Neighborhood disorder, sleep quality, and psychological distress: a model of structural amplification

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Abstract

Using data from the 2004 Survey of Texas Adults (n = 1,504), we examine the association between perceived neighborhood disorder and psychological distress. Building on prior research, we also test whether the effect of neighborhood disorder is mediated and moderated by sleep quality. Our specific analytic strategy follows a two-stage theoretical model of structural amplification. In the first stage, perceptions of neighborhood disorder increase psychological distress indirectly by reducing sleep quality. In the second stage, the effect of neighborhood disorder on psychological distress is amplified by poor sleep quality. The results of our analyses are generally consistent with our theoretical model. We find that neighborhood disorder is associated with poorer sleep quality and greater psychological distress. We also observe that the positive association between neighborhood disorder and psychological distress is mediated (partially) and moderated (amplified) by poor sleep quality.

Introduction

Studies consistently show that residence in neighborhoods characterized by socioeconomic disadvantage, social disorganization, and disorder is associated with poorer mental health, including higher levels of depression, anxiety, and non-specific psychological distress (Aneshensel and Sucoff, 1996; Burdette and Hill, 2008; Christie-Mizell et al., 2003; Echeverria et al., 2008; Gary et al., 2007; Latkin and Curry, 2003; Ross, 2000a; Ross et al., 2000; Schaefer-McDaniel, in press; Steptoe and Feldman, 2001). Although research suggests that disadvantaged neighborhoods are psychologically distressing because residents experience the stress of disorder (e.g., structural dilapidation, pollution, noise, crime, public intoxication, and other incivilities) as a way of life (Burdette and Hill, 2008; Hill and Angel, 2005; Hill et al., 2005; Ross and Mirowsky, 2001), additional research is needed to explore why and under what conditions stressful neighborhood environments might undermine psychological wellbeing. Drawing on the work of Ross and colleagues (2001), we develop and test a model of structural amplification which suggests that the association between neighborhood disorder and psychological distress is mediated and moderated by sleep quality. Our specific theoretical model is largely motivated by the surprising lack of research on neighborhood context and sleep quality, and the well established link between sleep quality and mental health status.

Theoretical Background

Ross and colleagues (2001) propose and test a model of structural amplification which suggests that the association between neighborhood disorder and mistrust is mediated and moderated by a sense of powerlessness. The structural amplification model is appropriate when it is hypothesized that neighborhood conditions shape outcomes by undermining social, psychological, or behavioral resources that link neighborhood conditions to outcomes

(mediation) or amplify the effects of neighborhood conditions (moderation). In their original specification, Ross and colleagues find that neighborhood disorder reduces trust indirectly by promoting a sense of powerlessness that also amplifies disorder's effect on mistrust. Following the general form of Ross and colleagues original model of structural amplification, we propose that perceptions of neighborhood disorder increase psychological distress indirectly by reducing sleep quality. Our model also suggests that the association between neighborhood disorder and psychological distress can be amplified by poor sleep quality.

The Mediating Influence of Sleep Quality

Research shows that living in disadvantaged urban environments increases the risk of adverse sleep outcomes (Hale and Do, 2007; Spilsbury et al., 2006; Steptoe et al., 2008). In a study of school-aged children, Spilsbury and colleagues (2006) report that residence in neighborhoods characterized by high rates of poverty, high school drop outs, male unemployment, and single, female-headed households increases the odds of obstructive sleep apnea by 244%. Using data from the 1990 National Health Interview Survey, Hale and Do (2007) show that residence in large metropolitan areas increases the odds of inadequate sleep duration (six or fewer hours) by 43%. In a recent analysis of middle-aged and older adults, Steptoe and colleagues (2008) find that fear of crime in the neighborhood is associated with additional sleep problems (e.g., trouble falling asleep and difficulty staying asleep).

Although the general patterns of previous research are remarkably consistent across studies of younger and older populations, objective (census indicators of neighborhood socioeconomic disadvantage) and perceived (fear of crime in the neighborhood) neighborhood characteristics, and clinical (obstructive sleep apnea) and self-reported (sleep duration and sleep problems) sleep outcomes, the mechanisms linking disadvantaged neighborhood conditions and

adverse sleep outcomes are presently uncertain. Researchers speculate that because sleep is an adaptive behavior, neighborhoods that are characterized by noise (from neighbors and busy streets), dilapidation (substandard housing), and crime (fear of victimization) may directly undermine the ability of residents to initiate and/or maintain sleep (Hale and Do, 2007; Muzet, 2007; Spilsbury et al., 2006). Studies also suggest that stressful neighborhood conditions could contribute to poor sleep quality through various psychological and physiological pathways. For example, perceptions of noise and crime could elicit short-term feelings of annoyance, fear, and hopelessness (Hale and Do, 2007; Muzet, 2007; Spilsbury et al., 2006). These feelings could effectively activate the stress response and trigger the release stress hormones (epinephrine and cortisol) that promote mental and physiological arousal (Espie, 2002; Karren et al., 2006; Sapolsky, 2004; Selye, 1978; Steiger, 2002; Van Reeth et al., 2000).

In addition to theoretical and empirical links between disadvantaged neighborhood conditions and adverse sleep outcomes, studies indicate that poor sleep quality is associated with poorer mental health, including higher rates of depression, anxiety, and non-specific psychological distress (Breslau et al., 1996; Ford and Kamerow, 1989; Hamilton et al., 2007; Lustberg and Reynolds, 2000; Meerlo et al., 2008; Moore et al., 2002; Roberts et al., 2000; Taylor et al., 2003). Although it is difficult to establish the causal order of the association between sleep quality and mental health, longitudinal studies show that sleep problems are significant risk factors for the development of anxiety and depression (Ford and Kamerow, 1989; Lustberg and Reynolds, 2000; Roberts et al., 2000). Researchers explain that poor sleep quality contributes to poor mental health by disrupting the natural circadian rhythm (Karren et al., 2006; Lustberg and Reynolds, 2000; Van Reeth et al., 2000). When established sleep-wake schedules are compromised (e.g., under the conditions of sleep deprivation), the brain restricts the release

of neurotransmitters (serotonin and norepinephrine) that help to regulate mood. If the stressful conditions of neighborhood disorder contribute to poor sleep quality, which in turn contributes to psychological distress, sleep quality could at least partially mediate the association between disorder and distress.

The Moderating Influence of Sleep Quality

It is widely accepted that sleep is fundamental for physiological restoration (Hamilton et al., 2007; McEwen, 2002; Meerlo et al., 2008; Sapolsky, 2004; Steiger, 2002; Van Reeth et al., 2000). This means that during episodes of quality sleep, the brain down-regulates the sympathetic nervous system and activates the parasympathetic nervous system. Activation of the parasympathetic nervous system is essential for secreting growth hormone, which helps the body to recover from the stresses of daily life and to replenish energy stores. Under these ideal conditions, quality sleep functions as a significant resource for managing stress.

In contrast, during episodes of poor sleep (e.g., sleep deprivation), the sympathetic stress response is prolonged, and the body is unable to efficiently initiate the parasympathetic nervous system (Espie, 2002; Meerlo et al., 2008; Steiger, 2002; Van Reeth et al., 2000). In this way, poor sleep contributes to allostatic load. Under the physiological conditions of poor sleep and allostatic load, the body is especially vulnerable to the effects of stressors in the environment (McEwen, 2002; Meerlo et al., 2008; Sapolsky, 2004; Van Reeth et al., 2000; Zohar et al., 2005). For example, in a study of medical residents, Zohar and colleagues (2005) find that sleep loss amplifies the negative emotional consequences of goal-disruptive events (e.g., barriers to scheduled work activities). If poor sleep increases vulnerability to stressors in the environment by contributing to allostatic load, neighborhood disorder may be more psychologically distressing under the conditions of poor sleep.

Methods

Data

Subsequent analyses employ data from the 2004 Survey of Texas Adults, a statewide probability sample of 1,504 community-dwelling adults residing in Texas and aged 18 and over (Musick, 2004). Sampling was conducted using a modified random digit dialing design. The data collection process yielded a household-level cooperation rate of 37% and a respondent-level cooperation rate of 89%. Each computer-assisted telephone interview lasted approximately 30-35 minutes. The survey instrument was translated into Spanish and administered by Spanish-speaking interviewers for respondents who were more comfortable answering in that language. Because the original sample overrepresented women, older adults, non-Hispanic Whites, and respondents with higher levels of education, all subsequent analyses are weighted on these characteristics to match the sample to the Texas population. The use of listwise deletion in multivariate analyses resulted in the loss of 60 respondents or approximately 4% of the full sample. These deletions reduced the analytic sample from 1,504 to 1,444.

Measures

Psychological distress is the focal outcome variable. Distress is measured as the mean response to six items developed by Kessler and colleagues (2002) to assess symptoms of non-specific psychological distress (α = .80). Respondents were asked to indicate how often in the past 30 days they felt: (a) nervous, (b) restless or fidgety, (c) so sad nothing could cheer them up, (d) hopeless, (e) everything was an effort, and (f) worthless. Response categories ranged from (0) never to (4) very often.

Neighborhood disorder is the focal predictor variable. Disorder is measured as the mean response to three items drawn from the work of Ross and Mirowsky (1999) to assess perceptions

of problems in the neighborhood, including social disorganization and disorder, ambient hazards, and structural disrepair ($\alpha = 0.58$). Respondents were asked to indicate the extent to which they agreed or disagreed with the following statements: "There is a lot of crime in my neighborhood." "My neighborhood is noisy." "My neighborhood is clean." Response categories ranged from (1) strongly agree to (5) strongly disagree, with reverse codes for "crime" and "noise." Items such as these have been used in prior research to predict depression, non-specific psychological distress, self-rated health, physical activity, obesity, and smoking behavior (Hill and Burdette, 2008; Ross, 2000ab; Ross and Mirowsky, 2001). These particular items have demonstrated sound psychometric properties in previous research (Burdette and Hill, 2008).

Sleep quality is the focal mediator and moderator of the association between neighborhood disorder and psychological distress. Sleep quality is measured with the following question: "How would you rate your sleep quality overall for the past 30 days?" Response categories ranged from (1) poor to (5) excellent. This global measure captures the subjective experience of sleep, including sleep disruptions and difficulties falling asleep and waking up. This measure may also serve as an indirect assessment common sleep disorders, including insomnia (difficulty falling asleep), hypersomnia (excessive sleep), parasomnia (sleepwalking and nightmares), narcolepsy (excessive daytime sleepiness and sleep attacks), and sleep apnea (obstructed breathing during sleep). This item has demonstrated construct validity in prior research. Using data from the Detroit Area Study, Moore and colleagues (2002) report a moderate positive correlation ($r = .43$) between overall self-rated sleep quality and average nightly sleep duration. They also show that quality sleep is more commonly reported by respondents who are more highly educated, have greater family incomes, exhibit fewer symptoms of non-specific psychological distress, and are in better physical health. In a recent

analysis of data from the Survey of Texas Adults, Hill and colleagues (2006) find quality sleep is more commonly reported by respondents who are older, married, with fewer children, more highly educated, employed, experiencing little financial hardship, and in good physical health.

Several indicators of health and lifestyle have been identified as significant risk factors for poor sleep. These indicators include irregular exercise, poor diet quality, smoking, binge drinking, obesity, and poor physical health (Espie, 2002; Fabricatore and Wadden, 2006; Hale and Do, 2007; Riedel et al., 2004; Vgontzas and Kales, 1999). We assess *irregular exercise* with three questions concerning the frequency of walking, moderate exercise, and strenuous exercise. According to Center for Disease Control and Prevention (CDC) guidelines, regular exercise entails (a) walking or (b) engaging in moderate exercise (e.g., playing golf, dancing, and gardening) on five or more days per week or (c) engaging in strenuous exercise (e.g., running, swimming, and lifting weights) on three or more days per week. Respondents who did not fall into any of these three categories were coded (1) as irregular exercisers and (0) otherwise.

Diet quality is measured with the following question: "Overall, how would you rate the quality of your diet?" Response categories ranged from (1) excellent to (5) poor. To indicate suboptimal diet quality this item has been recoded (1) for fair or poor and (0) otherwise. This global measure of diet quality is intended to assess patterns of excessive caloric intake and unhealthy food choices. This item has demonstrated predictive validity in prior research. For example, Burdette and Hill (2008) find that poor self-rated diet quality increases the risk of obesity by approximately 77%.

We measure *smoking* and *binge drinking* with two items. Smoking is measured with the following question: "Are you a current smoker, a former smoker or have you never smoked?" This item is coded (1) for current smoker and (0) otherwise. According to CDC guidelines, an

individual is considered to use alcohol excessively if he or she drinks more than one (for women) or two (for men) drinks on 16 or more days a month, or has participated in binge drinking (more than three drinks for women and more than four drinks for men on a single occasion) within the last 30 days. We measure drinking with the following question: "On those days that you drank alcohol, about how many drinks did you usually have?" In order to capture the binge drinking practices of women and men, this item is coded (1) for five or more drinks per drinking occasion and (0) otherwise.

We assess *obesity* and *physical health* with two items. Obesity is measured using self-reports of height and weight. We first calculated body mass by dividing weight in pounds (lbs) by height in inches (in) squared and multiplying by a conversion factor of 703 (Formula = weight (lb) / [height (in)]^2 x 703). Following CDC guidelines, we coded respondents with a body mass score equal to or greater than 30 as (1) obese and (0) otherwise. We measure physical health status with the following question: "How would you rate your physical health at the present time? Would you say it is excellent, very good, good, fair, or poor?" In order to indicate suboptimal physical health, this item is coded (1) for fair or poor and (0) otherwise.

In addition to these established indicators of health and lifestyle, our sleep quality analysis controls for nighttime *carousing*. This measure assesses responses to the following questions: "In a typical week**,** on how many nights do you go to bars or clubs to drink, dance or socialize?" The general idea is that frequent nighttime activities could undermine sleep quality. In order to indicate non-normative carousing activity, this item is coded (1) for two or more nights and (0) otherwise.

Following previous research (Hale, 2005; Hale and Do, 2007; Hill et al., 2006; Moore et al., 2002; Steptoe et al., 2008), subsequent multivariate analyses control for several potentially

relevant background factors. These factors include: (a) A*ge* (measured in continuous years); (b) *Gender* (1 = male, 0 = female); (c) *Race/ Ethnicity* (four dummy variables for African American, Mexican/Mexican American, other Hispanic, and other minority, with non-Hispanic white serving as the reference category); (d) *Citizenship Status* (1 = non-citizen, 0 = U.S. citizen); (e) *Interview Language* (1 = Spanish language interview, 0 = English language interview); (f) *Education* (0 = less than a high school degree to 4 = graduate degree); (g) *Employment* (1= currently employed, 0= other work status); (h) *Family Income* (1 = $0 - $14,900 to 6 = $85,000 or more); (i) *Financial Strain* (0 = no difficulty paying monthly bills to 4 = extreme difficulty); (j) *Marital Status* (1 = married, 0 = otherwise); and (j) *Number of Children* (0 to 4 or more). Missing values on family income were replaced with the mean of the original income measure ($35,000-$49,000); as a precaution, our models control for whether or not the respondent was missing on income (1 = missing income, 0 = otherwise).

Statistical Procedures

Table 1 provides weighted descriptive statistics for all of the variables used in our analyses. We formally assess our model of structural amplification by testing whether the association between neighborhood disorder and psychological distress is mediated and moderated by sleep quality. We begin our mediation analysis by regressing sleep quality on neighborhood disorder (Table 2), controlling for all background factors (Model 1), health and lifestyle factors (Model 2), and physical health (Model 3). We conclude our mediation analysis by regressing psychological distress on neighborhood disorder, controlling for all background factors (Model 1) and sleep quality (Model 2). Using the Sobel method (see Sobel, 1982) to analyze the coefficients and standard errors presented in Tables 2 (Model 1) and 3 (Model 2), we

formally test whether neighborhood disorder indirectly affects psychological distress via sleep quality.

In order to test whether the effect of neighborhood disorder on psychological distress is moderated by sleep quality, we estimated an interaction term (neighborhood disorder * sleep quality) in Model 3 of Table 3. Because a cross-product term is included in this stage of the analysis, all continuous variables were centered to avoid problems due to multicollinearity (Aiken and West, 1991). The potential for multicollinearity was formally diagnosed by examining variance inflation factors (VIF) for each regression coefficient. VIFs above 10.00 are generally considered to indicate problematic multicollinearity (Myers, 1986). Throughout our analyses, all VIFs were below 2.50.

Results

Descriptive Statistics

According to Table 1, the average respondent reports fairly low levels of neighborhood disorder and psychological distress and characterizes their sleep quality as "good." With respect to health and lifestyle factors, we observe low to moderate rates of irregular exercise (40%), fair or poor diet quality (38%), smoking (24%), binge drinking (10%), carousing on two or more nights per week (7%), obesity (20%), and fair or poor physical health (21%). The average respondent is approximately 41 years of age. The sample consists of non-Hispanic Whites (45%), Blacks (10%), Mexicans (31%), and other races/ethnicities (14%). Most respondents are women (52%) and U.S. citizens (83%) and were interviewed in English (80%). The typical respondent is currently married (57%) and reports nearly one child per household. In terms of socioeconomic status, the average respondent has at least a high school diploma or GED, is

currently employed (56%), reports a family income between $35,000 and $49,000, and has little to no difficulty paying bills.

<TABLE 1 ABOUT HERE>

Mediation Analysis

Model 1 of Table 2 shows that neighborhood disorder is inversely associated with sleep quality. In other words, those respondents who live in neighborhoods they characterize as being unclean, unsafe, and noisy report poorer sleep quality than those who live in areas that are perceived as clean, quiet, and safe. This general pattern is generally consistent across models, with controls for background and health and lifestyle factors. An examination of standardized regression coefficients suggests that neighborhood disorder is a modest predictor of sleep quality. In Model 3, the magnitude of the standardized regression coefficient for neighborhood disorder ($\beta = .05$) is comparable to other statistically significant predictors of sleep quality like sex ($\beta = .05$), employment ($\beta = .08$), and number of children ($\beta = .08$), but noticeably smaller than diet quality ($\beta = .26$), physical health ($\beta = .17$), and age ($\beta = .13$).

<TABLE 2 ABOUT HERE>

Table 3 shows the multivariate results for psychological distress. Our results for Model 1 show that neighborhood disorder is associated with greater psychological distress, net of a range of background factors. In Model 1, the standardized regression coefficient for neighborhood disorder ($\beta = .09$) is greater than those for sex ($\beta = .06$), education ($\beta = .07$), and marital status ($\beta = .07$), but much smaller than those for age ($\beta = .18$) and financial strain ($\beta = .29$).

<TABLE 3 ABOUT HERE>

Once sleep quality is added to the regression equation in Model 2, the relationship between neighborhood disorder and psychological distress (from Model 1) is reduced by

approximately 22 percent ([.09 – .07] / .09), but remains statistically significant. Nevertheless, the results of the Sobel test suggest that the association between neighborhood disorder and psychological distress is partially mediated by sleep quality ($z = 2.17$, $p < 0.05$). The results for Model 2 also indicate that sleep quality is associated with lower levels of psychological distress.

Moderation Analysis

Model 3 of Table 3 adds an interaction term (neighborhood disorder * sleep quality) to Model 2. The results of this analysis suggest that the effect of neighborhood disorder on psychological distress is moderated by sleep quality. More specifically, we observe significant attenuation (buffering) of the direct effect of neighborhood disorder with increasing sleep quality. Figure 1 provides a graphic illustration of this result and reveals two interesting patterns. First, neighborhood disorder is positively associated with psychological distress for those respondents who report sleep quality ranging from poor to good. In contrast, neighborhood disorder is *inversely* associated with distress for those respondents who report excellent sleep quality.

<FIGURE 1 ABOUT HERE>

Discussion

In this paper, we use data collected from a statewide probability sample of Texas adults to examine the association between neighborhood disorder and psychological distress. Following Ross and colleagues' (2001) theory of structural amplification, we tested whether the association between neighborhood disorder and psychological distress is mediated and moderated by sleep quality. Our results indicate that neighborhood disorder is associated with poorer sleep quality and greater psychological distress. We also observe that the positive association between

neighborhood disorder and psychological distress is mediated (partially) and moderated (amplified) by poor sleep quality.

Our finding that living in a neighborhood that is perceived as noisy, unclean, and crime-ridden can be psychologically distressing is generally consistent with previous studies of disadvantaged neighborhood conditions and mental health, especially those studies that emphasize perceived neighborhood characteristics (e.g., Burdette and Hill, 2008; Echeverria et al., 2008; Gary et al., 2007; Ross, 2000a). The results of our mediation analysis also confirm the patterns of research on disadvantaged neighborhood conditions and adverse sleep outcomes (Hale and Do, 2007; Spilsbury et al., 2006; Steptoe et al., 2008). To the best of our knowledge, we are the first to test whether the association between neighborhood disorder and psychological distress is mediated and moderated by sleep quality.

The present investigation makes several contributions. First and foremost, we build on previous research by specifying why and under what conditions perceptions of neighborhood disorder can be detrimental to psychological wellbeing. Although several theoretically viable mechanisms and subgroup variations have been proposed (e.g., Cutrona at al., 2007; Elliot, 2000; O'Campo et al., in press; Robert, 1999), few have been formally tested. Clearly, additional research is needed to elaborate the main effects of disadvantaged neighborhood conditions on mental and physical health.

Our mediation analysis also helps to extend general theoretical models that use sleep quality to link social location with mental and physical health outcomes (Hale et al., 2007; Hale and Do, 2007; Moore et al., 2002; Van Cauter and Spiegel, 1999). Do variations in sleep patterns contribute to enduring social inequalities in health and longevity? We find that the positive association between neighborhood disorder (a socially patterned stressor) and psychological

distress is at least partially mediated by sleep quality. This pattern fits neatly with research that shows that sleep quality mediates socioeconomic differentials in mental and physical health (Moore et al., 2002). The theoretical implications of our work are further clarified by recent speculation that the association between disadvantaged neighborhood context and adverse sleep outcomes may help to explain race/ethnic health disparities (Hale and Do, 2007).

The results of our moderation analysis may also help to position sleep quality as an important resource for residents of disadvantaged neighborhood contexts. Although we have emphasized the stress-amplifying properties of poor sleep, our results also suggest that quality sleep may buffer against the adverse psychological consequences of perceived neighborhood disorder. This general pattern supports existing theoretical frameworks that define sleep as an essential resource for stress management (Hamilton et al., 2007) and underscores the importance of subgroup resource models. Researchers have been quick to imagine sleep quality as a link to poor mental and physical health (see above); however, few scholars have explored sleep quality as a viable stress moderator (Meerlo et al., 2008).

Although the present investigation helps to advance the literature on neighborhood conditions and mental health, we would like to acknowledge several limitations of the data. First, the cross-sectional nature of our data makes it impossible to establish the causal order of many observed associations. Although we assume that perceptions of neighborhood disorder contribute to psychological distress, symptoms of depression and anxiety may also lead individuals to rate their neighborhood environments more negatively than other individuals. There is also research to suggest that psychological distress is a risk factor for poor sleep quality (Lustberg and Reynolds, 2000). Because our analyses are based on cross-sectional data, we are unable to eliminate these possibilities.

Another limitation of the data is our measurement of sleep quality. Although self-rated sleep quality has demonstrated construct validity (see Hill et al., 2006; Moore et al., 2002) and is one of the stronger correlates of psychological distress in our models, this single-item measure is less reliable than would be ideal. Rather than relying solely on a global indicator of sleep quality, future research should follow previous studies (Hale and Do, 2007; Spilsbury et al., 2006) and measure specific sleep outcomes, including sleep duration and sleep disorders (e.g., insomnia and sleep apnea).

Based on the results of the present study, we recommend that future research continue to think about how and under what conditions stressful neighborhood environments might contribute to psychological distress. While our results suggest that sleep quality is an important mediator and moderator, additional research is needed to confirm these patterns and to identify and establish new mechanisms and subgroup variations. Because our results are limited to the state of Texas, the veracity of our results is contingent upon replication and further testing.

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TABLE 1: Weighted Descriptive Statistics, 2004 Survey of Texas Adults (n = 1,444)

	Range	M	SD	α
Focal Measures				
Neighborhood disorder	1 – 5	2.28	.83	.58
Sleep quality	1 – 5	2.82	1.19	
Psychological distress	0 – 4	.97	.78	.80
Health and Lifestyle Factors				
Irregular exercise	0 – 1	.40		
Diet quality (fair or poor)	0 – 1	.38		
Current smoker	0 – 1	.24		
Binge drinker (5 or more drinks)	0 – 1	.10		
Carousing (2 or more nights)	0 – 1	.07		
Obese	0 – 1	.20		
Physical health (fair or poor)	0 – 1	.21		
Background Factors				
Age	18 – 94	41.39	9.52	
Male	0 – 1	.48		
Non-Hispanic White	0 – 1	.45		
Black	0 – 1	.10		
Mexican	0 – 1	.31		
Other race or ethnicity	0 – 1	.14		
Non-citizen	0 – 1	.17		
Spanish interview	0 – 1	.20		
Education	0 – 4	1.24	1.17	
Employed	0 – 1	.54		
Family income	1 – 6	3.01	1.48	
Income missing	0 – 1	.21		
Financial strain	0 – 4	1.20	1.18	
Married	0 – 1	.53		
Number of children	0 – 4	1.03	1.22	

TABLE 2: Weighted Ordinary Least Squares Regression of Sleep Quality, 2004 Survey of Texas Adults (n = 1,444)

	Model 1				Model 2				Model 3			
	b	SE	β		b	SE	β		b	SE	β	
Focal Measure												
Neighborhood disorder	-.09	.04	-.06	*	-.08	.04	-.06	*	-.07	.04	-.05	*
Health and Lifestyle Factors												
Irregular exercise					-.01	.06	-.01		-.01	.06	-.01	
Diet quality (fair or poor)					-.69	.06	-.28	***	-.64	.06	-.26	***
Current smoker					-.13	.07	-.05		-.09	.07	-.03	
Binge drinker (5 or more drinks)					.12	.10	.03		.07	.10	.02	
Carousing (2 or more nights)					.11	.12	.02		.12	.12	.02	
Obese					-.07	.07	-.02		-.02	.07	-.01	
Physical health (fair or poor)									-.49	.08	-.17	***
Background Factors												
Age	.01	.00	.10	**	.01	.00	.10	**	.01	.00	.13	***
Male	.12	.06	.05		.12	.06	.05	*	.12	.06	.05	*
Black	.08	.11	.02		.13	.11	.03		.12	.10	.03	
Mexican	-.08	.09	-.03		-.05	.09	-.02		.01	.09	.00	
Other race or ethnicity	-.30	.10	-.08	**	-.29	.10	-.08	**	-.23	.10	-.07	*
Non-citizen	.40	.11	.12	***	.41	.11	.13	***	.42	.11	.13	***
Spanish interview	.07	.12	.02		.06	.12	.02		.05	.11	.02	
Education	.09	.03	.09	**	.05	.03	.05		.04	.03	.04	
Employed	.19	.07	.08	**	.21	.06	.09	**	.18	.06	.08	**
Family income	.01	.02	.02		.01	.02	.01		-.00	.02	-.00	
Income missing	.09	.08	.03		.06	.08	.02		.07	.07	.02	
Financial strain	-.14	.03	-.14	***	-.11	.03	-.11	***	-.09	.03	-.09	***
Married	.13	.07	.05		.10	.07	.04		.11	.06	.05	
Number of children	-.09	.03	-.09	**	-.06	.03	-.06	*	-.07	.03	-.08	**
Model Statistics												
Model F			10.97	***			15.13	***			16.72	***
Nested F							23.01	***			41.08	***
R-squared			.10				.18				.21	

Shown are unstandardized OLS regression coefficients (b), standard errors (SE), and standardized coefficients (β).
*p < .05, **p < .01, ***p < .001

TABLE 3: Weighted Ordinary Least Squares Regression of Psychological Distress, 2004 Survey of Texas Adults (n = 1,444)

	Model 1				Model 2				Model 3			
	b	SE	B		b	SE	β		b	SE	β	
Focal Measures												
Neighborhood disorder	.09	.02	.09	***	.07	.02	.08	**	.06	.02	.07	*
Sleep quality					-.16	.02	-.24	***	-.15	.02	-.23	***
Disorder * sleep quality									-.06	.02	-.07	**
Background Factors												
Age	-.01	.00	-.18	***	-.01	.00	-.16	***	-.01	.00	-.16	***
Male	-.09	.04	-.06	*	-.07	.04	-.05		-.08	.04	-.05	*
Black	-.03	.07	-.01		-.01	.06	-.01		.01	.06	.00	
Mexican	-.09	.05	-.06		-.10	.05	-.06	*	-.10	.05	-.06	
Other race or ethnicity	.18	.06	.08	**	.12	.06	.05	*	.13	.06	.05	*
Non-citizen	-.30	.07	-.14	***	-.24	.07	-.11	***	-.24	.07	-.11	***
Spanish interview	.03	.07	.02		.04	.07	.02		.04	.07	.02	
Education	-.05	.02	-.07	*	-.03	.02	-.05		-.03	.02	-.05	
Employed	-.08	.04	-.05	*	-.05	.04	-.03		-.05	.04	-.03	
Family income	-.01	.01	-.02		-.01	.01	-.01		-.01	.01	-.01	
Income missing	-.03	.05	-.01		-.02	.05	-.01		-.02	.05	-.01	
Financial strain	.19	.02	.29	***	.17	.02	.26	***	.17	.02	.26	***
Married	-.11	.04	-.07	*	-.09	.04	-.06	*	-.09	.04	-.06	*
Number of children	-.04	.02	-.07	*	-.06	.02	-.09	**	-.05	.02	-.09	**
Model Statistics												
Model F			24.80	***			29.99	***			31.05	***
Nested F							99.07	***			9.94	**
R-squared			.21				.26				.27	

Shown are unstandardized OLS regression coefficients (b), standard errors (SE), and standardized coefficients (β).
*p < .05, **p < .01, ***p < .001

FIGURE 1: The Effect of Neighborhood Disorder on Psychological Distress as a Function of Sleep Quality