Neighborhood Disorder and Anxiety Symptoms: New Evidence from a Quasi-Experimental Study

RUNNING HEAD: Neighborhood Disorder and Anxiety Symptoms

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Abstract

This paper examines the relationship between neighborhood disorder and anxiety symptoms. It draws on data from the Monitoring Mt. Laurel Study, a new survey-based study that enables us to compare residents living in an affordable housing project in a middle-class New Jersey suburb to a comparable group of non-residents. Using these new data, we test the hypothesis that living in an affordable housing project in a middle class suburb reduces a poor person's exposure to disorder and violence compared to what they would have experienced in the absence of access to such housing, and that this lesser exposure to disorder and violence yields improvements in anxiety that can be attributed to residents' reduced stress burden. We find that residents of the project are much less likely to be exposed to disorder and violence and that these differences explain differences in stress burden and, hence, anxiety symptoms between the two groups.

The publication of William Julius Wilson's landmark book, *The Truly Disadvantaged* (1987), repositioned neighborhood ecology as an important factor in explaining individual-level disparities. That economic, social, and even physical well-being were products not only of individual-level attributes but also neighborhood-level processes was an idea that was consistent with the Chicago School's early emphasis on ecology and community context, but had lost traction in the 1970s and 1980s as sociologists shifted their attention toward the application of large-scale surveys to the study of individual-level outcomes (Clampet-Lundquist & Massey 2008).

Wilson made a convincing case for the concentration of poverty and its importance as a determinant of human behavior and his work acted as a stimulus to further empirical study of the processes governing these relationships. Much of the early research on "neighborhood effects" simply merged survey and census data to look for relationships between neighborhood poverty and individual-level outcomes. This work was important for establishing that poverty rates vary dramatically across neighborhoods; that there is considerable variation in violence, poor health, joblessness, and other undesirable conditions across neighborhoods; and that there is a statistical correlation between neighborhood disadvantage and various individual-level outcomes (Sampson, Morenoff & Gannon-Rowley 2002; Sampson 2003).

The last twenty years have witnessed improvements in both the theorization and measurement of the social processes underlying the relationship between neighborhood conditions and individual well-being (Sampson, Raudenbush & Earls 1997; Sampson, Morenoff & Earls; Raudenbush & Sampson 1999), and in the types of statistical models applied to the study of these processes (see, e.g., Garner & Raudenbush 1991; Bryk & Raudenbush 1992; Harding 2003). Yet, while these observational studies were able to demonstrate strong statistical associations between neighborhood ecology and a range of economic, social, and health outcomes, they told us little about whether neighborhood conditions have any causal impact on behavior and well-being or whether individuals with certain traits simply select into certain neighborhoods (Jencks & Mayer 1990; Tienda 1991).

The application of experimental and quasi-experimental research designs to the study of neighborhood effects has enabled researchers to make some progress on this issue. The Gautreaux studies followed poor Chicago residents who were given vouchers to relocate out of segregated communities and offered some evidence that participants who moved into low-minority, suburban neighborhoods experienced higher employment, while their children showed improved educational and employment outcomes relative to those who stayed in Chicago (Rubinowitz & Rosenbaum 2000; Popkin, Rosenbaum & Meaden 1993). Yet the Gautreaux project was not a true experiment; residents were not randomly assigned to receive vouchers, so the possibility that these findings were spurious remained. In response, the U.S. Department of Housing and Urban Development funded a demonstration project to move residents of public housing projects in five cities into non-poor neighborhoods, but this time researchers employed an experimental research design to correct for selection bias. The Moving to Opportunity (MTO) project randomly assigned residents to one of three groups: a treatment group that received vouchers to move to a low-poverty neighborhood, a group that received Section 8 vouchers but could move wherever they desired, and a control group that did not receive vouchers. The study boasted a pre-post design that enabled researchers to collect data prior to the administration of vouchers and then at several follow-up points, and was seen as the first chance to apply the rigors of experimental research to Wilson's hypothesis.

Results from the MTO program suggest it was successful in moving people out of poor neighborhoods and that living in non-poor neighborhoods had positive effects on adult mental health, but that living in non-poor neighborhoods had little positive effect on participants' economic and physical well-being (Kling, Liebman & Katz 2007; Orr et al 2003). The bulk of this research seems to suggest that neighborhoods matter for some outcomes, but not all, and that the benefits accrue more to females than males (Sampson 2008). Some argue that this dearth of promising findings, particularly regarding adults' economic self-sufficiency, can be attributed to the design and implementation of the MTO program (for a fuller review of these issues, see Clampet-Lundquist & Massey 2008). Though the study was designed to

control the endogeneity that emerges when participants self-select into treatment groups, specific features of the MTO program may have introduced additional sources of selection bias. For instance, since compliance was not mandatory, some participants assigned to the treatment group (47%) opted not to use their vouchers to move out of their neighborhoods. In experimental studies, researchers typically compare all who were *assigned to* the treatment group to those who were assigned to other groups, irrespective of whether they actually complied with this assignment. If compliance is low, this "intent-to-treat" (ITT) effect may underestimate the impact of the treatment condition. To correct for this, researchers also calculate a treatment-on-the-treated (TOT) effect, which in the case of the MTO program is measured by dividing the ITT effect by the take-up rate of the treatment group (Orr et al 2003; Kling, Liebman & Katz 2007). The TOT effect is considered a better indicator of the real impact on the treatment group, even though it is considered a quasi-experimental rather than experimental approach.

In addition, although the MTO data may provide estimates of the effects of moving to a non-poor neighborhood after receipt of a housing voucher, they are not as useful for measuring the effect of *living in* a low-poverty neighborhood. We would expect that neighborhoods would exert a gradual, if not cumulative, influence on residents. Thus, if participants moved into non-poor neighborhoods but only stayed for a short period of time, and we do not account for this in our models, then the ITT and even TOT estimates underestimate of the true neighborhood effect and yield results that are biased by selective out-migration (Clampet-Lundquist & Massey 2008). The MTO program only required that participants stay in their new homes for a period of one year. By the time of the 4 to 7 year follow-up study, nearly 40 percent of those who had moved into low-poverty neighborhoods had moved out. Clampet-Lundquist & Massey (2008) suggest that this mobility has real consequences for the estimation of neighborhood effects. When they measured the length of time MTO participants spent in non-poor neighborhoods, they found it to be significantly associated with measures of adult self-sufficiency.

The present paper examines the relationship between neighborhood disorder and individual-level health outcomes. It draws on data from the Monitoring Mt. Laurel Study, a new survey-based study that

enables us to compare residents living in an affordable housing project in a middle-class New Jersey suburb to a comparable group of non-residents who applied to live in the project but were not accepted in the project or were still on the waiting list at the time the survey was administered, thus holding constant self-selection into the pool of people wishing to move into affordable suburban housing. The quasi-experimental design of the Mt. Laurel Study is well-suited for the study of neighborhood effects and overcomes some of the limitations of the MTO experiment. At the time the data were collected, for example, most residents had lived in the project for several years, some for as long as ten years. This means that enough time had elapsed to allow hypothesized cumulative effects to emerge, thus enabling us to disentangle neighborhood effects from the effects of moving. In addition, we also had access to residents' and non-residents' initial applications to enter the project and we drew on these applications to estimate propensity scores to capture the likelihood of moving from the applicant list into the project. We use these propensity scores in multivariate models to control for other unmeasured factors that might influence entry into the project.

Using these new data, we test the hypothesis that living in an affordable housing project in a middle class suburb reduces a poor person's exposure to disorder and violence compared to what they would have experienced in the absence of access to such housing, and that this lesser exposure to disorder and violence yields improvements in mental health that can be attributed to residents' reduced stress burden. We begin by reviewing theory and research on the relationship between neighborhood context and health status. We then offer a brief history of the Mt. Laurel housing project and its present configuration. We then outline our data and measures and subject them to a series of multivariate analyses to capture neighborhood effects on exposure to crime and disorder, stressful life events, and health. We conclude with a summary of our findings and their implications for affordable housing policy.

Neighborhood Conditions and Individual Mental Health

We suggest that living in a housing project in a middle-class suburb reduces residents' exposure to social disorder, crime and violence, which in turn decreases their likelihood of experiencing stressful life events and consequently lowers their anxiety symptoms relative to what they might experience in a poorer neighborhood. Why do neighborhood economic conditions affect one's exposure to disorder? Poor neighborhoods lack the social interactional processes that are crucial for community social control and thus are at greater risk for social disorganization. Robert Sampson and colleagues find that poor, unstable communities have lower rates of "collective efficacy," or shared expectations that neighbors will intervene to control their neighborhood, and that lower rates of collective efficacy in turn increase the level of violence in the community (Sampson, Raudenbush & Earls 1997; Sampson, Morenoff & Earls 1999). As a result, individuals living in poor communities are more likely to witness violence and crime than their counterparts in non-poor communities. Members of the MTO treatment group reported, for example, that they felt safer in their neighborhoods and observed less crime and disorder than members of the control group (Katz, Kling & Liebman 2001).

Repeated exposure to disorder and violence may in turn increase an individual's likelihood of experiencing stressful life events. First, physical proximity to violence, drug use, and gang presence undoubtedly increases one's chances of being victimized in the form of burglary, robbery, or physical assault. Living in close proximity to violence and disorder also impacts the composition of one's social networks, such that residents have increased contact with people involved in illegal activity and less contact with positive role models, increasing their likelihood of dropping out of school, having an unplanned pregnancy, and becoming involved in illicit activity (Harding 2003; Kling, Ludwig, Katz 2005; Lindberg & Orr 2011). In short, residents of poor neighborhoods are embedded in a well-known "tangle of pathology" (Clark 1965) that impacts their decision-making and bears on the number of stressful events they experience over time.

Moreover, living amongst chaos and disorder places the body in a state of heightened physiological arousal, which ultimately leads to heightened stress and anxiety. Prolonged exposure to disorder initiates the fight or flight response, stimulating the release of adrenaline, which over time heightens one's aggressiveness and impulsiveness and prompts risky behavior and poor decision-making (McEwan 1992; McEwan & Lasley 2002; Massey 2004). A person with these traits may in turn be more likely to self-medicate with drugs and alcohol, which can further heighten allostatic load and cause physical damage to the body (McEwan & Lasley 2002; Ross & Mirowsky 2001).

To summarize, neighborhood poverty has a known impact on residents' exposure to violent activity and disorder. In turn, repeated exposure to these activities impacts a person's likelihood of becoming a victim by placing them in close physical proximity to violence and, through both social and physiological mechanisms, increasing their likelihood of becoming involved in behaviors that bring on stress and anxiety.

Evidence based on observational data suggests an empirical association between neighborhood poverty and mental health status. Mair, Diez Roux and Galea's (2008) review of observational studies testing the link between neighborhood characteristics and depressive symptoms shows a strong cross-sectional evidence that one's neighborhood impacts mental health. Galea and colleagues (2006), for instance, use data from a prospective cohort study to show that adults residing in poorer New York City neighborhoods were significantly more likely to develop depressive symptoms over an 18 month period than adults in high-SES neighborhoods.

The literature further suggests that exposure to neighborhood disorder and stress plays a salient role in mediating the neighborhood-mental health relationship. Aneshensel and Sucoff (1996) show that adolescents in poor neighborhoods in Los Angeles are more likely to perceive their neighborhoods as being dangerous, which in turn heightens symptoms of depression, anxiety and other mental health conditions. Hill, Ross and Angel's (2005) work offers evidence that neighborhood disadvantage

increases psychological stress, which in turn has negative consequences for individual physical health, echoing Ross & Mirowsky's (2001) earlier finding that the negative relationship between neighborhood poverty and health status is mediated entirely by exposure to neighborhood disorder and the fear associated with witnessing stressful events (see also Boardman 2004).

There is also some experimental evidence linking neighborhood conditions to individual health, as adults in the experimental MTO group reported better mental health than the control group (Kling, Liebman & Katz 2007; Katz, Kling & Liebman 2001). Researchers were unable to test why neighborhood conditions impact mental health, though qualitative evidence with MTO participants indicates that stress reduction is likely the primary reason (Kling, Liebman & Katz 2007; see also Popkin, Harris & Cunningham 2002).

In short, empirical evidence suggests a relationship between neighborhood disorder and self-reported physical and mental health; this same literature shows disorder and stress as potential mediators of this relationship. Still, there is little work testing these mediating effects in an experimental or quasi-experimental context.

The Mt. Laurel Case

Mt. Laurel Township is located about eight miles east of Camden, New Jersey, a severely depressed former manufacturing center that lies just across the Delaware River from Philadelphia. Until the Second World War Mt. Laurel was a small farming community, but afterward it grew into a Philadelphia suburb of around 40,000 residents, with extensive retail and commercial development and thousands of jobs attracted there because of its location at the intersection of major highways. In many ways, it represents a classic suburban community. According to data from the 2000 Census, it is predominantly white (88% of the population) and composed mostly of homeowners (84% of households) living in single family housing (72% of all housing units). A significant proportion of residents live in age-restricted (55+) condominium or townhouse developments.

In 1971 the NAACP filed suit against the Township of Mount Laurel, New Jersey on behalf of Ethel R. Lawrence and other low income plaintiffs. The suit challenged the township's restrictive zoning regulations, which effectively prevented the construction of affordable housing within the community, and thus excluded poor families from residence. After a prolonged legal battle, the state Supreme Court in 1975 found for the plaintiffs and articulated what has since come to be known as "the Mount Laurel Doctrine:" that municipalities throughout New Jersey have an affirmative obligation to meet their "fair share" of the regional demand for low income housing (Kirp, Dwyer, and Rosenthal 1995).

The favorable court decision (commonly known as Mt. Laurel I) did not immediately lead to the project's construction, however, as the township fought over what its "fair share" of low income units might be. In 1983 the court reaffirmed its earlier ruling in another decision (known as Mt. Laurel II) and ordered the township to permit the project to move forward (Haar 1996). Fair Share Housing Development, Inc., a nonprofit developer of affordable housing in South Jersey, began planning a development that came to be known as the Ethel Lawrence Homes.

Plans submitted to township authorities were subject to a long series of acrimonious hearings and public challenges, however, and it was not until April of 1997 that the Township Planning Board finally granted its approval, but not before a series of stormy public hearings attended by more than 500 angry citizens (Smothers 1997a, 1997b, 1997c). The Ethel R. Lawrence Homes were finally built on a 62 acre field and wooded site, adjacent to luxury, market-rate single family detached housing and a retirement community. The development opened in two phases, with 100 initial units in late 2000 and 40 other units early in 2004. It consists of one-, two-, and three-bedroom two-story townhouses that are 100% affordable to lower income households, defined as those with incomes under 80% of the regional median income, who pay no more than 30% of their incomes for rent and utilities. These criteria yield a remarkably broad range of "affordability," with units going to households having incomes that range from 10% to 80% of the median income, roughly $6,200 to $49,500 per year.

In 2000, Fair Share Housing Development began an affirmative marketing program in newspapers and local media, followed by three days during which applications were distributed to all who sought them. The applications were reviewed in the order in which they were returned within each category and evaluated with respect to several selection criteria, including third party verification of income; a five-year history of residence; and a search of public records for criminal, bankruptcy or landlord judgments. Those who met the entry criteria were interviewed separately to review the information in the file and, upon agreement to the terms of the lease, were offered a spot in the housing complex. Fair Share repeated the application process in 2003, 2006, 2007 and 2010 in order to refresh the waiting list.

Methodology

This paper asks three questions. Are residents in a suburban affordable housing complex less likely to witness disorder and violence in their neighborhoods and experience stressful life events than a comparable group of non-residents? Do residents have fewer anxiety symptoms relative to non-residents? And to what extent can differences in anxiety be attributed to differences in their exposure to disorder and stressful events? We hypothesize that residing in the Ethel Lawrence Homes (ELH) reduces residents' exposure to neighborhood disorder, which reduces stressful experiences and, in turn, reduces their anxiety symptoms.

We draw on data from a survey of current and former residents of the Ethel Lawrence Homes and a comparison sample of individuals who applied but who, for one reason or another, remained on the waiting list at the time of the survey or had not been accepted into the project. We sought to interview all persons who currently reside in ELH and all former ELH residents for whom we could find a valid address. We also interviewed a sample of applicants who had not yet been admitted or had been rejected for whom we could find a recent address. The survey staff sent letters explaining the study and requesting participation to all potential respondents and then a staff of trained field interviewers followed

up with phone calls or, if a phone number could not be identified, home visits. Interviewers administered an in-person, 60-minute questionnaire to all willing participants, either in participants' homes or at a neutral site of their choosing. The interviews were conducted between November 19, 2009 and March 3, 2010.

This method yielded a final sample of 116 residents and 108 non-residents. Of the 116 residents, five are former residents who have since moved out of the project. Not surprisingly, compliance was much higher among residents than non-residents—79 percent of current and former residents surveyed participated, compared to 30.3 percent of non-residents. Table A1 in Appendix A gives the breakdown of the reasons for non-compliance for each group. By far the most important reason for non-response among non-residents was the simple inability to find the respondent (45% of cases), in most cases because they had moved from the address listed on their application form. Among those non-residents who were located, the non-response rate was 55 percent.

Given that some members of our sample were selected to live in the housing project, while others were not (or have yet to be), it remains a possibility that the two groups differ on unmeasured characteristics that may bear on the outcomes of interest. To control for this, we estimated a model predicting, for each participant in the study, the likelihood, or propensity, of being accepted into the Ethel Lawrence Homes and then include these propensity scores in our final models.[1] These models were estimated using data from participants' initial applications to the Ethel Lawrence Homes, which were archived at Fair Share Housing Development, located on-site at the Homes. We used them to create a database that included relevant data on all participants, including their age, household size and composition, relationship status, sex, income, and location and type of residence. In addition to these variables, the applications also included several variables that helped us measure their purported reasons for wanting to move, their actual motivation to enter the project, as indicated by their number on the first-come-first-served waiting list, and their access to family resources, as indicated by whether they were

currently living with a family member. Descriptions of these variables and the results from the propensity score analysis are presented in Appendix B.

We used these scores to match the 116 residents in the sample to non-residents with comparable propensity scores, using nearest-neighborhor matching within a caliper of .05. We matched with replacement since the distribution of propensity scores differed between groups, with non-residents having fewer cases at the upper-end of the score distribution (Dehejia & Wahba 2002). This method yielded a final sample of 51 non-residents, weighted such that each of the 116 residents in the sample has one, non-unique match. The mean propensity score for the sample of residents is identical to that of the weighted sample of non-residents, 0.59.

The questionnaire asked participants about the demographic composition of their households and solicited general background information about race, marital status, age, educational background, employment status, and income, as well as questions about public transit use, social contact, access to resources, exposure to neighborhood disorder, the experience of stressful life events, and health status. Table 1 compares basic individual and household characteristics of ELH residents and non-residents who responded to the survey. In general, residents do not appear to differ markedly from non-residents. The resident group has fewer whites and more identifying as belonging to another race (mostly Latinos). A greater share of residents is married or widowed and a smaller share is separated or divorced, though roughly the same proportion of both groups has never been married. Residents appear to differ most from non-residents in terms of employment and earnings: more residents are working, their earnings are higher, and they receive a greater share of their income from work. Residents of the Ethel Lawrence Homes also tend to have somewhat smaller households and more females per household.

TABLE 1 ABOUT HERE

Measures

Neighborhood Disorder. Respondents were asked a series of questions about their exposure to disorder and violence within their neighborhoods in the 12 months preceding the interview. Questions included exposure to homeless people on the streets, prostitutes, gangs, drug paraphernalia, drug dealing, people using drugs, public drinking, physical violence, and gunshots. Responses to these questions were categorical and specified whether the respondent never, rarely, sometimes, often, very often, or every day witnessed the events. Using these questions and following Massey et al. (2003), we constructed a Weighted Disorder Scale that weighted each item using the Wolfgang-Sellin Severity Score, thereby yielding an index that reflects not only the frequency with which different transgressions were witnessed but also the severity of the transgression itself (see Appendix C for details). The scale ranges from 0 to 209.

TABLE 2 ABOUT HERE

Table 2 shows the portion of respondents who reported witnessing each instance of disorder, by resident status, as well as residents' and non-residents' mean scores on the Weighted Disorder Scale. As can be seen, ELH residents and non-residents' experienced very different exposures to social disorder and violence. Residents were far less likely to have witnessed signs of disorder and violence than non-residents. Indeed, non-residents' mean weighted disorder score was nearly six times greater than residents' score ($t = 7.652$, $p = .000$).

Negative Life Events. Respondents were also asked the number of times they or a member of their household had experienced certain negative events in the 12 months preceding the interview. These included serious illness, serious injury, death, unexpected pregnancy, arrest by police, sentencing to jail or prison, expulsion from school, loss of job, loss of home, robbery, and burglary. Responses ranged from 0 to 10; those who had experienced a particular event more than 10 times were top-coded at 10. Following Massey and Fischer (2006), we used the Holmes-Rahe Stress Score weights to construct a Stress-

Weighted Life Events Scale (see Appendix C for more detail). The scale ranges from 0 to 4,790. To reduce negative skew and improve the overall fit of the multivariate models, we use the natural log of the life events scale.[2]

TABLE 3 ABOUT HERE

Table 3 presents the mean number of times residents and non-residents experienced negative life events along with their mean scores on the Stress-Weighted Life Events Scale. ELH residents experienced slightly fewer negative life events than non-residents in the previous 12 months, 1.77 compared to 2.62 events, respectively (t=1.720, p=.086). The two groups differ by roughly .53 points on the logged Stress Scale (t=1.612, p=.108); this difference is not significant, likely because our relatively small sample lacks the power to detect the difference.

Anxiety Symptoms. To measure anxiety, respondents were asked to indicate the frequency with which they experienced four anxiety symptoms. Responses were categorical and indicated whether the respondent had never experienced a condition or whether they'd experienced it a few times, about once a week, almost every day, or every day. Using these four measures, we constructed an Anxiety Symptom Scale (α = .720), where higher scores indicate more anxiety. The scale ranges from 1 to 5. Table 3 shows the portion of residents and non-residents who reported experiencing these symptoms at least once a week and ever in the twelve months preceding the interview. It also presents the mean score on the Anxiety Symptom Scale by residential status. On average, residents report experiencing fewer anxiety symptoms, with residents scoring 1.76 on the scale and non-residents scoring 2.06 (t=2.592, p=.010).

Explanatory and Control Variables. For each set of analyses, residential status is measured in two ways: as a binary indicator of whether a respondent lives in Ethel Lawrence Homes and as the number of years a respondent has lived in the project, with non-residents being coded as 0. We also control for a host of relevant covariates, including: sex (reference group = female), age (continuous), race (reference group = black), marital status (reference group = never married), and educational attainment

(reference group = less than a high school degree or GED). We control for household composition by including two continuous measures: percent female in the household and number of children under 18. Lastly, to account for an individual's likelihood of selecting into the housing project, we include propensity score.

Neighborhood Disorder, Life Stress, and Health

Our hypothesis is that residence in ELH has a negative impact on anxiety symptoms by reducing exposure to neighborhood disorder and, consequently, the experience of stressful life events. Thus, we begin by testing the relationship between ELH residence and the experience of stressful life events, conducting a formal test of whether this relationship is mediated by differences in exposure to neighborhood disorder. We then test whether exposure to disorder in turn impacts anxiety symptoms by increasing stressful experiences. To evaluate indirect effects, we use a bootstrapping method (n = 5,000 bootstrap resamples) described by Preacher and Hayes (2008). We report bias-corrected 95% confidence intervals and consider an indirect effect significant if zero is not contained in the confidence interval. The results are reported in Table 5, where *a* represents the effect of the independent variable (IV) on the hypothesized mediating variable (M) and *b* is the effect of M on the dependent variable (DV), controlling for the IV. The total effect (*c*) of the IV on the DV consists of a direct effect (*c'*) of the IV on the DV and an indirect effect (*a*b*) of the IV on the DV through the hypothesized mediating variable.

Row 1a shows the results of an OLS regression predicting the impact of ELH residence on the experience of stressful life events, controlling for the covariates described above and testing for an indirect effect of exposure to disorder. The results suggest that living in the housing project is associated with a roughly 42 point decline ($p<.01$) on the Weighted Disorder Scale (see column *a*) and, in turn, a one point increase on the disorder scale is associated with a .01 point ($p<.01$) increase on the Logged Stress Scale (*b*). Overall, living in ELH is associated with a .560 point reduction on the stress scale (*c*). This total effect is insignificant, possibly due to the relatively small sample size, though the indirect effect of

ELH residence on stressful life events is significant (*a*b*), as indicated by the fact that zero does not fall within the confidence interval. Row 1b of Table 5 presents estimates from a test of whether neighborhood disorder in turn impacts the experience of anxiety symptoms through its positive impact on stress. As we saw above, a one point increase on the disorder scale is associated with a .01 unit increase on the stress scale, which in turn is associated with a .13 point increase on the anxiety scale ($p<.01$). Neighborhood disorder thus has a positive impact on anxiety symptoms (*c*), but this is primarily a result of its positive effect on the experience of stressful events (*a*b*). In sum, living in ELH reduces residents' exposure to disorder, which in turn reduces their experience of stressful life events and, thus, anxiety symptoms.

Rows 2a and 2b of Table 5 show results from a similar set of analyses that substitutes the continuous measure "years in ELH" for the binary ELH residence measure. Row 2a suggests that each additional year of living in the housing project is associated with a 4 point ($p<.01$) reduction on the Weighted Disorder Scale, which as we showed above is positively associated with the experience of stressful life events. The number of years one resides in the project indirectly and negatively affects stress by reducing exposure to disorder, violence and chaos (*a*b*). Row 2b confirms that disorder impacts anxiety via its effect on the experience of stressful life events.

Summary and Conclusion

This paper suggests that residents of the Ethel Lawrence Homes are less likely to witness disorder and violence in their neighborhood and experience stressful life events than a comparable group of non-residents. They also have fewer anxiety symptoms, a characteristic that can be explained almost entirely by their lower exposure to chaos and stress. Moreover, this advantage appears to be cumulative, as the number of years spent in the project subjects residents to less disorder and in turn less stress and less anxiety. Taken together, these results indicate that one benefit of living in a tranquil, suburban setting is lower stress, fear and anxiety.

This pattern of results is similar to existing findings on the impact of neighborhood economic conditions on mental health. As articulated earlier, adults in the MTO experimental group reported better mental health than the control group, though the authors were only able to speculate on the reasons for this effect. In our sample, the reasons are clear: residents of the affordable housing project experience far less stress than non-residents, which translates into less anxiety.

In communities across the U.S., debates persist over whether and to what extent middle- and upper-middle class suburbs have an obligation to provide housing for low-income families. In an effort to appeal to voters who selected a Republican governor in 2009, the Democratic-controlled state Senate in New Jersey called for major changes to the state's affordable housing policy, introducing new elements that would allow affluent municipalities to shirk their affordable housing responsibilities. Yet our results suggest that there are advantages, in the form of reduced stress and anxiety, to living in a community like Mt. Laurel. These are advantages that policymakers in New Jersey and beyond should weigh when considering the next generation of affordable housing policies.

Endnotes

1. Originally we sought to compute the propensity scores for residents and then compute the propensity scores of non-residents and seek to interview those that most closely matched, but given the difficulty of tracking down and interviewing non-residents and the resources at our disposal, in the end we just sought to compile roughly the same number of non-resident interviews and use the propensity scores as a statistical control in multivariate models.
2. Since some individuals had a score of 0, we added 1 to each score before taking the natural log.

Tables

Table 1. Selected social and economic characteristics of Ethel Lawrence residents and non-resident householders (weighted sample).

Characteristic	Non-Residents	Residents	Sig. Diff.?
Demographic Characteristics			
Percent Female	91.4	91.4	
Average Age	42.5	43.1	
Respondent Race			
White	27.5	9.5	**
Black	68.1	67.2	
Asian	0.0	0.9	
Other	4.3	22.4	**
Marital Status			
Married or Cohabiting	6.0	16.3	*
Separated or Divorced	44.0	23.3	**
Widowed	2.6	10.3	*
Never Married	47.4	50.0	
Schooling			
Currently enrolled	15.5	19.1	
Less than High School	6.9	12.9	
High School Graduate	30.2	25.9	
Some College	51.7	50.0	
College Graduate	11.2	11.2	
Employment			
Working for Pay	55.2	67.2	+
Income from Work ($)	12911.8	19686.8	**
Other Income ($)	8110.5	6583.9	
Total Income ($)	21022.3	26270.7	*
Share of Income from Work	42.2	60.3	**
Household Characteristics			
Number of Persons	3.3	2.6	**
Percentage Female	60.2	71.0	**
Number of Children <18	1.0	0.9	
Average Propensity Score	0.6	0.6	
N	116	116	

** p<0.01; * p<0.05; ^ p<0.10, one-tailed test

Table 2. Whether respondent reported witnessing signs of disorder and violence within their neighborhoods in 2009.

Sign of Disorder	Non-Residents	Residents	Sig. Diff?
Homeless people	52.6	13.8	**
Prostitutes	38.8	4.3	**
Gangs	48.3	12.1	**
Drug Paraphernalia	55.2	15.6	**
Selling of drugs	51.7	13.8	**
Use of drugs	46.6	19.0	**
Public drinking	64.7	26.7	**
Physical violence	65.5	22.4	**
Gunshots	38.8	6.0	**
Weighted Disorder Scale	54.6	9.3	**

** p<0.01; * p<0.05; ^ p<0.10, one-tailed test

Table 3. Number of times negative life events were experienced in the past year within respondent's household.

Negative Life Event	Non-Residents	Residents	Sig. Diff?
Serious illness	1.06	0.78	
Serious injury	0.28	0.24	
Death	0.41	0.26	
Unexpected pregnancy	0.08	0.09	
Arrest	0.09	0.01	*
Incarceration	0.04	0.00	*
Expelled from school	0.03	0.01	
Loss of job	0.37	0.25	
Loss of home	0.05	0.02	
Robbery	0.06	0.01	*
Burglary	0.14	0.09	
Total negative events	2.62	1.77	+
Weighted Stress Scale	134.38	91.47	+
Natural log of scale	2.92	2.39	

** p<0.01; * p<0.05; ^ p<0.10, one-tailed test

Table 4. Symptoms reported by residents and non-residents of Ethel Lawrence Homes.

	Symptom at Least Once a Week		Symptom Ever in Past Year	
Symptom	Non-Residents	Residents	Non-Residents	Residents
Anxiety Symptoms				
Trouble Falling Asleep	38.8	26.7	56.0	62.9
Trouble Relaxing	32.8	24.1	65.5	54.3
Frequent Crying	11.2	8.6	40.5	27.6
Fearfulness	28.4	5.2	43.1	23.3
Anxiety Index	2.06	1.76		

Table 5. Mediation of the Effect of Ethel Lawrence residence (and Years in Ethel Lawrence) on Anxiety Symptoms through Experience of Stressful Life Events and Exposure to Disorder (N=229).[a]

	Independent Variable (IV)	Mediating Variable (M)	Dependent Variable (DV)	Effect of IV on M (*a*)	Effect of M on DV (*b*)	Total effects (*c*)	Direct effects (*c'*)	Indirect effect (*a*b*)	Bias-Corrected 95% CIs		R^2
									Lower	Upper	
1a	ELH residence	Exposure to disorder	Stressful life events	-41.915 (6.188)**	.014 (.004)**	-.560 (.349)	.042 (.373)	-0.602	-0.973	-0.275	0.232
1b[b]	Exposure to disorder	Stressful life events	Anxiety symptoms	.014 (.004)**	.128 (.024)**	.003 (.001)*	.001(.001)	0.002	0.001	0.003	0.260
2a	Years in ELH	Exposure to disorder	Stressful life events	-4.027 (.838)**	.014 (.004)**	-.062 (.045)	-.005 (.046)	-0.057	-0.094	-0.026	0.232
2b[c]	Exposure to disorder	Stressful life events	Anxiety symptoms	.014 (.004)**	.128 (.024)**	.003 (.001)*	.001 (.001)	0.002	0.001	0.003	0.260

[a] Standard errors in parentheses; 5000 bootstrap samples; ** $p<0.01$; * $p<0.05$; + $p<0.10$, two tailed. All models include controls for age, race, marital status, educational attainment, percent female in household, number of children under 18, and propensity score.

[b] Model also includes control for ELH Residence.

[c] Model also includes control for Years in ELH.

Appendix A: Response Rates

Table A1. Response rates and reasons for non-response, by resident status.

				Reasons for non-response			
	Total contacted	Participated	Response rate	Could not find	Refused	Other	Total
Residents							
Current residents	138	111	80.4	1	26	0	27
Former residents	9	5	55.6	4	0	0	4
All residents	147	116	78.9	5	26	0	31
Non-residents	356	108	30.3	159	86	3	248

Appendix B: Generating Propensity Scores

To generate propensity scores for each applicant, we created a dependent variable equal to 1 if the participant had ever lived in the Ethel Lawrence Homes and equal to 0 otherwise. We used Stata's psmatch2 command to generate propensity scores from the following set of variables:

Position on Waiting List. All applicants to the Homes are placed on a waiting list in the order in which they submit their applications in-person. Hence, lower numbers on the waiting list are more favorable for entry into the Homes. An applicant's position on the waiting list could thus be considered an indicator of both the applicant's real likelihood of being selected to move into the project as well as his/her motivation for being selected, since more motivated applicants theoretically would submit their applications before less motivated residents. When management calls for a new round of applications, they begin a new waiting list, which means the applicants in our sampling frame were on one of five waiting lists: 2000; 2003; 2006; 2007; or 2010. Some waiting lists are much longer than others, which made it difficult to simply include applicants' waiting list number in the regression equation—a position of "200" on the waiting list may be more or less favorable depending on how long the actual list for that particular year is. Thus, for each of the five application rounds, we split the list into quartiles and then generated a set of dummy variables indicating in which quartile a given applicant falls. These dummies were included in the model (reference = Quartile 1). There were also a handful of applicants (roughly 2.6% of all cases) that could not be found on a waiting list. Their application files were discovered when we were going through the applications that were archived at the Fair Share Housing Development. These cases were added to the sampling frame, but not assigned a waiting list number. We assigned them a separate dummy indicating their status as "not assigned a waiting list number."

Number of bedrooms requested at Ethel Lawrence Homes. The Homes have 1-, 2- and 3-bedroom units. According to management, the 3-bedroom units are in largest demand, which means that a family requesting a 3-bedroom unit has a smaller probability of being selected to move in. We included a continuous variable, ranging from 1 to 3, indicating the number of bedrooms being requested

Lives with a family member. To gauge an applicant's access to family resources, we included a binary measure of whether he/she was living with a family member at the time they applied to the Homes.

Female. We included a dummy variable indicating whether the applicant was female.

Relationship status. We generated four dummy variables indicating an applicant's status: never married (reference group), married, divorced/separated/estranged, and widowed.

Age. Age is coded as a continuous variable.

Has children. We included a dummy variable indicating whether (yes = 1) the applicant listed children under 18 as potential residents on the application.

Income. Applicants were asked to self-report and provide documentation for their income, including non-wage income, like TANF or Social Security. Applicants who made it far enough in the application process also had their incomes verified by a Fair Share staff member. We drew on data from all available sources to create a measure of income at the time applicants applied to the Homes. For ease of interpretation, we standardized income for the propensity score analysis. For each case missing on

income, we imputed income to the mean annual income of other cases that shared the same relationship status, age, and sex. We include a variable in the model indicating whether a respondent's income was imputed (N=8).

Neighborhood characteristics. Applicants were required to give a current address on their applications. Some applicants provided P.O. Boxes; we assigned these applicants an address equal to the post office corresponding to this P.O. Box. We then geocoded these addresses and attached relevant characteristics of applicants' Census tracts. The final models included measures of percent black, percent Hispanic, percent vacant units, percent rental units, and percent below the federal poverty line.

Reasons for applying to Ethel Lawrence Homes. At the end of the application, applicants were asked to provide the reason they were applying to live in the project. Responses were open-ended and were used to create two dummy variables indicating residents' motivations for moving: housing-related needs (needs affordable housing, homeless, lease is up, needs more space, etc.); and reasons related to safety and opportunity (wants better school district, wants safer/better environment, wants a better life for family, etc.). We also created a dummy variable indicating whether respondents did not provide a response to this question. Lastly, we created an interaction variable between whether an applicant has children and whether they cited reasons related to safety and opportunity, under the assumption that applicants who have children and are concerned about safety issues may be particularly motivated to move.

Table B1 presents frequencies for each of these variables for all applicants included in our final sample. Table B2 presents the results from the propensity score analysis.

Table B1. Means on key variables for applicants to Ethel Lawrence Homes at time of application.

	Non-Residents		Residents
	Before Matching	After Matching	
Year applied			
2000	41.7	50.9	47.4
2003	20.4	15.5	32.8
2006	5.6	3.5	6.9
2007	1.9	1.7	10.3
2010	30.6	28.5	2.6
Position on Waiting List			
Quartile 1	.17	.40	.30
Quartile 2	.29	.18	.19
Quartile 3	.25	.21	.22
Quartile 4	.29	.16	.17
Not assigned a waiting list number	.04	.09	.15
Number of BRs requested at ELH	2.01	1.99	2.08
Lives with a family member	.23	.39	.28
Female	.87	.91	.90
Relationship status			
Never married	.71	.59	.67
Married	.07	.10	.13
Divorced/separated/estranged	.19	.27	.19
Widowed	.02	.00	.03
Age	37.2	36.8	36.4
Has children	.64	.70	.73
Income	20,623.9	17,406.2	18,946.8
Income imputed	.01	.05	.06
Neighborhood characteristics			
% black	32.1	31.9	32.4
% Hispanic	12.8	11.5	13.7
% vacant units	8.0	7.7	7.8
% rental units	34.0	32.1	34.1
% poor	13.6	12.6	13.8
Reason for applying to ELH			
Housing issues	.41	.56	.53
Safety and opportunity	.23	.22	.20
Closer to important resources			
Did not provide a reason	.34	.23	.30
N	108	116	116

Table B2. Coefficients from multivariate logistic regression predicting whether an applicant to the Ethel Lawrence Homes became a resident.

Explanatory Variable	B	SE
Position on Waiting List		
Quartile 1 (reference)	--	--
Quartile 2	-.746**	.266
Quartile 3	-.646*	.269
Quartile 4	-.944**	.273
Not assigned a waiting list number	.797+	.448
Number of bedrooms requested at ELH	-.312	.217
Lives with a family member	-.048	.232
Female	.098	.331
Relationship status		
Married (reference)	--	--
Never married	-.349	.373
Divorced/separated/estranged	-.168	.416
Widowed	-.003	.709
Age	-.003	.009
Has children	.681+	.392
Income (standardized)	-.149	.098
Income imputed	-.208	.721
Neighborhood characteristics		
% black	.002	.005
% Hispanic	.004	.010
% vacant units	-.020	.025
% rental units	.001	.007
% poor	.005	.018
Reason for applying to ELH		
Housing issues	.503+	.265
Safety and opportunity	.133	.527
Did not provide a reason	.192	.301
Interaction: “Has children” * “safety & opportunity”	-.425	.573
Intercept	.705	.736
Chi Squared	36.23	
N	224	

**p<.01; *p<.05; +p<.10

Appendix C

Severity-Weighted Disorder Scale

Severity-weighted disorder scale = EiEj(Xij*(j-1)*Wi), where

i refers to 1 to 9 items on neighborhood disorder
j refers to 1 to 6 response categories on frequency witnessed
X_{ij} = 1 if respondent picked response category j, 0 otherwise
W_i = Wofgang-Sellin Severity Score for item i

The weights for each item are as follows:

Item	Weight
Homeless people on the street	0.3
Prostitutes on the street	2.1
Gang members hanging out on the street	1.1
Drug paraphernalia on the street	1.3
People selling illegal drugs in public	20.6
People using illegal drugs in public	6.5
People drinking or drunk in public	0.8
Physical violence in public	6.9
Hearing the sound of gunshots	2.1

Stress-Weighted Life Event Scale

Stress-Weighted Life Event Scale = E_i (F_i * W_i), where

i refers to 1 to 11 items on frequency of negative life events
F_i = frequency reported by respondent for life event i
W_i = Holmes-Rahe Stress Score

The weights for each item are as follows:

Item	Weight
Serious illness	49
Serious injury	53
Death	82
Unexpected pregnancy	40
Arrest by police	37
Sentenced to jail or prison	63
Expelled from school	26
Loss of job	47
Loss of home	30
Robbery	29
Burglary	23

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