.41** (1.39-4.16)
Black	.34*** (.20-.57)	.38*** (.23-.63)
Marital status	1.57 (.85-2.89)	1.74 (.91-3.33)
Parental status	1.13 (.60-2.10)	1.08 (.54-2.14)
Stress measures		
Traumatic events X Daily hassles		.97 (.77-1.22)
Traumatic events		1.69*** (1.29-2.20)
Daily hassles		1.47** (1.13-1.92)

Notes: n = 307 people. Mental Health is a composite total of current depression and anxiety. Female (ref: male). Black (ref: white). Marital status (ref: married/in a relationship). Parental status (ref: yes). *p < .05; **p < .01; ***p < .001

Table 3-7. Estimated modifying effect of daily hassles on the relationship between mental health (outcome) and traumatic events (predictor): Ordered logistic regression with proportional odds ratios, n=307

	Reg 1	Reg 2
Variables	OR	OR
	(CI)	(CI)
Income-to-needs ratio	.58**	.73
	(.42-.80)	(.52-1.03)
Age	1.00	1.01
	(.98-1.02)	(.99-1.03)
Gender	2.26**	2.22**
	(1.32-3.88)	(1.26-3.89)
Black	.34***	.38**
	(.20-.57)	(.21-.68)
Marital status	1.57	2.03
	(.85-2.89)	(.99-4.16)
Parental status	1.13	1.39
	(.60-2.10)	(.71-2.76)
Stress measures		
Perceived stress X Daily hassles		.93
		(.70-1.25)
Perceived stress		4.05***
		(2.76-5.96)
Daily hassles		1.05
		(.76-1.44)

Notes: n = 307 people. Mental Health is a composite total of current depression and anxiety. Female (ref: male). Black (ref: white). Marital status (ref: married/in a relationship). Parental status (ref: yes).
*p < .05; **p < .01; ***p < .001

Finally, results in Table 3-8 fail to provide any support for our *Model 3 Hypothesis*, which had posited that daily hassles would modify the effect of chronic and acute major life events and traumatic events on perceived stress. Although daily hassles and traumatic events are both strongly associated with perceived stress on their own, neither modifies the effect of the other in this sample.

Table 3-8. Estimated moderating effect of daily hassles on the relationship between perceived stress (outcome) and traumatic events (predictor): Linear regression, n=307

Variables	Model 1		Model 2	
	b	(SE)	b	(SE)
Income-to-needs ratio	-.27***	(.07)	-.11	(.07)
Age	-.01*	(.01)	-.01*	(.01)
Gender	.18	(.11)	.16	(.10)
Black	-.29**	(.11)	-.17	(.10)
Marital status	-.08	(.15)	-.05	(.13)
Have children	-.07	(.14)	-.09	(.12)
Exposure stress measures				
Traumatic events X Daily hassles			-.04	(.04)
Traumatic events			.19***	(.05)
Daily hassles			.42***	(.06)

Notes: n = 307 people. Female (ref: male). Black (ref: white). Marital status (ref: married/in a relationship). Have children (ref: yes).
*p < .05; **p < .01; ***p < .001

Summary of Findings

Overall, on average, the stress measures examined in this study explain more variance in our mental health outcome as compared with the physical health outcome. In terms of our focus on daily hassles, we find that while exposure to daily hassles were strongly associated with mental health, even after adjusting for demographic factors, they did not significantly help explain the association between socioeconomic status and mental health once other stress measures were included, failing to support the *Model 1 Hypothesis (Daily hassles will partially mediate the socioeconomic status and health association)*. This finding corresponds with results from one of the two studies, both employing daily diary methodology, that examined whether daily hassles mediate the socioeconomic status and health relationship (46). Our results are consistent with the work of Grzywacz et al. (2004), who found that while neither exposure nor vulnerability explained socioeconomic differentials in daily health, their results showed that the daily stressor (used stressful daily event measures similar to daily hassles) and health (i.e., psychological distress and physical symptoms like aches/pain and gastrointestinal symptoms)

association could not be considered independent of socioeconomic status (97). On the other hand, our null findings generally conflict with research by Almeida et al. (2005), who found differences in severity and daily stressor appraisal (used stressful daily event measures similar to daily hassles) accounted for education differences in psychological distress and physical health symptoms (63).

Our Model 2 Hypothesis (Daily hassles will modify the health effect of chronic and acute major life events, traumatic events, and perceived stress) was also not supported by this study's findings. A 2004 study of a U.S. national sample of mostly white adults had found that chronic home stressors function as a moderating factor on the relationship between daily hassles and psychological distress (49). Unlike this work by Serido et al. (2004), chronic stressors, in the form of chronic and acute major life events in the current study, were not found to be significantly associated with mental health problems after adjusting for demographic characteristics. Expanding on the work of Serido et al. (2004) as well as the cumulative stress burden research of Turner and Lloyd (1999), the present study, employing similar covariates, uniquely tested whether daily hassles modify the health effect of traumatic events and perceived stress (34,49). The results demonstrated that the mental health effects of traumatic events and perceived stress did not significantly change as the number of daily hassles reported change.

Finally, this study found that the perceived stress effect of traumatic events is not significantly modified by daily hassles and vice versa. Thus, findings do not support our *Model 3 Hypothesis (Daily hassles will modify the effect of chronic and acute major life events and traumatic events on perceived stress)*. The thought has been that changes in one's experience with daily hassles might serve as a tipping point among those who have experienced traumatic events, further exhausting coping resources, leading to a higher likelihood of perceiving even

ambiguous events as stressful. Stressors can multiply over the life course, with childhood traumas and strains in early adulthood intensifying the impacts of events and strains that occur later in adulthood (31,36,98).

Discussion

This study examined the unique and combined effects of the stress exposure and stress perception chain of events linking socioeconomic status to physical and mental health. In addition to results from our hypotheses tests, a number of important patterns emerged worth discussing. First, as expected, a significant, and, for the most part, robust negative association was found between socioeconomic status and mental health but not between socioeconomic status and physical health.

The absence of a robust negative association between socioeconomic status and physical health in this study conflict with research demonstrating a persistent association even after adjusting for demographic factors (3,25,83,84, 85–87). Factors associated with age, gender, and race, such as discrimination, have been shown to account for a portion of health disparities and may in part explain the adjusted null relationship. Another reason we do not observe an association between socioeconomic status and physical health in this sample is that the physical health measure consists of health outcomes (e.g., high blood pressure, heart disease) typically experienced by older individuals. The sample under study is relatively young (average age of 44 years old) and may not be old enough to have reported trouble with such distal health indicators. Our finding may also be due to the limited sensitivity of our physical health measure, as one's status in life may have a more proximal effect on health behaviors or daily physical symptoms, than the more distal physical health indicators employed, such as coronary heart disease. Research consisting of larger sample sizes have found significant, yet relatively small

associations between socioeconomic status and signs of future disease and chronic diseases, even after controlling for age, race, and gender (3,102–104). All told, the true effect size of the independent relationship between socioeconomic status and physical health, controlling for demographics, may be too small to be detected in a study of this sample size.

Second, and, contrary to the literature, this study did not find that major life events, as measured by the revised Social Readjustment Rating Scale, uniquely or in combination with daily hassles, traumatic events, or perceived stress affect physical or mental health. This study conflicts with results from longitudinal research by Aldwin and colleagues which found that daily hassles and stressful life events have independent effects on mental health and mortality (105,106). A reason for this discrepancy may be due to our sample including both men and women and whites and African-Americans, while Aldwin et al.'s results are generalizable to an older (mean age = 65.58), all male, predominantly white population from the Boston area. Gender differences in exposure to different types of stressors has been documented (36). Moreover, research shows that racial/ethnic populations are disproportionately impacted by stress exposure (107,108). Another reason why our results may differ is, compared to our study, Aldwin and others did not also adjust for the independent effects of traumatic events and perceived stress. Finally, while prior studies demonstrate significant and consistent associations between major life events and health, many have found associations weak to modest in strength and few, if any, have adjusted for other stress exposure and perception variables (10,23). This analysis enhances the existing literature by suggesting that the observed effects of major life events on health may in fact be modest once other stress measures are controlled.

Third, the study also revealed a significant gender and race mental health effect. Females, relative to males, were found to experience more mental health problems and blacks, compared

to whites, to experience less. These findings are consistent with other research showing that women report higher levels of distress and anxiety disorders than men and blacks report equal or lower levels of distress and psychiatric disorders than whites (10,17).

Although this study provides an important and unique perspective of the links among socioeconomic status, stress exposure, stress perception, and health, it is important to note its limitations. First, the data are cross-sectional, thereby precluding an assessment of the temporal order among the variables. Second, in addition to lacking measures for more proximal health behaviors, the dataset did not include important variables in the psychosocial chain of events, such as social and coping resources (e.g., self-esteem, social support), personality traits (e.g., control beliefs, neuroticism), or situational states (e.g., catastrophizing) (11,19,27,109–111). Research suggests that interpersonal and intrapersonal resources such as social support and perceived control can help in attenuating negative appraisals and coping more effectively with stressful events associated with being at the lower end of the socioeconomic hierarchy (112,110,113–116). Omitting such variables from my analyses may have resulted in an underestimation of the extent to which factors along the stress pathway could explain the association between socioeconomic status and health. In addition to potentially being directly related to health, as suggested in the Reserve Capacity Model (Gallo & Matthews, 2003), these psychosocial resources may modify the relationship between socioeconomic status and health, a role not examined in the current study (117). Third, with respect to our focus on daily stressors, our measure of daily hassles in the past month may fail to capture the full health impact of daily stressors in this sample. While daily stressors can pile up and turn into chronic stressors, they often happen unexpectedly and are time-limited in their occurrence and effect (90,91,48,87). Lastly, findings from this sample may not be generalizable outside the Atlanta metro area.

In spite of these limitations, the results from this study build on prior work and underscore the importance of adopting a cumulative adversity and life course approach to unraveling how stress exposure and perception mediate the socioeconomic status and health connection. Our findings, in part, support the path from socioeconomic status to stress exposures—especially traumatic life events—to perceived stress to mental health outcomes. Contrary to our expectations, daily hassles exposure did not play a strong role in the socioeconomic status and health constellation. One possible reason for this in the present study may be that the unique contributions of daily hassles to health outcomes were reduced by the introduction of traumatic events and perceived stress. Traumatic events and perceived stress, known to have strong health effects in their own right, had a much stronger and significant mental-health effect relative to exposure to daily hassles (16,23).

While exposure to daily hassles on its own did not significantly mediate the socioeconomic status and health relationship, it does seem to be one of the major factors in how stress is perceived—an important observation given that perceived stress had a strong impact on mental health. This is consistent with results from a growing number of longitudinal studies examining daily hassles that show that reactivity to daily stress (versus stressor exposure alone) has a statistically significant impact on mental and physical health, as well as mortality (53,105,106).

While a significant indirect effect was not found for daily hassles, our findings indicate that traumatic events play a significant role in the socioeconomic status and mental health relationship, and have lasting health impacts. Such findings should encourage future longitudinal research to further untangle the stress exposure-appraisal pathway in a large, diverse sample.

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Appendix 3

Appendix 3-1. Correlations among health outcomes, stress, and income-to-needs

Variables	Physical Health	Mental Health	Income: Needs Ratio	Daily Hassles	Major Life Events	Traumatic Events	Perceived Stress
1. Physical health	__						
2. Mental health	.06	__					
3. Income-to-needs	-.14*	-.19**	__				
4. Daily hassles	.03	.29***	-.19**	__			
5. Major life events	.00	.21***	-.20***	.54***	__		
6. Traumatic events	.11*	.32***	-.23***	.37***	.28***	__	
7. Perceived stress	-.05	.52***	-.19**	.52***	.39***	.34***	__

Notes: n=307 people. Stressor variables rescaled to have a mean of zero and a standard deviation of one.

Appendix 3-2. Exploratory Factor Analysis Results for Chronic and Acute Major Life Events

 To examine the unidimensionality of the scale for the current study, all 51 items for the revised Social Readjustment Rating Scale were included in a principal axis factor analysis using promax rotation. Assessment of the scree plot below revealed 5 factors. Though difficult to detect a distinct elbow, the first 5 components account for most of the variance. I subsequently ran an EFA with 5 factors (below). The results of this analysis are consistent with the scree plot findings. The first factor (i.e., transitions in personal or occupational situations) explains 16.67% of the variance, the second factor (i.e., personal catastrophies) explains 13.47% of the variance, the third factor (i.e., negative interactions with the law) explains 10.02% of the variance, the fourth factor (i.e., changes in one's usual routine) explains 9.41% of the variance, and the fifth factor (i.e., significant changes in family or marriage) explains 8.32% of the variance. The table below provides a summary of the factor analysis results. While the results of this 5-factor structure are promising, consistent with prior research using the same data, I created a composite scale of all items to represent chronic and acute major life events. Assuming a unidimensional construct, Cronbach's alpha indicates adequate reliability for the chronic and acute major life events measure (.75). Confirmatory factor analysis failed to converge on one latent construct. This warrants future, more in-depth analysis into the 5 components.
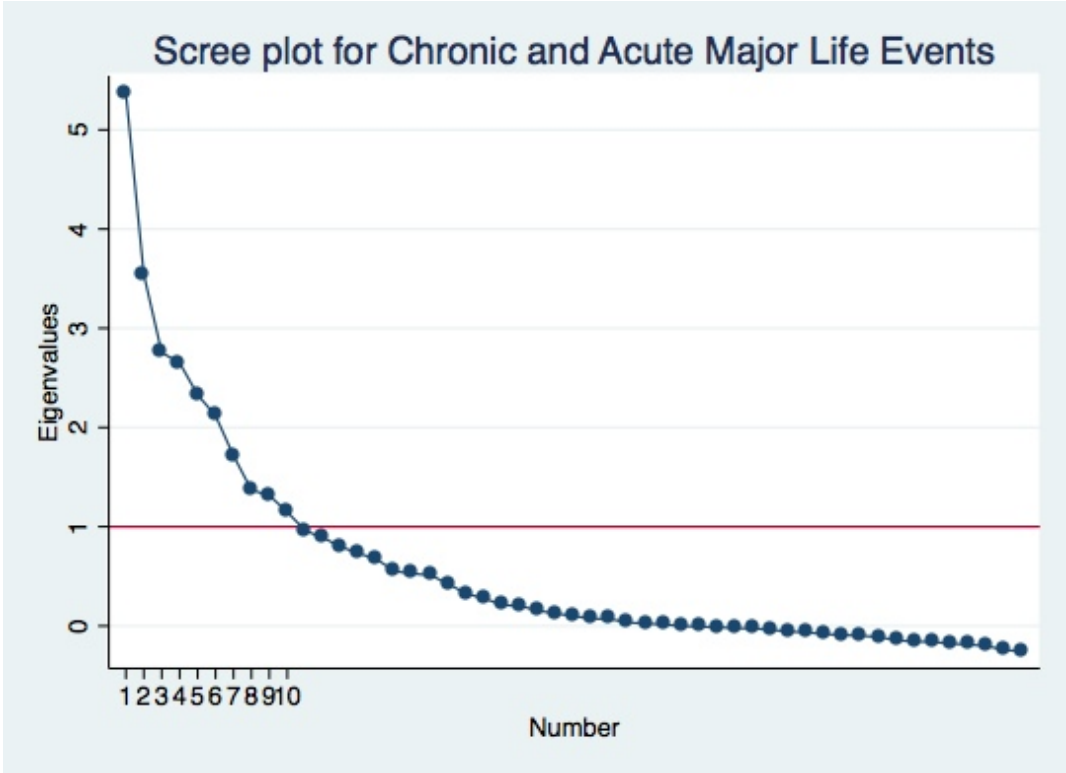
Scree plot for Chronic and Acute Major Life Events

Factor Loadings for a 5-Factor Structure for Chronic and Acute Major Life Events

Items	Factor1	Factor2	Factor3	Factor4	Factor5
Death of spouse/mate	-0.03	-0.03	0.10	0.01	0.05
Death of close family member	-0.08	-0.04	0.25	0.12	0.02
Major injury/illness to self	0.17	0.01	0.00	0.01	-0.03
Detention in jail or other institution	-0.01	-0.12	**0.62**	0.07	0.03
Major injury/illness to close family member count past	0.43	0.04	-0.02	0.54	-0.05
Foreclosure on loan/mortgage	0.02	-0.04	0.26	0.03	0.07
Divorce	-0.06	-0.04	0.28	0.04	0.05
Being a victim of crime	0.59	0.65	0.06	0.01	-0.04
Being the victim of police brutality	-0.05	0.28	**0.64**	-0.07	-0.11
Infidelity	0.01	-0.02	0.09	-0.00	0.05
Experiencing domestic violence/sexual abuse	-0.09	**0.96**	0.02	0.02	0.03
Separation or reconciliation with spouse/mate	-0.00	**0.94**	0.01	0.04	0.01
Being fired/laid-off/unemployed	0.04	0.48	-0.05	0.00	-0.02
Experiencing financial problems/difficulties	0.10	0.36	0.10	-0.02	0.11
Death of close friend	-0.07	0.19	0.06	0.06	0.05
Surviving a disaster	-0.09	0.07	-0.07	**0.90**	-0.02
Becoming a single parent	-0.02	0.06	0.23	0.09	0.06
Assuming responsibility for sick or elderly loved one	**0.81**	-0.05	-0.12	-0.03	-0.02
Loss of or major reduction in health insurance benefits	-0.05	-0.01	-0.04	**0.64**	-0.03
Self/close family member being arrested for violating the law	-0.03	-0.02	**0.73**	-0.04	-0.05
Major disagreement over child support/custody/visitation	-0.01	-0.00	0.01	0.06	0.09
Experiencing/involved in auto accident	0.13	0.09	0.15	0.03	-0.01
Being disciplined at work/demoted	0.03	0.00	0.21	-0.06	0.33
Dealing with unwanted pregnancy	-0.04	0.01	0.08	0.05	0.03
Adult child moving in with parent or parent moving in with adult child	-0.04	-0.01	-0.07	-0.02	**0.84**
Child develops behavior or learning problem	-0.02	-0.01	-0.06	0.41	0.11
Experiencing employment discrimination/sexual harassment	**0.97**	-0.05	-0.09	-0.04	-0.00
Attempting to modify addictive behavior of self	-0.01	-0.01	-0.01	0.01	0.21
Discovering/attempting to modify addictive behavior of	-0.03	0.02	0.04	0.00	0.19

Factor Loadings for a 5-Factor Structure for Chronic and Acute Major Life Events

Items	Factor1	Factor2	Factor3	Factor4	Factor5
Employer reorganization/downsizing	0.00	-0.04	0.48	-0.06	-0.08
Dealing with infertility/miscarriage	-0.08	**0.98**	-0.06	-0.00	-0.01
Getting married/remarried	-0.01	0.05	-0.03	-0.03	**0.85**
Changing employers/careers	**0.91**	-0.03	0.05	0.03	-0.04
Failure to obtain/qualify for a mortgage	-0.03	0.06	0.16	0.04	0.08
Pregnancy of self/spouse/mate	-0.01	-0.03	0.07	0.04	0.02
Experiencing discrimination/harassment outside the workplace	0.02	0.09	0.44	-0.04	0.05
Release from jail	-0.02	-0.14	**0.59**	0.08	-0.02
Spouse/mate begins/ceases work outside the home	-0.03	0.02	0.04	-0.02	0.17
Major disagreement with boss/co-worker	**0.71**	-0.04	-0.11	-0.08	0.02
Change in residence	0.04	-0.03	0.09	**0.83**	-0.01
Finding appropriate child care/day care	0.02	-0.01	0.01	0.08	0.04
Experiencing a large unexpected monetary gain	-0.03	-0.02	0.02	0.21	-0.00
Changing positions (transfer, promotion)	**0.75**	-0.01	0.12	0.01	-0.08
Gaining a new family member	**0.49**	-0.05	0.09	-0.00	0.05
Changing work responsibilities	**0.66**	-0.02	0.01	0.01	0.19
Child leaving home	0.01	-0.04	-0.08	-0.02	**0.81**
Obtaining a home mortgage	0.01	-0.03	0.12	-0.06	-0.08
Obtaining a major loan other than home mortgage	0.02	-0.05	0.20	-0.04	-0.08
Retirement	-0.05	-0.02	-0.06	**0.47**	-0.01
Beginning/ceasing formal education	-0.04	0.26	-0.02	-0.01	-0.04
Receiving a ticket for violating the law	0.02	-0.05	**0.47**	-0.04	-0.05
Eigenvalue	5.37	3.54	2.75	2.65	2.33
% variance	16.67	13.47	10.02	9.41	8.32

Notes: The extraction method used was principal axis factoring with promax rotation. Factor loadings > .40 are in bold.

Appendix 3-3. Exploratory Factor Analysis Results for Daily Hassles

All 97 items for the modified Daily Hassles Scale were included in a principal axis

analysis using promax rotation. Initial assessment of a scree plot revealed 8 factors. Thoug

difficult to detect a distinct elbow, the first 8 components account for most of the variance

subsequently ran an EFA with 8 factors. The results of this analysis are consistent with the

plot findings. The first factor (i.e., hassled with basic necessities and compromised physic

health) explains 16.91% of the variance, the second factor (i.e., signs of stress and difficul

managing domestic chores) explains 13.39% of the variance, the third factor (i.e., interper:

financial and occupational challenges) explains 10.26% of the variance, the fourth factor (

feeling isolated from family and unsafe where one lives) explains 9.85% of the variance, t

factor (i.e., distracted and partner relationship problems) explains 9.05% of the variance, t

sixth factor (i.e., substance use) explains 8.79% of the variance, the seventh factor (i.e., jol

related stressors) explains 8.57% of the variance, and the eighth factor (i.e., interpersonal

stressors) explains 8.40% of the variance. The table below provides a summary of the fact

analysis results. While the results of this 8-factor structure are promising, consistent with ļ

research using the same data, I created a composite scale of all items to represent daily has

Assuming a unidimensional construct, Cronbach's alpha indicates strong reliability for the

hassles measure (.96). However, confirmatory factor analysis on this composite measure o

items failed to converge, suggesting future analysis is needed on the 8-factor or other mult

dimensional structure.

Scree plot of Daily Hassles
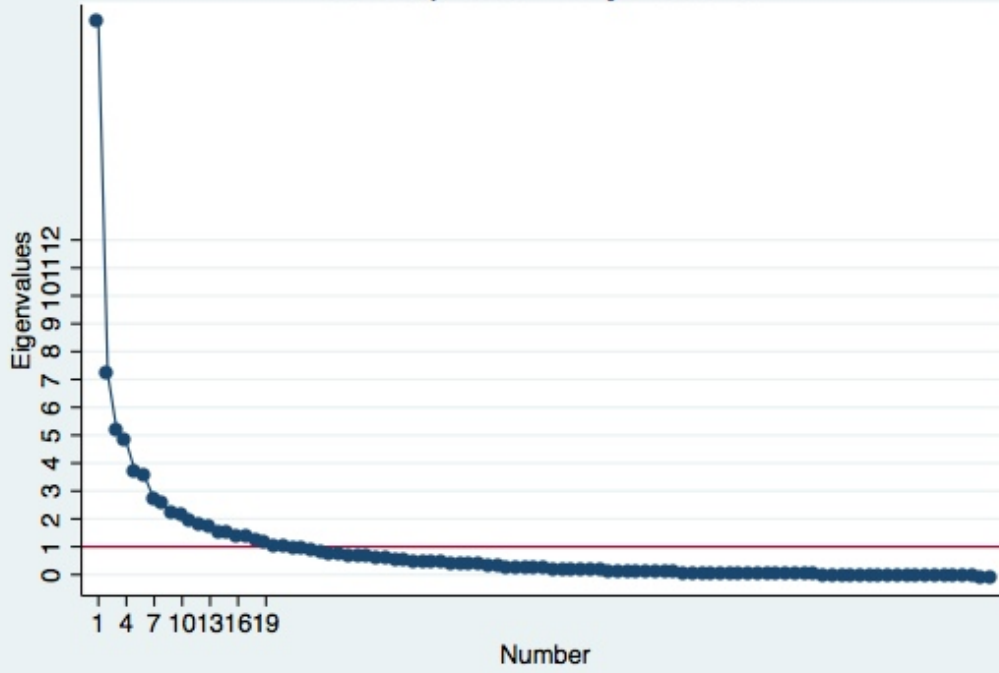
Factor Loadings for an 8-Factor Structure for Daily Hassles

	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8
Misplacing or losing things	-0.20	-0.16	0.04	0.01	**0.76**	-0.02	-0.02	0.12
Troublesome neighbors	-0.04	-0.06	-0.02	**0.92**	-0.05	-0.01	0.02	-0.07
Social obligations	0.24	0.19	0.01	-0.11	0.31	0.03	0.18	-0.14
Inconsiderate smokers	0.30	0.09	-0.06	-0.09	-0.01	0.04	0.12	-0.04
Health of a family member	0.11	0.22	0.03	-0.03	0.40	0.01	-0.17	-0.07
Not enough money for clothing	**0.63**	0.12	0.04	-0.13	0.02	0.24	0.04	-0.10
Not enough money for housing	**0.66**	0.01	0.32	-0.11	-0.02	0.17	-0.10	-0.05
Concerns about owing money	0.37	0.10	**0.64**	-0.07	0.02	0.03	0.05	-0.08
Concerns about getting credit	0.42	-0.12	0.78	-0.05	-0.09	-0.03	-0.03	0.02
Concerns about money for emergencies	0.44	0.08	0.69	-0.04	-0.05	0.05	-0.06	-0.08
Someone owes you money	0.38	-0.07	0.01	-0.04	0.23	0.06	0.04	0.01
Financially responsibility for someone who doesn't live with you	0.09	-0.10	**0.69**	0.03	0.31	-0.05	0.18	0.01
Cutting down on electricity, water, etc.	**0.70**	-0.03	0.06	0.16	-0.09	-0.04	-0.03	-0.04
Smoking too much	0.05	0.24	-0.03	-0.00	0.00	0.02	-0.15	-0.02
Use of alcohol	-0.12	-0.17	-0.04	0.02	0.08	**0.90**	0.10	-0.01
Personal use of drugs	-0.20	-0.10	-0.07	0.03	-0.01	**0.96**	-0.01	-0.00
Too many responsibilities	-0.10	0.37	0.42	0.18	-0.01	0.04	0.10	-0.05
Decisions about having children	**0.63**	-0.01	0.01	-0.15	-0.19	-0.07	0.15	-0.00
Non-family members living in your house	-0.00	-0.00	**0.80**	0.10	0.03	-0.08	-0.05	0.05
Care for pet	-0.15	**0.54**	-0.04	-0.03	0.02	0.02	0.10	0.02
Planning meals	-0.00	**0.60**	-0.10	0.21	-0.01	-0.03	-0.06	-0.05
Problems getting along with fellow coworkers	-0.14	-0.05	0.20	0.05	0.15	0.04	0.58	-0.08
Customers or clients give you a	0.02	-0.02	**0.80**	0.03	-0.04	-0.05	0.23	-0.03

Factor Loadings for an 8-Factor Structure for Daily Hassles

	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8
Home maintenance (inside)	0.25	**0.62**	-0.07	-0.10	-0.17	-0.07	0.11	0.03
Concerns about job security	0.21	0.03	0.68	-0.04	0.01	-0.02	0.29	-0.02
Concerns about retirement	0.02	-0.03	0.67	-0.01	-0.01	-0.05	-0.14	0.57
Laid-off or out of work	0.64	-0.02	0.02	-0.07	0.08	0.01	-0.04	0.05
Don't like current work duties	-0.14	0.24	0.22	0.05	-0.02	-0.00	**0.53**	-0.02
Don't like fellow workers	-0.23	0.04	**0.65**	0.05	-0.01	0.03	0.29	0.02
Not enough money for basic necessities	0.21	0.02	0.46	-0.07	-0.06	0.54	-0.15	0.30
Not enough money for food	0.21	0.16	-0.01	-0.06	-0.11	0.77	-0.04	-0.04
Too many interruptions	0.04	**0.45**	-0.06	0.08	0.23	0.01	-0.01	0.05
Unexpected company	0.04	0.05	-0.06	**0.79**	0.04	0.05	-0.08	-0.01
Too much time on hands	0.20	-0.10	-0.07	-0.02	0.21	0.74	-0.08	0.02
Having to wait	0.13	0.14	0.00	0.03	0.40	0.03	0.38	-0.04
Concerns about accidents	0.13	0.17	-0.07	0.10	0.04	-0.01	0.03	0.05
Not enough money for health care	0.04	-0.10	0.23	0.86	-0.07	0.27	-0.09	-0.05
Financial security	0.22	0.16	0.45	0.06	-0.06	0.48	0.07	-0.05
Silly practical mistakes	0.13	-0.04	0.02	0.20	**0.64**	-0.00	0.17	-0.04
Physical illness	**0.51**	0.18	0.02	0.25	0.16	-0.07	-0.25	-0.02
Side effects of medication	**0.52**	-0.04	-0.02	0.30	0.19	-0.09	-0.02	0.05
Concerns about medical treatment	**0.65**	0.05	0.01	0.21	0.05	-0.08	-0.13	0.00
Difficulties with getting pregnant	0.30	0.08	-0.01	-0.18	-0.11	-0.01	0.00	-0.04
Sexual problems that result from physical problems	0.43	0.01	-0.05	-0.01	0.22	-0.06	-0.01	0.08
Sexual problems other than those resulting from physical problems	0.14	0.07	-0.06	-0.02	0.40	-0.07	-0.01	0.04
Concerns about health in general	0.47	0.35	-0.03	0.31	0.02	-0.07	-0.20	-0.01

Factor Loadings for an 8-Factor Structure for Daily Hassles

	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8
Friends or relative too far away	0.10	0.27	-0.06	**0.53**	0.12	-0.01	0.05	-0.02
Preparing meals	-0.01	**0.59**	-0.11	0.09	-0.01	-0.02	0.03	0.01
Auto maintenance	**0.50**	0.04	-0.01	-0.08	-0.01	-0.03	0.31	-0.01
Filling out forms	-0.09	0.03	-0.09	0.10	0.07	0.76	0.10	0.05
Neighborhood deterioration	0.36	-0.14	-0.04	0.03	0.01	-0.06	0.46	0.08
Financing children's education	0.39	-0.07	-0.02	0.57	-0.11	-0.09	0.29	0.02
Problems with employees	-0.08	-0.16	**0.92**	0.08	0.01	-0.05	0.05	0.04
Problems on the job due to being a woman or man	-0.11	-0.08	**0.95**	0.06	0.03	-0.04	-0.06	0.04
Declining physical abilities	0.11	0.07	0.01	0.00	0.12	-0.01	-0.15	0.70
Concerns about bodily functions	0.44	-0.08	-0.03	0.53	0.04	-0.03	-0.05	0.00
Rising prices of common goods	0.15	0.00	0.05	0.05	-0.03	-0.02	0.16	-0.03
Not getting enough rest	-0.02	0.52	0.44	-0.02	0.03	-0.08	0.09	0.07
Not getting enough sleep	0.07	**0.68**	-0.04	-0.08	0.07	-0.06	0.14	0.07
Problems with aging parents	0.04	0.34	0.33	0.01	0.15	-0.10	-0.07	-0.03
Problems with your children	0.34	0.44	0.01	-0.10	0.06	0.00	-0.05	-0.02
Problems with persons younger than yourself	0.25	0.03	0.04	0.08	0.09	-0.03	0.09	0.08
Problems with your lover	-0.06	-0.04	0.02	-0.14	**0.76**	0.05	0.09	0.34
Difficulties seeing or hearing	0.31	0.20	-0.05	-0.03	0.13	0.06	-0.07	0.28
Overloaded with family responsibilities	-0.08	0.25	0.31	0.75	-0.03	-0.03	-0.04	-0.05
Too many things to do	-0.17	0.39	0.31	-0.06	-0.04	-0.01	0.02	0.69
Unchallenging work	0.26	-0.14	0.09	-0.12	0.15	0.01	0.38	-0.04
Concerns about meeting high standards	0.05	0.28	0.04	-0.02	0.15	0.01	0.14	-0.02
Financial dealings with friends or acquaintances	0.15	-0.04	0.04	-0.13	0.09	0.02	-0.03	**0.86**
Job dissatisfactions	0.02	0.07	0.13	-0.01	0.09	-0.01	**0.74**	0.01
Worries about decisions to	-0.03	0.20	0.11	-0.03	0.11	0.01	**0.70**	0.02

Factor Loadings for an 8-Factor Structure for Daily Hassles

	Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8
change jobs								
Trouble with reading, writing, or spelling abilities	0.05	-0.06	-0.08	0.06	0.10	0.77	-0.07	0.03
Too many meetings	-0.24	0.34	-0.04	-0.05	0.24	0.05	0.32	-0.10
Problems with divorce or separation	0.05	0.08	-0.02	-0.09	**0.64**	0.06	0.29	-0.09
Trouble with arithmetic skills	0.44	0.16	-0.01	-0.06	0.06	0.14	-0.29	-0.03
Gossip	-0.06	-0.04	0.04	-0.10	0.14	0.05	0.01	0.81
Legal problems	0.50	-0.11	0.06	-0.06	0.03	-0.05	0.20	0.02
Concerns about weight	0.14	0.54	-0.10	-0.04	-0.17	0.01	0.09	-0.01
Not getting enough time to do the things you need to do	0.00	**0.60**	-0.12	-0.04	-0.11	-0.02	0.29	0.22
Television	0.18	0.03	-0.08	0.20	0.21	0.01	0.09	0.02
Menstrual (period) problems	0.01	0.43	0.03	-0.04	0.07	-0.01	-0.13	-0.13
The weather	-0.14	0.24	-0.09	0.04	0.27	0.07	0.51	-0.08
Hassles from boss or supervisor	-0.23	0.33	0.14	0.04	-0.14	0.05	0.26	0.06
Difficulties with friends	0.43	-0.09	-0.02	-0.12	0.35	0.00	0.02	0.11
Not enough time for family	-0.24	0.43	-0.03	-0.05	0.07	0.00	0.10	0.58
Transportation problems	0.34	-0.07	-0.06	0.23	0.04	0.03	0.05	0.08
Not enough money for transportation	**0.69**	-0.08	0.02	0.19	-0.08	0.04	0.01	0.08
Not enough money for entertainment and recreation	0.32	0.04	-0.01	0.18	-0.19	0.65	0.14	-0.01
Shopping	**0.51**	0.09	0.02	0.39	-0.17	0.04	0.12	0.00
Property, investments or taxes	0.26	0.07	0.04	-0.09	0.25	-0.02	0.13	-0.04
Not enough time for entertainment and recreation	0.38	0.39	-0.02	-0.04	-0.31	0.03	0.15	0.06
Yardwork or outside home maintenance	0.21	0.21	-0.13	-0.07	-0.08	-0.07	0.13	0.29
Concerns about news events	0.02	0.00	-0.05	0.21	0.07	0.01	0.02	0.58

Factor Loadings for an 8-Factor Structure for Daily Hassles

		Factor1	Factor2	Factor3	Factor4	Factor5	Factor6	Factor7	Factor8
Noise		0.28	0.02	-0.05	0.40	0.18	-0.02	0.06	0.05
Crime		0.07	-0.08	-0.05	**0.85**	0.01	-0.03	0.11	-0.01
Traffic		-0.07	0.07	-0.06	0.06	-0.02	-0.01	0.22	0.46
Pollution		0.10	0.01	-0.12	0.21	-0.03	0.01	0.07	0.64
	Eigenvalue	19.84	7.21	5.12	4.75	3.64	3.50	2.69	2.49
	% variance	16.91	13.39	12.67	9.85	9.05	8.79	8.57	8.40

Notes: The extraction method used was principal axis factoring with promax rotation. Factor loadings > .40 are in boldface.

Appendix 3-4. Exploratory and Confirmatory Factor Analysis Results for Traumatic Events

All 20 items of the Traumatic Events Scale were included in a principal axis factor analysis. Initial assessment of a scree plot revealed 1 factor with a distinct elbow. The first factor accounts for most of the variance. I subsequently ran an EFA with 1 factor. The results of this analysis are consistent with findings from the scree plot. The one factor (i.e., traumatic events) explains 64.05% of the variance, suggesting a unidimensional construct. The table below summarizes the factor analysis results. Confirmatory factor analysis provides some evidence to indicate that a 1-factor model is adequate. A 1-factor structure yielded an acceptable model fit $[X^2(1, N = 170) = 383.28 \text{ p} = .000; CFI = .651; RMSEA = .064]$. While the EFA and CFA results suggest removal of the war-related item, a CFA excluding this item (not shown) did not result in an appreciable difference in model fit. Based on these results, as well as prior literature, I created a composite scale of all items to represent traumatic events. Cronbach's alpha indicates adequate reliability for this composite traumatic events measure (.70).

Scree plot of Traumatic Events
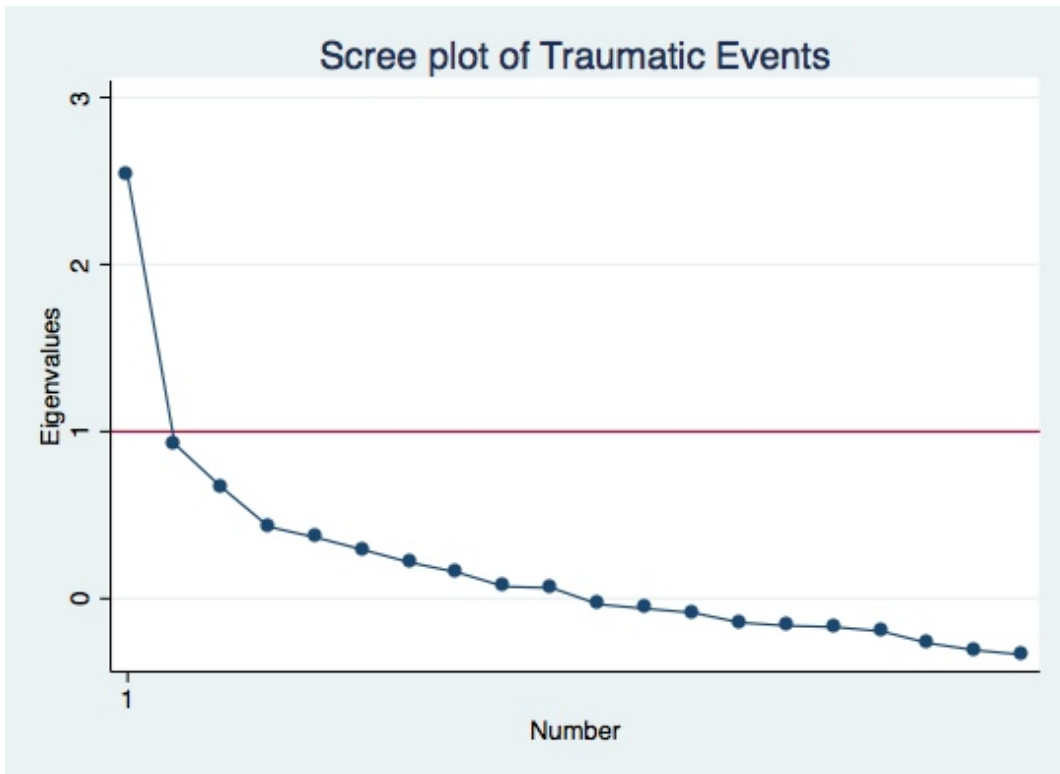
Factor Loadings for a 1-Factor Structure for Traumatic Events

	Factor1
Major illness or accident	0.20
Parents got divorce	0.21
Had to do a year of school over again	0.19
Parent did not have a job for a long time when they wanted to be working	0.29
Something scared you and the thought of it has scared you for years	0.51
Sent away from home because you did something wrong	0.30
Parent had drug problems	0.41
Regularly physically abused by parents	0.31
One of your parents died	0.22
Seen violence happen to someone or seen someone killed	0.40
Experienced major fire, flood, earthquake, or other natural disaster	0.33
Had a serious accident, injury, or illness that was life threatening	0.41
Sexually abused or assaulted	0.45
Divorced or ended a relationship with someone you still love	0.49
Spouse, child, or loved one died	0.16
One of your children ever had near-fatal accident or life-threatening illness	0.24
Been in combat in a war, lived near a war zone, or been in a political uprising	-0.02
Discovered spouse or partner in a close relationship was unfaithful	0.48
Physical abused by your current or a previous spouse or partner	0.48
Spouse, partner, or child been addicted to alcohol or drugs	0.50
Eigenvalue	2.53
% variance	64.05

Notes: Extraction method consisted of principal axis factor analysis. Because only one factor was extracted, the solution could not be rotated.

Appendix 3-5. Exploratory and Confirmatory Factor Analysis Results for Perceived Stress

To examine dimensionality, all items from the Perceived Stress Scale were included in a principal axis factor analysis. Consistent with the how the scale is meant to be scored, positively worded items (e.g., "how often have you felt confident about your ability to handle your personal problems?") were reverse coded. Initial examination of results from a scree plot revealed 1 factor with a distinct elbow. The first component accounts for most of the variance. A 1-factor EFA was then conducted. The results of the EFA are consistent with findings from the scree plot. The one factor (i.e., perceived stress) explains 100% of the variance, suggesting a unidimensional construct. The table below summarizes the EFA results. Confirmatory factor analysis provides additional evidence indicating a 1-factor model is appropriate. A 1-factor structure yielded an acceptable model fit [$X^2(1, N = 35) = 114.632$ p $= .000$; CFI $= .937$; RMSEA $= .086$]. Based on these results, in addition to prior research, I created a composite scale of all items to represent perceived stress. Cronbach's alpha indicates acceptable reliability for the composite perceived stress measure (.88).

Scree plot of Perceived Stress
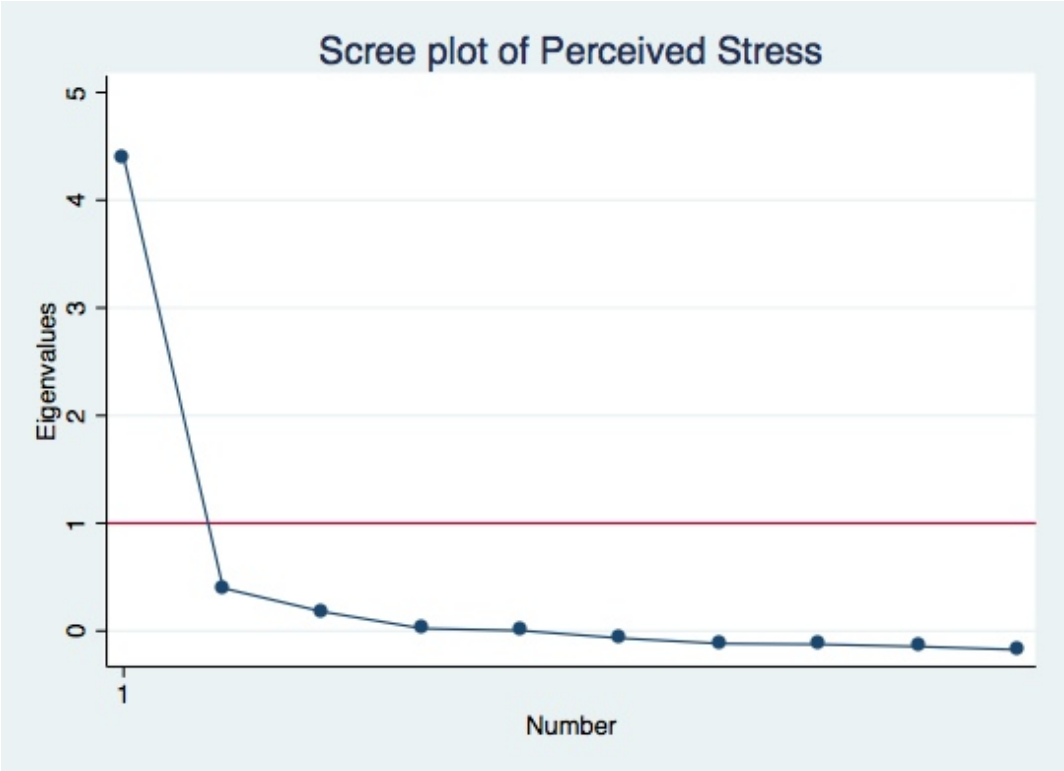
Factor Loadings for a 1-Factor Structure for Perceived Stress

	Factor1
How often upset because of something that happened unexpectedly	0.58
How often felt you were unable to control important things in life	0.73
How often felt nervous and stressed	0.74
How often felt confident in ability to handle personal problems	0.43
How often felt things were going your way	0.70
How often have you found that you could not cope with all the things you had to do	0.67
How often have you been able to control irritations in your life	0.57
How often have you felt that you were on top of things	0.73
How often have you been angered because of things that happened that were outside of your control	0.58
How often have you felt difficulties were piling up so high that you could not overcome them	0.82
Eigenvalue	4.40
% variance	100

Notes: Extraction method consisted of principal axis factor analysis. Because only one factor was extracted, the solution could not be rotated.

CHAPTER 4

The Effects of Daily Negative Interpersonal Events on Emotional Reactivity And Their Potential Role in Education Health Disparities

Introduction

Daily hassles, defined as relatively minor everyday stressors, such as having an argument with another person, experiencing home maintenance issues, and transportation problems, can have significant negative effects on physical health and psychological well-being (1–16). While any number of such commonplace challenges can disrupt daily life, a majority of daily stressors involve interpersonal conflicts and it is these day-to-day interpersonal stressors that are particularly unhealthy (17,13,7,18–23). Individuals are not equally susceptible to the deleterious health effects of interpersonal stress. Those burdened by chronic stress (e.g., chronic pain) may be especially vulnerable.

Chronic pain is a highly prevalent chronic health problem among adults (24,25). Chronic pain illness symptoms and disease activity have been shown to co-occur with psychosocial stressors, particularly those of an acute and interpersonal nature (24,26–28). The health effects of interpersonal stress associated with lower socioeconomic status may be compounded by the stress associated with chronic pain, rendering rheumatoid arthritis patients especially vulnerable to the adverse emotional effects of interpersonal conflict. Given the potential for chronic pain and pain-related disability to influence status, there is a need to better understand the influence of status on interpersonal stress among individuals with chronic pain.

Studies document a significant association between daily interpersonal stress and both physical and psychological symptoms among chronic pain patients with rheumatoid arthritis, an autoimmune disease characterized by joint pain, swelling, and stiffness

(29,30,24,31,28,26,32,27,33). While the adverse health effects of daily negative interpersonal events have been shown to carry over to the next day among rheumatoid arthritis patients, few studies have examined the individual contribution of interpersonal stressors from multiple life domains to capture a more nuanced account of the relationship between interpersonal stress and emotional health (24,30,32). In addition, stress is posited to play a key role in explaining socioeconomic disparities in mental health (34–40), yet few studies have tested this pathway employing daily stress (38,39), and none have incorporated a disaggregated measure of daily interpersonal stress by life domain (e.g., family, friends, etc.).

There is reason to suspect that daily interpersonal stressors from multiple life domains could be differentially patterned by status and have varied health effects. For example, the regularity and intensity of interpersonal conflict regarding expenses and other day-to-day challenges that occur between spouses/partners may be greater compared to similar arguments with family, friends, or co-workers. Moreover, prior studies of major life events and daily stress demonstrate that stressor disaggregation reveals important variability in health effects (17,41,42).

SES-Stress Relationship: Are Interpersonal Stressors Patterned by Status?

The association between high levels of stress and poor health is well established (43–45). Differential stress exposure and vulnerability may help explain socioeconomic disparities in health (34–40). Individuals lower on the socioeconomic totem pole face a disproportionate number of stressful life events (e.g., loss of a job) and chronic stressors (e.g., financial strain) compared to their higher socioeconomic counterparts (37,46–48). At the same time, socioeconomically disadvantaged individuals are less able to manage stressful experiences due to having fewer resources (i.e., instrumental and/or psychological) and thus are more likely to perceive generic life events as stressful (49–53).

Individuals on the lower rungs of the socioeconomic ladder experience multiple types of stressors (e.g., acute, chronic, and episodic challenges), each of which can trigger an unhealthy stress response (54–59). Yet much of the socioeconomic status-stress research has focused on dramatic life events or chronic stress (36,38,44,46,48). Though less often examined, daily hassles have been shown to independently influence emotional well-being and may serve as a mechanism by which socioeconomic disparities in emotional health are produced (60–63,39,37,9,40). Socioeconomic status is believed to influence rates of interpersonal conflict, one of the more commonly occurring types of daily stressors reported. Specifically, lower status individuals are hypothesized to experience more negative social interactions with family, friends, co-workers, and community members (64). Nevertheless, to the author's knowledge, there is little evidence to support this hypothesis.

Two studies using general population data (i.e., National Study of Daily Experiences) provide insight into the complex relationship between socioeconomic status and daily stress (the most common form of stress reported in these studies was an aggregate measure of daily interpersonal stress) (38,39). Contrary to the prevailing notion of an inverse status-stress relationship, Grzywacz et al. (2004) found that lower status was associated with fewer but more severe daily stressors (38). A follow-up study by Almeida and others (2005) found that stressor domain, severity, timing, and perceived risk were important factors influencing the nature of the relationship between socioeconomic status and daily stress (39). Therefore, the present study builds on this research by investigating whether daily negative interpersonal events from multiple life domains are differentially patterned by level of education.

Relative Emotional Influence of Interpersonal Stressors in Different Life Domains

Interpersonal conflict may arise in multiple life domains, such as with co-workers, family, friends, and/or with one's spouse/partner. Individuals likely weigh the importance of each of these interpersonal stressors differently. Subsequently, interpersonal tensions stemming from different relationships may have varying health effects. Yet prior studies examining the daily interpersonal stress-health relationship have tended to aggregate these stressors into a summary measure of interpersonal conflict (30,24,31,28,32,27,7). Such practice may potentially obscure important differential effects of daily interpersonal stressors on emotional reactivity.

Disaggregating interpersonal stress and assessing its potential varied health effects could provide a nuanced perspective not yet observed in the stress-health literature. For example, disagreements with one's spouse/partner may be especially harmful for chronic pain patients who rely on their support, perhaps more regularly than that provided from family, friends, or co-workers, to manage symptoms. Chronic pain patients reporting problematic spousal relationships have been shown to experience more psychological distress (65–69). This study thus uniquely examines the contribution of daily interpersonal stress from multiple life domains on emotional reactivity. Based on prior research, we expect negative interpersonal events involving one's spouse/partner to have a particularly strong effect on emotional reactivity compared to arguments with friends, family, or co-workers.

The Present Study

The present study addresses the aforementioned gaps in the literature by examining whether a disaggregated measure of daily interpersonal stress provides a significant and more nuanced perspective on the status-stress and stress-emotional health relationship. The study first tests the status-differential exposure hypothesis and determines whether it is the same across

multiple life domains (i.e., among co-workers, friends, family, or spouse/partner). This study then examines whether daily interpersonal stress from these different domains have varying effects on emotional reactivity. Such an investigation represents key steps in the Baron and Kenny (1986) mediation approach and lays the foundation for future research to assess the degree to which interpersonal stress explains educational differentials in emotional health (70,71).

Research Hypotheses

Based on this literature we propose the following hypotheses:

Hypothesis 1: Level of education will be inversely associated with daily negative interpersonal events controlling for demographic characteristics (i.e., age, gender, and work status).

Hypothesis 2: Daily negative interpersonal events occurring on one day will be associated with next-day negative affect, controlling for illness symptoms (i.e., pain, fatigue), demographic characteristics (i.e., age, gender), personal attributes (i.e., neuroticism, pain coping capacity), and prior-day's negative affect.

Hypothesis 3: Daily negative interpersonal events occurring on one day will be associated with next-day unpleasant mood, controlling for illness symptoms (i.e., pain, fatigue), demographic characteristics (i.e., age, gender), personal attributes (i.e., neuroticism, pain coping capacity), and prior-day's unpleasant mood.

Hypothesis 4: Daily negative interpersonal events occurring on one day with one's spouse/partner will be more strongly associated with next-day emotional reactivity compared to other interpersonal stressors, controlling for illness symptoms (i.e., pain, fatigue), demographic characteristics (i.e., age, gender), personal attributes (i.e., neuroticism, pain coping capacity), and prior-day's emotional reactivity.

Methods

Data Source

This study uses data from a survey of 117 individuals (32 men and 85 women) with a physician-confirmed diagnosis of rheumatoid arthritis. In the original study, participants were recruited in the Phoenix metropolitan area through solicitations at health fairs, physician's offices, VA hospital rheumatologists, senior citizen groups, and the Arthritis Foundation

membership. Participants included in the survey were those not taking any cyclical estrogen replacement therapies, did not have Lupus, and described themselves as having rheumatoid arthritis at screening and could obtain a written confirmation of their diagnosis from their rheumatologist.

All participants provided informed consent and a release-of-information form to ascertain physician-confirmed diagnosis for their rheumatoid arthritis. Subsequently, respondents were asked to complete an initial questionnaire assessing demographic characteristics and stable personality traits (e.g., trait neuroticism) and a set of 30 daily diaries (with 30 pre-addressed, stamped envelopes) measuring day-to-day reports of illness symptoms, coping, and emotional reactivity. Participants were asked to complete a diary each night a half-hour before bedtime and place the completed diary in the mail the next day. Postmark verification was monitored to substantiate compliance with instructions. In total of the original study participants, 94% of the diaries were completed, and of those completed, 97.3% were received with a verified postmark. Of that number, approximately 80% were postmarked within 2 days of diary completion. Respondents were paid up to $90 for returning the daily diaries (30).

Measurement

The Value in Examining Impact on Negative Affect and Unpleasant Mood

Recent studies examining the mental health effect of daily interpersonal stress among chronic pain patients focus on negative affect, a construct consisting of a variety of negative emotional states (i.e., instant reactions that are typically short-lived), such as feeling upset, guilty, and nervous (72,24,30,73,74). The transitory nature of negative affect makes it arguably well-suited at capturing the emotional effects of daily stressors, generally thought to moderate or

disappear in a day or two (17,73). However, negative affect alone may not fully capture the total emotional effect of daily stressors.

Daily stressors function not only by having distinct, immediate effects on a person's emotional health on the day they occur, but have the potential to carry over to subsequent days resulting in more serious emotional/stress reactions (13,7,75,63,74). Bolger et al. (1989) found the emotional impact of interpersonal conflict can extend over multiple days (17). To tap into the more long-lasting emotional effects of daily interpersonal stress, it may be necessary to assess negative/unpleasant mood (e.g., feeling sad and blue), a more prolonged emotional state or disposition compared to negative affect (74,76). An unexpected argument with one's spouse/partner could result in an unpleasant mood lasting longer than a day. Lingering mood disturbances can result in mood disorders such as depression (74). For these reasons, this study assesses the emotional effect of various interpersonal stressors on both negative affect and unpleasant mood.

Negative Affect: Daily negative affect was measured using items from the negative affect subscale of the Positive and Negative Affect Schedule (73). Participants rated 10 standard mood adjectives each for negative affect using a 5-point scale from 1 (very slightly or not at all) to 5 (extremely). The internal reliability estimate for the items aggregated across the 30 days was .93. Based on the distribution of responses the composite categories were scaled to include "Very slightly/not at all," 2 "A little," and 3 "Moderately or higher." This outcome variable was treated as ordinal.

Unpleasant Mood: Daily mood was assessed using a series of emotion adjectives rated on a 5-point scale from 1 (very slightly/not at all) to 5 (extremely). Consistent with research by Tennen et al. (2006), reports of 'sad' and 'blue' were averaged for a measure of unpleasant mood

(77). The alpha coefficient for this subscale over the 30-day period was .76. Again, based on the distribution of responses the composite categories were scaled to include "Very slightly/not at all," 2 "A little," and 3 "Moderately or higher" and treated as ordinal.

Daily Negative Interpersonal Events: Daily interpersonal stressors were measured by using negative interpersonal events from the Inventory of Small Life Events (ISLE) for older adults (29). Respondents provided frequency counts of the occurrence of 22 negative interpersonal events (e.g., "criticized by spouse/partner") in four separate relationship domains: spouse/partner, family members, friends, and coworkers (29). Participants were also asked whether any "other" negative events occurred during the day in their social interactions in each relationship domain. Daily sum scores were created for each of the relationship categories by calculating the total number of negative interpersonal events in each domain. Each domain was treated as a count variable.

Spouse/Partner Negative Interpersonal Events: Items included in this subscale were, "argued with spouse/partner," "was critical of spouse/partner," "criticized by spouse/partner," and "spouse/partner stopped being affectionate." The alpha coefficient for this subscale in the present study was .81 for the 30-day period. Factor analysis indicated the items loaded significantly on the primary latent construct.

Family Negative Interpersonal Events: Items for this subscale included, "criticized or blamed for something by a family member," and "had an argument with a family member." The internal reliability estimate for this measure in the present study was .81 for the 30-day period. Factor analysis indicated one primary latent construct.

Friend Negative Interpersonal Events: This subscale included the following items, "friend/acquaintance did not return your call," "friend/acquaintance did not show up on time,"

"criticized by friend/acquaintance," "argued with friend/acquaintance," "met an unfriendly or rude person," and "not invited to party given by friends." In the present study, the alpha coefficient for this subscale was .56 for the 30-day period. Factor analysis indicated these items loaded on one primary latent construct.

Work Negative Interpersonal Events: Items for this subscale included, "had to work overtime when you didn't want to," "people under your supervision failed to get work done," "criticized by your superior at work," "had added pressure to work harder and faster," "disagreement with others about your job assignment(s)," and "got negative feedback about performance review." This subscale exhibited high internal consistency (Cronbach's $\alpha = 0.75$) across the 30 days. Factor analysis indicated one primary latent construct.

Demographic Controls: Demographic controls were assessed in the initial questionnaire and included age (reference = <65 years, 1=65+ years), gender (reference=male, 1=female), work status (reference = employed/volunteering) and education level. We account for age, because older individuals have been shown to experience fewer negative social interactions and decreased emotional reactivity to interpersonal stress (23,24,78). Gender is also included in our analyses because men and women differ in their average mood and in reports of mental health (23,79,80). Education is used as it may be a more stable socioeconomic indicator among older adults than income level and is therefore less prone to endogeneity bias from reverse causality (38,39,81–83). Moreover, my thinking was that the lower individuals are on any given socioeconomic status indicator, the more likely they are to be exposed to interpersonal conflict. Therefore, a series of dichotomous indicators of educational attainment were coded representing high school education or less; vocation or trade school; 1 to 3 years of college education; a 4-year college education; and post-graduate college education (reference category).

Illness Symptom Controls: We adjust for the common rheumatoid arthritis symptoms of chronic pain and fatigue, as they are predictive of negative interpersonal exchanges, and are negatively associated with psychological well-being (30,32,84,24). Daily pain and fatigue were measured in the diaries with the standard instruction for a numerical rating scale, "What number between 0 and 100 describes your average level of arthritis pain (or fatigue) today?" A zero (0) would mean 'no pain (or fatigue) and a one hundred (100) would mean 'pain (or fatigue) as bad as it can be.' (85,86).

Personal Attribute Controls: The personal attributes included in this analysis are trait neuroticism and pain coping capacity. We adjust for trait neuroticism as "neuroticism is related to the experience of more frequent negative events and to greater distress in the face of these events" (24,87). Trait neuroticism was measured in the initial questionnaire using 12 items making up the neuroticism subscale (e.g., "too often, when things go wrong, I get discouraged and feel like giving up") of the Big Five Personality Inventory (88). The items for this subscale were scored on a 5-point scale from 1 (strongly disagree) to 5 (strongly agree). The alpha coefficient for the neuroticism subscale in the present study was .83. We control for pain coping capacity as the ability to effectively cope with stressors, like chronic pain, is positively associated with psychological well-being and could influence one's ability to engage in positive social interactions (65,89–91). Pain coping capacity was assessed daily in the diary by asking respondents, "Think of the time today when your pain was the worst. How difficult was it to cope with this pain?" This was scored on a 5-point scale from 1 (not at all) to 5 (extremely).

Statistical Analyses

Multilevel modeling procedures were employed in the main analyses to account for the hierarchical nested data structure (i.e., 30 daily observations nested within each participant).

Level 1 (within-person) variables consisted of daily measurements of negative interpersonal stressors, negative affect, unpleasant mood, pain, pain coping capacity, and fatigue. Level 2 (between-person) variables consisted of age, gender, education level, work status, and trait neuroticism. The outcome variables, negative affect and unpleasant mood, were analyzed separately in random-effects ordered logistic models.

Overall, the analysis consisted of 4 main parts. First, univariate descriptives were generated to examine the distribution of all variables, with means and standard deviations presented for continuous variables and percentages for categorical variables. Second, bivariate correlations were conducted to assess the strength of the associations among the predictor variables (i.e., interpersonal stressors) and rule out potential collinearity problems. Third, multivariate, multilevel, negative binomial regression models examined whether level of education was correlated with each interpersonal stressor, controlling for level-2 variables (i.e., age, gender, and work status). Betas for these models were exponentiated as incident rate ratios for ease of interpretation. Fourth, multivariate, multilevel, random-effects ordered logistic regression models were run to examine the association between predictor variables and each outcome variable with proportional odds ratios generated for ease of interpretation. These models adjusted for level-2 variables (i.e., age, gender, and trait neuroticism) and the lagged effects of level-1 variables (negative interpersonal stressors, pain, pain coping capacity, and fatigue). These models also controlled for prior day's respective outcome (i.e., negative affect or unpleasant mood) to help rule out potential reverse causality (i.e., prior negative affect or unpleasant mood affecting the subsequent occurrence of interpersonal stressors). All analyses were conducted using Stata version 13 and statistical significance was set at $P < .05$.

Results

Table 4-1 presents descriptive statistics of the sample of 117 adult rheumatoid arthritis respondents. On average participants were 52.86 years of age (SD = 12.67), 17% were 65 years of age or older, and 73% were female. On average, 59% of respondents reported working or volunteering and over 40% reported having earned a 4-year college education or higher. Regarding to outcome measures, 40% reported feelings and emotions associated with negative affect "Very slightly/not at all," with 49% and 11% reporting, "A little" and "Moderately or higher," respectively. Seventy-one percent reported feeling an unpleasant mood "Very slightly/not at all," with 18% and 11% reporting, "A little" and "Moderately or higher," respectively. Each day participants reported an average of .48 (SD = .87) negative interpersonal spouse/partner events, .19 (SD = .48) negative interpersonal family events, .21 (SD = .53) negative interpersonal friend events, and .30 (SD = .73) negative interpersonal work events. The average daily pain rating was 33.72 (SD = 24.45) and the average daily fatigue rating was 31.57 (SD = 24.41) on a 0-100 rating scale. The average daily report of difficulty coping with pain was 2.25 (SD = 1.10). The sample had a mean trait neuroticism score of 2.59 (SD = .69).

Table 4-1. Sample characteristics of rheumatoid arthritis study participants, n=117

Class of variable	Variable	N (%)	Unweighted mean (SD)[a]	Range
Outcomes	Daily negative affect	2714		
	Very slightly/not at all	1098 (40.46%)		
	A little	1329 (48.97%)		
	Moderately or higher	287 (10.57%)		
	Daily unpleasant mood	2720		
	Very slightly/not at all	1930 (70.96%)		
	A little	496 (18.24%)		
	Moderately or higher	294 (10.81%)		
Predictors	Daily spouse/partner negative events	2710	.48 (.87)	[0, 5]
	Daily family negative events	2708	.19 (.48)	[0, 3]
	Daily friend negative events	2712	.21 (.53)	[0, 5]
	Daily work negative events	2689	.30 (.73)	[0, 5]
SES	Education	117		
	High school or less	19 (16.54%)		
	Vocation or trade school	16 (13.59%)		
	1-3 years of college	34 (29.12%)		
	4-year college	14 (12.66%)		
	Post-grad college	32 (28.08%)		
Demographics[b]	Age	117	52.86 (12.67)	[21, 81]
	65 years or more	20 (17.13%)		
	Gender	117		
	Male	32 (26.97%)		
	Female	85 (73.03%)		
	Work status	117		
	Not working	47 (40.44%)		
	Working or volunteering	69 (59.56%)		
Symptoms	Daily pain	2720	33.72 (24.45)	[0, 95]
	Daily fatigue	2720	31.57 (24.41)	[0, 100]
Personal attributes	Trait neuroticism	117	2.59 (.69)	[1, 4.38]
	Daily difficulty coping with pain	2705	2.25 (1.10)	[0, 5]

Notes: SD = standard deviation. [a] Numbers may not add up due to rounding. [b] 88.79% of participants were Caucasian.

Table 4-2 displays the pairwise correlations among the daily interpersonal stressors.

While significant, these bivariate correlations indicate weak-to-moderate associations among the

interpersonal stressors. Moreover, none of the stressors demonstrate a variance inflation factor

value greater than 1.06. A variance inflation factor value greater than 100 merits applying

techniques to rectify possible multicollinearity (92). Together these findings do not suggest a

multicollinearity problem for our predictor variables. Thus all interpersonal stressors were included in the main analyses, as they do not appear to contribute redundant information.

Table 4-2. Correlations among daily interpersonal stressors in rheumatoid arthritis study

Variables	Spouse/partner interpersonal stress	Family interpersonal stress	Friend interpersonal stress	Work interpersonal stress
1. Spouse/partner interpersonal stress	__			
2. Family interpersonal stress	.15*	__		
3. Friend interpersonal stress	.15*	.16*	__	
4. Work interpersonal stress	.11*	.13*	.18*	__

Notes: n=117 people. Negative interpersonal stressors rescaled to have a mean of zero and a standard deviation of one.
*p < .05; **p < .01; ***p < .001

Table 4-3 to Table 4-6 show results of the multivariate, multilevel, negative binomial regression models testing whether level of education is inversely associated with exposure to daily negative interpersonal events (*Hypothesis 1*). The results presented in these tables provide mixed support for this hypothesis. **Table 4-3** and Table 4-6 are not supportive of *Hypothesis 1* as they indicate that respondents with education less than the post-graduate college level are expected to experience significantly lower rates of exposure to negative interpersonal spouse and work events compared to those with post-graduate education, controlling for age, gender, and work status. On the other hand, results in Table 4-4 and Table 4-5 are supportive of *Hypothesis 1* as respondents with education less than the post-graduate college level are expected to experience significantly greater rates of exposure to negative interpersonal family and friend events compared to those with post-graduate college education, holding all other variables constant.

Concerning demographics, the models presented in **Table 4-3** through Table 4-6 indicate a significant association between age and gender and exposure to negative interpersonal family, friend, and work events. Being 65 years of age or older (vs. not) is protective against increased

exposure to interpersonal conflict with family (IRR = 0.337***; 95% CI: 0.270 - 0.421), friend (IRR = 0.588***; 95% CI: 0.493 - 0.700), and coworkers (IRR = 0.247***; 95% CI: 0.166 - 0.366). Men (vs. women) report less exposure to conflicts with family (IRR = 0.578***; 95% CI: 0.490 - 0.682) and friends (IRR = 0.696***; 95% CI: 0.600 - 0.808) but significantly more with coworkers (IRR = 3.384***; 95% CI: 1.228 - 1.795). Working (vs. not) is associated with more exposure to negative interpersonal events with family (IRR = 1.118*; 95% CI: 0.980 - 1.276) and coworkers (IRR = 3.384***; 95% CI: 2.749 - 4.166).

Work status, age, and gender were not significantly associated with the rate of exposure to negative interpersonal spouse/partner events.

Table 4-3. Estimated effect of education on exposure to negative interpersonal spouse events: Negative binomial regression with incident rate ratios, n = 117

	Negative interpersonal spouse events	
	IRR	95% CI
Education (ref: Post-grad college)		
HS or less	0.635***	0.528 - 0.764
Vocation or trade school	0.856	0.708 - 1.035
1-3 years of college	0.787***	0.672 - 0.920
4-year college	0.715***	0.592 - 0.865
Work status (ref: employed/volunteering)	1.027	0.901 - 1.170
65 years + (ref: <65 years)	1.017	0.867 - 1.193
Male (ref: female)	1.009	0.886 - 1.150

*p < .05; **p < .01; ***p < .001.

Table 4-4. Estimated effect of education on exposure to negative interpersonal family events: Negative binomial regression with incident rate ratios, n = 117

	Negative interpersonal family events	
	IRR	95% CI
Education (ref: Post-grad college)		
HS or less	1.357***	1.084 - 1.699
Vocation or trade school	1.387***	1.108 - 1.736
1-3 years of college	1.645***	1.368 - 1.978
4-year college	1.445***	1.175 - 1.778
Work status (ref: employed/volunteering)	1.118*	0.980 - 1.276
65 years + (ref: <65 years)	0.337***	0.270 - 0.421
Male (ref: female)	0.578***	0.490 - 0.682

*p < .05; **p < .01; ***p < .001.

Table 4-5. Estimated effect of education on exposure to negative interpersonal friend events: Negative binomial regression with incident rate ratios, n = 117

	Negative interpersonal friend events	
	IRR	95% CI
Education (ref: Post-grad college)		
HS or less	1.381***	1.126 - 1.693
Vocation or trade school	1.235*	0.998 - 1.528
1-3 years of college	1.305***	1.094 - 1.557
4-year college	1.411***	1.161 - 1.715
Work status (ref: employed/volunteering)	1.060	0.931 - 1.208
65 years + (ref: <65 years)	0.588***	0.493 - 0.700
Male (ref: female)	0.696***	0.600 - 0.808

*p < .05; **p < .01; ***p < .001.

Table 4-6. Estimated effect of education on exposure to negative interpersonal work events: Negative binomial regression with incident rate ratios, n = 117

	Negative interpersonal work events	
	IRR	95% CI
Education (ref: Post-grad college)		
HS or less	1.088	0.848 - 1.396
Vocation or trade school	0.644***	0.488 - 0.850
1-3 years of college	0.813**	0.664 - 0.994
4-year college	0.974	0.778 - 1.219
Work status (ref: employed/volunteering)	3.384***	2.749 - 4.166
65 years + (ref: <65 years)	0.247***	0.166 - 0.366
Male (ref: female)	1.485***	1.228 - 1.795

*p < .05; **p < .01; ***p < .001.

To get a better understanding of the distribution of negative interpersonal events across education level, Table 4-7 presents results of a cross-tabulation of negative interpersonal spouse events by highest level of education reported. A majority of respondents within each category of education-level report zero negative interpersonal spouse events. Consistent with results reported in **Table 4-3**, the distribution of respondents across all categories of education level vary, suggesting a strong relationship between education and spousal conflict. Similarly, the distribution of negative interpersonal spouse events is not equal across the education categories. A greater percentage of respondents with post-graduate education report negative interpersonal spouse events (across all levels) compared to those with a high school degree or less, suggesting a positive relationship. These results justify further analysis into the relationship between negative interpersonal spouse events and subsequent emotional reactivity.

Table 4-7. Negative interpersonal spouse events by level of education, n = 2,681

	Level of education					
	HS or less	Vocation or trade school	1-3 years of college	4-year college	Post-graduate college	Total
Spouse stress events						
0	349	229	553	232	498	1,861
	78.25%	62.74%	71.17%	68.44%	66.05%	69.41%
1	67	93	124	74	154	512
	15.92%	25.48%	15.96%	21.83%	20.42%	19.10%
2	23	22	64	21	64	194
	5.16%	6.03%	8.24%	6.19%	8.49%	7.24%
3	4	14	21	9	28	76
	.90%	3.84%	2.70%	2.65%	3.71%	2.83%
4	3	6	10	3	6	28
	.67%	1.64%	1.29%	.88%	.80%	1.04%
5	0	1	5	0	4	10
	.00%	.27%	.64%	.00%	.53%	.37%
Total	**446**	**365**	**777**	**339**	**754**	**2,681**
	100%	100%	100%	100%	100%	100%

Note: Pearson chi-square = 50.49, p = .00; frequencies and column percentages displayed

Table 4-8 shows results for the multivariate, multilevel, random-effects ordered logistic associations between interpersonal stressors and negative affect. Overall, these results are supportive of *Hypothesis 2* and *Hypothesis 4*, showing that daily negative interpersonal events, specifically, current-day negative spouse/partner interpersonal events are associated with next-day negative affect, controlling for illness symptoms, demographic characteristics, personal attributes, and current-day's negative affect. For each one-unit increase in current-day negative spouse/partner interpersonal events, the odds of reporting moderate or higher ratings of negative affect the next day versus the combined middle and lower categories were 1.17 times greater, holding the other variables constant (OR = 1.168; 95% CI: 1.049 - 1.301). Furthermore, greater odds of reporting a moderate or higher rating of negative affect the following day versus the combined lower ratings were observed for a one-unit increase in current-day negative affect (OR = 1.987; 95% CI: 1.604 - 2.462), a one-unit increase in trait neuroticism (OR = 2.752; 95% CI: 1.927 - 3.931), and a one-unit increase in current-day difficulty coping with pain (OR = 1.147; 95% CI: 0.996 - 1.321), holding the other variables constant.

Table 4-8. Estimated effect of current-day interpersonal stressors on next-day negative affect: Random effects ordered logistic regression with proportional odds ratios, n = 117

	Negative affect	
	Odds ratio	95% CI
Current day negative affect	1.987***	1.604 - 2.462
Current day spouse stress	1.168***	1.049 - 1.301
Current day family stress	0.894	0.729 - 1.096
Current day friend stress	1.128	0.976 - 1.303
Current day work stress	1.023	0.916 - 1.142
65 years + (ref: <65 years)	0.676	0.259 - 1.766
Male (ref: female)	1.450	0.786 - 2.676
Current day average pain	0.997	0.989 - 1.005
Current day average fatigue	1.005	0.998 - 1.012
Trait neuroticism	2.752***	1.927 - 3.931
Current day difficulty coping with pain	1.147*	0.996 - 1.321

*p < .05; **p < .01; ***p < .001.

Table 4-9 shows results of the multivariate, multilevel, random-effects ordered logistic regression analysis for unpleasant mood. These results are supportive of *Hypothesis 3* and *Hypothesis 4*. Current-day negative interpersonal events, specifically, negative interpersonal spouse/partner events, were associated with next-day unpleasant mood, controlling for illness symptoms, demographic characteristics, personal attributes, and current-day's unpleasant mood. For a one-unit increase in current-day negative interpersonal events, the odds of reporting moderate or higher ratings in next-day unpleasant mood versus the combined middle and low ratings are 1.16 times greater, holding the other variables constant (OR = 1.156; 95% CI: 1.021 - 1.309). Greater odds of reporting a moderate or higher rating of unpleasant mood the following day versus the combined lower ratings were also observed for a one-unit increase in current-day unpleasant mood (OR = 1.933; 95% CI: 1.021 - 1.309), a one-unit increase in trait neuroticism (OR = 3.084; 95% CI: 2.132 - 4.461), and a one-unit increase in current-day difficulty coping with pain (OR = 1.132; 95% CI: 0.984 - 1.301), holding all other variables constant. No other type of daily interpersonal stress was associated with unpleasant mood on the following day.

Table 4-9. Estimated effect of current-day interpersonal stressors on next-day unpleasant mood: Random-effects ordered logistic regression with proportional odds ratios, n = 117

	Unpleasant mood	
	Odds ratio	95% CI
Current day unpleasant mood	1.933***	1.564 - 2.390
Current day spouse stress	1.156**	1.021 - 1.309
Current day family stress	1.090	0.887 - 1.338
Current day friend stress	1.028	0.853 - 1.238
Current day work stress	0.984	0.861 - 1.125
65 years + (ref: <65 years)	0.665	0.285 - 1.547
Male (ref: female)	0.944	0.550 - 1.618
Current day average pain	0.997	0.988 - 1.006
Current day average fatigue	1.006	0.998 - 1.015
Trait neuroticism	3.084***	2.132 - 4.461
Current day difficulty coping with pain	1.132*	0.984 - 1.301

*p < .05; **p < .01; ***p < .001.

Discussion

This analysis contributes to the status-stress and stress-health literature by examining the understudied impact of daily interpersonal stress from multiple life domains in an educationally diverse sample of rheumatoid arthritis patients. The results indicate important similarities with previous research as well as suggest a unique and more nuanced perspective on the potential role of interpersonal stress in the status-emotional health pathway.

Overall, this study's general associations are consistent with the literature. The significant status-interpersonal stress relationships complement the notion that status affects stress exposure and shapes the instrumental and psychological resources available to manage hardships (93–97). Prevailing status-stress theory and research also supports this study's finding of an inverse relationship between socioeconomic status and exposure to negative interpersonal family and friend events. Compared to individuals with higher socioeconomic status, individuals lower in status have been shown to experience higher levels of social conflict with relatives and friends (98,99).

Also in keeping with prior research is this study's general finding that negative interpersonal events predict next-day emotional reactivity (17,30). Increases in interpersonal stress exposure have been shown to result in increases in next-day negative affect intensity (17,30). Additionally, the fact that neuroticism and pain coping difficulty serve as significant risk factors for increases in next-day emotional reactivity consistent with prior research (24,65,87,89–91).

The results of this study also extend previous research, prompting new ways of thinking about and researching daily interpersonal stress as a health determinant and potential contributor to socioeconomic health disparities. For example, prior research on whether daily stress accounts

for socioeconomic health disparities have included an aggregate measure of interpersonal stress, potentially masking important variation in the effects of status on interpersonal stress from multiple life domains (38,39). By contrast, as a result of independently examining associations between status and multiple domains of interpersonal stress, this study revealed heterogeneity in the status-interpersonal stress relationship not yet observed in the literature.

This study's finding of a positive association between level of education and exposure to negative spouse/partner and work interpersonal events substantially nuances existing literature that documented a general inverse relationship between status and stress (99–103). The reasons that level of education is positively associated with exposure to interpersonal conflict with spouse/partners and co-workers are not clear. It could be that compared to socioeconomically disadvantaged couples, higher socioeconomic couples, particularly dual-earner households, experience greater financial stress in their attempts to "keep up with the Joneses," which may increase the probability for interpersonal arguments concerning expenses. This interpersonal conflict could be exacerbated by perceived inequities in division of labor and earnings, which may play a greater role among higher status couples versus lower status couples, as the distance the former can fall down the socioeconomic ladder is much greater.

With respect to explaining the positive association between status and exposure to interpersonal conflict with coworkers, it could be that higher status individuals qualify for and select work experiences that require a greater amount of collaboration and teamwork compared to the manual labor often assumed by lower status individuals. With a greater premium placed on productive teamwork comes more opportunity for interpersonal conflict. A recent international study by Inoue et al. (2010) found a positive relationship between socioeconomic status and interpersonal conflict at work (104).

The non-significance of age, work status, and gender with spousal/partner stress is also worth mentioning, particularly in light of the significance of these variables for other types of interpersonal stress. While the exact reasons why these variables do not help explain additional variance in spousal/partner stress beyond that already explained by education are unclear, one possible explanation may lie in the well-documented, strong association between socioeconomic status and satisfaction and stability in adult romantic relationships (100–102). In contrast to the positive association I found between education and spousal conflict, prior studies show that socioeconomic status (primarily income) is positively related to quality and stability in romantic unions (among both cohabitating and married couples) (100). Higher socioeconomic status is associated with less risk of separation and divorce and increases in satisfaction, happiness, stability (100,105–108). By comparison, lower socioeconomic status is associated with higher rates of relationship problems, less happiness, and greater instability, especially among working-class, dual earners (100,109,110).

The "family stress model" developed by Conger and Elder (1984) has provided a well-received and empirically supported mechanism through which socioeconomic status influences spousal/partner quality and stability (101). In this model they propose that socioeconomic problems lead to deterioration in relationships and increased risk for instability. Studies among couples have confirmed that economic hardship predicts economic pressure which, in turn, exacerbates emotional distress, resulting in increased conflict (100,111,112). Thus, while the direction of association between level of education and negative interpersonal spousal events conflict with previous research, the strength of the association in our sample is consistent with prior studies, potentially overshadowing associations between stress and age, gender, and work status.

This study also revealed that days with more frequent negative spouse/partner interpersonal events were related to higher ratings (versus the combined lower ratings) of next-day negative affect and unpleasant mood. The deleterious effect on negative affect and unpleasant mood were observed solely in the spouse/partner interpersonal domain and did not extend to the family, friend, or work domains, another finding not yet observed in the literature.

The persistent emotional effect of spousal/partner conflict observed in this study is generally consistent with findings from previous daily diary studies of individuals with arthritis. Compared to other types of daily stressors, the emotional impact of interpersonal tensions has been shown to often extend beyond a day (17). Moreover, chronic pain patients reporting more frequent spousal conflict tend to experience greater psychological distress (65–69,113). One explanation for the emotional effect of spousal/partner conflict observed in this study is that participants in our sample may rely more heavily on spouse/partners (versus family, friends, and co-workers) for emotional and symptom management support. The greater level of intimacy and companionship commonly and often more continually provided by significant others may make even less serious conflicts with one's spouse/partner more emotionally threatening than equivalent conflicts with family, friends, or co-workers.

Although this study provides an important and unique perspective on the links between daily interpersonal stress and emotional reactivity and provides a differential perspective not yet observed on the relationship between level of education and exposure to interpersonal stress, it is important to consider two key limitations in interpreting our results. First, although results from the lagged analyses portion of this study suggest a unidirectional path from interpersonal stress to emotional reactivity, we are unable to assert causality. Additional longitudinal studies with multiple data points collected within the same day are needed to better establish this causal

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sequence. Second, the generalizability of these findings is limited to a mostly white, female population with rheumatoid arthritis. Future research is needed to assess whether these results generalize to a more ethnically diverse sample of rheumatoid arthritis patients outside the Phoenix metropolitan area. Ethnic minorities are disproportionately represented in the lower social classes, experience more frequent exposure to stress, and are more likely to perceive basic life challenges as more stressful than their white counterparts (53,93,95,96,114,115). Thus the links between status and interpersonal stress, and interpersonal stress and emotional reactivity could be even greater in an ethnically diverse, chronic pain sample, potentially resulting in significant and costly health disparities.

These limitations notwithstanding, these findings advance prior work and underscore the importance of examining the relative emotional effect of interpersonal stressors from different domains. The significant yet varied association between status and exposure to daily interpersonal stress is appealing and, coupled with the significant association between interpersonal stress and emotional well-being, constitute two important links in assessing whether daily interpersonal stress partially accounts for the effect of differential education level on emotional reactivity. Future investigations of interpersonal stress should pay special attention to the health effects of spouse/partner interpersonal conflict. Identifying which interpersonal stress domains are particularly emotionally impactful can help clinicians support rheumatoid arthritis patients in increasing their capacity to meet these challenges and in developing strategies to reduce their exposure. All things considered, this study provides evidence suggesting that daily interpersonal stress may play an important part among the larger group of psychosocial factors implicated in socioeconomic disparities in health among chronic pain patients.

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CHAPTER 5

Discussion of Dissertation Findings

Overview of Study Findings

This dissertation, through three studies, investigated whether subjective social status, daily hassles, and daily interpersonal stress potentially mediate the observed association between socioeconomic status and health among racial/ethnic minorities and chronic pain populations. The aim of this research was to further our understanding of the intermediate, psychosocial chain of events (with a focus on different measures of stress) that lead to socioeconomic disparities in health. As described in detail below, this research produced useful information towards advancing policy development and designing responsive interventions to reduce stress-related health outcomes and status-driven disparities in health.

Findings from study 1 highlight the importance of subjective social status as a socioeconomic measure and health correlate, particularly among immigrant Latinos. This contributes to the literature as prior studies of subjective social status among Latinos produced mixed results (1,2). Subjective social status may tap into immigrant-related stressors likely to affect perceptions of relative worth and health, such as discrimination and economic hardship. At the same time, income and education may not represent the same amount of instrumental and/or psychological resources for immigrants as some may send part of their earnings to family in their native country and/or may experience discrimination against foreign-earned education (3,4).

The results in study 1 also lend support to the hypothesized psychosocial mechanism (i.e., stressful social comparisons) through which socioeconomic deprivation and income inequality is thought to affect health. Among studies exploring this mechanism, few have assessed the health effects of one's social position beyond income-based measures of deprivation. Our study

advances this research by employing a measure of stressful social comparisons (i.e., subjective social status) that accounts for one's absolute and relative standing on multiple dimensions of socioeconomic status and social position. The stress and feelings of shame and mistrust tied to lower social status is believed to affect health directly through neuroendocrine pathways and indirectly through influence on behavior (2,5,6).

With respect to our results in study 2, contrary to expectations, daily hassles did not play a convincing mediating role in the status-health relationship, especially when compared to the strong health effects of traumatic events and perceived stress. Nevertheless, daily hassles were shown to be one of the major factors in how stress is perceived, an important observation given that perceived stress had a strong impact on mental health. The value of considering perceived stress in daily hassles research is supported by recent evidence showing that it is the affective response or intensity of reported daily stress (versus accounting for exposure alone) that have significant, long-term impacts on health and mortality (7–9).

Study 2 enhances research in this area as it is the first to examine whether daily hassles mediate and/or magnify the status-health relationship in a socioeconomically and racially-diverse sample. This is an important contribution as stress exposure and vulnerability, health outcomes, and the meanings attributed to socioeconomic status vary depending in part on the racial/ethnic population under study. Despite a handful of studies having examined the possible intermediate role of daily stress in status-health disparities, many were based on a predominantly white sample (9–12).

Study 3 takes a more refined approach than previously taken to examine the emotional health effects of daily interpersonal stress among chronic pain patients. Our results suggest that daily interpersonal stress—particularly spousal/partner conflict—may play an important, albeit

more nuanced, role in socioeconomic health disparities. Moreover, this study found that the relationship between status and interpersonal stress vary depending on the type of interpersonal stress analyzed. Additionally, negative interpersonal events from multiple life domains were shown to have differential effects on emotional reactivity. These significant status-stress and stress-health associations constitute two important links in assessing whether daily interpersonal stress may partially account for the effect of socioeconomic status on emotional health.

Our results in study 3 contribute to the literature by examining the understudied impact of daily interpersonal stress from multiple life domains in a socioeconomically diverse sample of rheumatoid arthritis patients. The generalizability of these results are far-reaching as chronic pain is a highly prevalent chronic health problem among adults (13,14). A more refined analysis of the relationship between interpersonal stress and health in this sample is important as the effects of interpersonal stress associated with education level likely co-occurs and is compounded by stress associated with chronic pain. As noted by Rios and Zautra (2011), some of the greatest socioeconomic inequalities in stress and health are found among people with arthritis and other musculoskeletal disorders (15–17).

Overall, the results in study 3 augment previous research, prompting new ways of thinking about and researching daily interpersonal stress as a health determinant and potential contributor to socioeconomic health disparities. By independently examining associations between status and different types of interpersonal stress, this study uncovered important heterogeneity in the status-interpersonal stress relationship, a finding not yet observed in the literature. Incorporating a disaggregated interpersonal stress measure also allowed this study to find a positive association between socioeconomic status and exposure to negative spouse/partner and work interpersonal events—a direction in relationship that substantially

nuances existing literature that has documented a general inverse relationship between status and stress (18–22).

Overview of Collective Results

Collectively these results indicate three key points.

First, while certain types of daily stressors are patterned by socioeconomic status and produce significant health effects, these relationships appear modest relative to those associated with traumatic events and perceived stress. Our research shows that traumatic events and perceived stress play a large role, especially in the status-mental health relationship. This is congruent with prior research documenting the importance of major events and the perceived severity of stress in the status-health association. According to Thoits (2010), early life traumatic events have been shown to proliferate over the life course and across generations, sustaining (and widening) the health gaps between advantaged and disadvantaged social groups (23–25). The lasting effects of traumatic events are arguably more likely to trigger allostatic load or the unhealthy wear and tear in our physiological stress responses than those daily hassles that are less enduring. Research by Almeida and colleagues also highlight the importance of stressor domain and severity in assessing whether daily stress mediates the status-health relationship (7,26).

Second, our research findings underscore the utility of employing a robust stress measure that explicitly captures both the effect of absolute deprivation as well as the more affective and psychological experience associated with relative deprivation. The subjective social status measure employed in this research is thought to encapsulate an averaging of standard socioeconomic status indicators, current and future socioeconomic prospects, nuanced aspects of

social standing (e.g., quality of education, job prestige), as well as the stress and feelings of shame and distrust associated with being at the lower end of the socioeconomic hierarchy (5).

Third, while stress is implicated as a psychosocial explanation for socioeconomic health disparities, our research shows that this relationship is complex and multidimensional. For example, status was found to be positively associated with exposure to spouse/partner conflicts, a finding contrary to the inverse relationship originally theorized for status and stress. Yet, spousal/partner conflicts were found to have an enduring emotional effect, a finding not found among other types of interpersonal stressors (i.e., family and friends) that exhibited an inverse relationship with status. While lower status individuals may experience fewer interpersonal conflicts, the severity of those conflicts may be greater; a point for future research to investigate. One study found that lower status individuals experienced fewer, but more severe daily hassles compared to their higher status counterparts (27).

Limitations

There are important limitations that should be considered when interpreting these results.

First, given that all three studies are observational (studies 1 and 2 are cross-sectional and study 3 is a longitudinal panel study), we can conclude only that status and/or stress are associated with health but cannot make any causal inferences. While this research employed complex analytic methods (e.g., structural equation modeling and hierarchical linear modeling with lagged effects) that assert a unidirectional path from status-to-stress-to-health, our observational designs are subject to reverse causality. That is, poor emotional and/or physical health could determine stress and status (28). Nevertheless, prior longitudinal studies have documented that the more likely direction is from status to health (29,30).

Second, the daily stress measures used in studies 2 (i.e., a composite score based on the revised Daily Hassles scale) and 3 (i.e., a composite score based on negative interpersonal events items from the Inventory of Small Life Events - ISLE scale) may be limited in assessing the various day-to-day challenges associated with trying to eke out a living as well as their negative health effects. As documented journalistically, many of the real sources of daily stress associated with struggling to make ends meet include such experiences as working two jobs, being fearful of losing a job, having unreliable transportation, having stressful financial dealings with friends, or living in a deteriorating neighborhood (31–36).

While the revised Daily Hassles scale is comprised of a broad array of daily stressors (e.g., work, interpersonal, intrapersonal, and environmental stressors) and the negative interpersonal event items from the ISLE scale represent interpersonal conflicts from multiple life domains (i.e., spousal/partner, family, friend, and work), both omit daily experiences germane to living on the edge as well include items not closely associated with being at the bottom of the economic spectrum. Factor analyses did not result in a latent factor consisting only of items theorized to capture the experience of trying to make ends meet. The multi-dimensional aspect of the Daily Hassles measure suggest caution in interpreting results for Daily Hassles models. Unfortunately, no other measures of daily stress were collected in the Chronic Stress survey. However, the full Daily Hassles scale used in the present study, along with the interpersonal domain scales from ISLE have been shown to have acceptable validity and reliability. Furthermore, the measures created from both scales demonstrate solid internal reliability and multiple latent factors, both of which are consistent with the original design of the Daily Hassles and the ISLE scales.

Third, the scoring of the daily stress measures used in studies 2 and 3 may provide an incomplete assessment of the health effects of daily stress. The items in studies 2 and 3 were scored in terms of exposure. While status is hypothesized to effect health via differential stress exposure, theory and evidence also suggest that differential stress appraisal is an important factor influencing the status-health relationship (26,37). An assessment of both daily stress exposure and their corresponding perceived severity/intensity may be necessary to fully evaluate their health effects and role in the status-health relationship. Research by Grzywacz and colleagues (2004) and Almeida and others (2005) found that while exposure to daily stress did not mediate the status-health relationship, the perceived severity of daily stress did (26,27).

Fourth, the analyses in studies 1 and 2 omit consideration of important psychosocial protective factors thought to buffer or possibly mediate the relationship between socioeconomic status and health. For example, social and coping resources (e.g., self-esteem, social support) and personality traits (e.g., control beliefs) were all factors not accounted for, all of which may influence a person's emotional reactivity and adaptive coping. These resources are thought to provide people with greater capacity to avoid stress exposure and enable more effective coping responses that diminish adverse emotional and psychological responses to those stressors that are encountered (38,37,26,39–41,15).

Finally, the results presented in this dissertation are based on specific populations and may not be representative of the United States as a whole. The sample in study 1 included non-institutionalized Latino adults in the U.S. It is unknown whether these results translate to other racial/ethnic groups in the U.S. Similarly the results presented in study 2 (a convenience sample of black and white adults from 4 outpatient clinics) may not generalize beyond the Atlanta metro area. Study 3 included adults (mostly Caucasian, female, and middle-aged) with rheumatoid

arthritis. Whether this study's findings apply to younger, ethnically diverse rheumatoid arthritis patients or non-rheumatoid arthritis patients is unclear.

Strengths

This dissertation includes several notable strengths.

First, a strength of the research conducted in study 1 was our investigation of the joint contribution of socioeconomic status and culture/ethnicity on health. Study 1 included stratified analyses to examine whether the health effects of subjective social status among Latinos were modified by nativity status. This type of analysis is important as research has documented that being low status may be especially harmful for ethnic minorities due to the added stressors of discrimination, acculturation, or immigration (42–44). On the other hand, the association between socioeconomic status and health has been shown to be attenuated in studies among Hispanics and immigrants (37).

Second, together these studies teased apart different aspects of a hypothesized psychosocial chain of events linking status to health. In so doing, each study's contributions go beyond the mere identification of significant associations but help advance our understanding of whether stress can be implicated in the proposed, yet understudied, psychosocial pathway. Furthermore, this research used complex analytic methods (i.e., structural equation modeling and hierarchical linear modeling) where appropriate (studies 2 and 3) to generate estimates for total, direct, and indirect effects in mediation analyses and to assert a unidirectional path from status-to-stress-to-health.

Third, each study adds value based on the populations, health outcomes, and especially, the multiple measures of psychological stress examined. Perhaps most notable are our analyses in study 2, which used multiple types of stressors (e.g., chronic and acute major life events,

traumatic events, daily hassles, and perceived stress) in assessing whether daily stress mediates the status-health relationship. Prior studies investigating this stress pathway, especially those focused on daily stress, have generally included only one type of stressor in their examinations (26,27). While such studies may suggest that daily stress partially mediates the status-health relationship, these findings may be overstated due to not adjusting for other types of stressors.

Those studies failing to control for other types of stressors could bias results since socioeconomic disadvantage influences exposure to a variety of stressors and sometimes, as evidenced in study 3, in directions contrary to prevailing theory. Thus, by including multiple types of stressors, study 2 provides a more robust assessment of the independent contribution that daily stress may or may not have in the status-health association. Along the same lines, the association between subjective social status and health observed among immigrant Latinos in study 1 is all the more impressive given that demographic characteristics along with objective indicators of absolute deprivation (low income, education, occupation) were accounted for.

Fourth, this dissertation extends prior research on interpersonal stress by examining this construct at a more refined level than previously conducted. Most prior research has employed an aggregate measure of interpersonal conflict. By contrast, study 3 used a disaggregated measure to examine the relative contribution of negative interpersonal events from multiple life domains. In so doing, this study found considerable variation in the status-interpersonal stress and interpersonal stress-health relationships, nuanced findings not yet observed in the empirical literature.

Finally, in addition to the multiple and more refined measures of stress, this dissertation incorporated a diverse set of socioeconomic indicators (e.g., subjective social status, income-to-needs ratio, education, and occupation). There are strengths and weaknesses associated with each

measure, depending largely on the population, health outcomes, and research questions examined. Our use of multiple indicators of socioeconomic status was intentional as the various stress measures assessed could contribute differentially to disparities based on the status measure used.

Implications for Research and Policy

The results of this dissertation have several implications for future research and policy.

To begin with, the significant subjective social status-health relationship observed in study 1 supports the notion that stressful social comparisons may partially mediate the status-health relationship. As a result, future studies exploring this mechanism should consider capturing the health effects of one's social position beyond income-based measures of relative deprivation (as we accomplished using subjective social status). Those studies that limit their assessment of stressful social comparisons to traditional socioeconomic indicators may underestimate their health implications, especially among Latino immigrants. Along the same lines, policies focused only on addressing absolute deprivation may fail to move the needle on the health consequences associated with feeling lower in social status.

This research prompts additional questions as to how and why self-rated status is especially strong among immigrant Latinos. Thus far, only one study, Franzini & Fernandez-Esquer (2006), has explored this among Latinos in general and found that opportunities and life chances were the major components of subjective social status (2). Building off our findings, additional research might assess whether the health implications of low subjective social status (i.e., high stressful social comparisons) vary depending upon the contextual factors (e.g., ethnic enclave, generosity of state benefits) of the receiving community. Ethnic enclaves in generous welfare states could increase educational and employment opportunities, which can translate into

greater social and economic resources to prevent or cope with stressful social comparisons and/or downward social mobility.

This dissertation research suggests that among the constellation of stressors implicated in the psychosocial pathway, future research might consider paying closer attention to traumatic life events compared to daily stress. While our findings are based on a comparison of various traumatic events and daily hassles, more generally, we submit, based on the literature, that it is exposures specific to the kinds of stressful conditions related to socioeconomic disadvantage that might partially account for the status-health relationship. This is not to say that daily hassles are not at play in the status-health relationship. It is more likely that multiple types of discrete (e.g., life events and traumatic events) and continuous (e.g., daily hassles and chronic stressors) stressors associated with socioeconomic deprivation are involved in the psychosocial chain of events and it is their combined impact over time that lead to impaired functioning with potentially lifelong adverse impacts on health.

More recently attention has been placed on continuous stressors to help explain the relationship between status and health, nevertheless, it is important to keep in mind that even within everyday, commonplace stressors, there are sub-classes of stressors, with distinct health effects. Theory and research identify chronic stressors and daily hassles as two such classes of continuous stressors with separate health effects (10,23). Though both are continuous, they differ in their timing and resolution (10,23,45,46). Compared to daily stressors, it is often difficult to determine when a chronic stressor began and even more difficult to know when it will end. Conversely, daily stressors tend to be small, more unexpected events whose emotional effects are thought to moderate or disappear in a day or two (10,46,47).

Thus in keeping with research and the design of the various stress measures used in this study, it is my view that daily hassles are not intended to serve as a proxy for chronic stressors but as an different type of continuous stressor. This distinction is important to keep in mind in light of the notion that being at the bottom of the social hierarchy is associated with greater exposure to all types of stressors. The cascade of stressors, coupled with inadequate resources to cope, could compound to create higher levels of stress over a person's lifetime, particularly among the more socially disadvantaged (48).

Some researchers speculate that allostatic load, or the unhealthy, prolonged activation of the body's response to stress, provides a biological mechanism by which stress mediates the status-health relationship. Along these lines, compared to daily stressors, some have proposed that it is the more enduring types of continuous stressors (i.e., chronic stressors) that are likely to trigger allostatic load and its subsequent deleterious health effects. This might explain why, consistent with prior research, daily hassles were not found to significantly mediate the status-health relationships examined in this study (27). Then again, it is interesting to note that major life events and chronic stress also did not have a significant indirect effect in this study, failing to provide circumstantial evidence in support of this pathophysiological mechanism. As pointed out earlier, whereas there may be limitations in how I measure daily hassles and chronic stress, the null indirect findings are in keeping with the results of a majority of the stress literature (37). In sum, my findings do not lend support to allostatic load as a potential explanation for how continuous stressors (i.e., daily hassles and chronic stress) associated with social disadvantage results in poorer health. To date, most of the evidence concerning allostatic load as a mediator of the status-health relationship are speculative or limited to specific health outcomes (e.g., cardiovascular disease and mortality) (6,49,50).

That said, existing measures of continuous daily stress may be inadequate in assessing the universe of on-going challenges associated with being at the lower end of the economic spectrum. In order to more accurately capture the association between daily economic vulnerability and health it might be necessary to develop and validate a new survey instrument. Such research would stimulate investigation into other questions like which daily economic hassles are most associated with poor health or poor health behaviors? What are the key economic factors that contribute to the severity of perceived daily economic hassles? What specifically about the low-income experience would make for a high score on the relevant daily hassle subscale?

A related macro-level question is which public policies might mitigate the translation of low income into daily hassles? There is variation nationally in the generosity of state spending on social welfare policies such as employment and income supplements, job search assistance, and child and health care subsidies. This lends itself to an appropriate research design (e.g., Difference-in-Difference) to investigate how public policies could reduce ongoing daily hassles germane to social disadvantage, stress reduction, and improving overall health.

Finally, our findings on interpersonal stress suggest that daily interpersonal stress research among rheumatoid arthritis patients should focus on spousal/partner conflicts. Conflicts and tensions with one's spouse/partner were by far the most distressing in terms of initial and enduring emotional effects. Consequently, clinicians should consider assessing the presence of spousal/partner interpersonal conflict and assisting rheumatoid arthritis patients in developing strategies to reduce their exposure.

Final Thoughts

It is well established that stress can have a major influence on population health. What is less clear is how much stress helps explain the link between social disadvantage and ill health. Additional unresolved questions in the literature revolve around how big is the stress effect in this pathway and what is meant by stress. This dissertation contributes to the literature by helping to address these questions.

The evidence presented in this dissertation seem least supportive of stress, particularly, daily stress, as a meditational pathway, even though stress exposure is hypothesized to partially explain the association between low socioeconomic status and poor health. With respect to the health implications of stress, while this research provides insufficient evidence to suggest that stress significantly affects physical health, it does strongly indicate meaningful mental health effects. Additionally, though daily hassles related to struggling to make ends meet are worth considering for their contribution to a more complete and meaningful measure of stress as a meditational pathway, this research collectively suggests that daily stressors in general, even among lower status individuals, cannot compare to the lasting impact of traumatic life events.

Future studies on the effects of various types of stressors on health, particularly those associated with the socioeconomic deprivation, could yield important information on the range and boundaries of the adverse effects of being socially disadvantaged. Those studies should incorporate multiple stressors, and a more refined and multidimensional approach to identify the differential effects and the more affective and psychological experiences associated with being at the lower end of the socioeconomic ladder. This could provide greater insight into the psychosocial causal pathway that leads to socioeconomic inequalities in health and may improve our ability to reduce them. Enduring health disparities and growing income inequality make the

potential health consequences of stressors patterned by status even more critical. A thorough understanding of the stress and true impact of relative and absolute socioeconomic deprivation on health could serve an important role in informing new interventions and policies as they develop.

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