

**Associations between neighborhood perceptions and mental well-being among older adults**

RUNNING HEAD: Neighborhood perceptions and well-being

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## **Abstract**

This study examined whether perceived neighborhood factors were associated with positive well-being in older adults using data from the English Longitudinal Study of Ageing.

Neighborhood perceptions were assessed at baseline (2006/7) and three measures of wellbeing – hedonic, eudaimonic and evaluative – were assessed at baseline and follow-up

(2010/11) for 6134 participants. In cross-sectional and longitudinal analyses, negative neighborhood perceptions were associated with poorer well-being on all three measures.

These associations remained significant after adjusting for a range of sociodemographic and health status variables and depressive symptoms.

**Keywords:** neighborhood; well-being; life satisfaction; older adults; English Longitudinal Study of Ageing

## **Introduction**

While scholars have tried to understand and articulate what constitutes a ‘good life’ for many centuries, the scientific study of emotional well-being only started in the 1960s (Campbell et al. 1976) and since then has grown rapidly (Diener et al. 1985). A conceptual distinction has been proposed between the hedonic (Diener 2000; Kahneman et al. 1999) and the eudaimonic traditions (Ryan and Deci 2001; Ryff and Singer 2006; Ryff and Singer 2008). The hedonic approach is characterized by an affective component based on feelings of joy and pleasure and absence of negative affectivity, and by a cognitive component based on one’s evaluation of one’s own life satisfaction. The cognitive component has also been termed as evaluative well-being in some conceptualizations (Dolan et al. 2011). In contrast, the eudaimonic perspective is related to concepts like purpose in life, personal growth, sense of control over one’s environment and valued relationships with others. Both formulations of well-being have been associated with physiological processes involved in health outcomes, although they seem to exhibit a different pattern of association with biomarkers (Ryff et al. 2004).

Mental well-being is a human aspiration and an increasingly valued indicator of societal progress (Stiglitz et al. 2009). There is also a considerable body of research indicating that higher levels of well-being in old age are associated with improved health outcomes including better physical and cognitive function, decreased levels of frailty and disability, and lower mortality (Gale et al. 2014; Ostir et al. 2000; Steptoe et al. 2014a; Steptoe et al. 2014b; Steptoe and Wardle 2011; Steptoe and Wardle 2012). In the UK, there are currently more than 11 million individuals aged 65 years and over, and this number is expected to increase by nearly 50% by 2030 (Age UK 2014). Therefore understanding the factors that affect mental and physical well-being in older age is of primary social and economic significance. Qualitative work with older adults suggests that optimism,

contentment and adaptation are more relevant than absence of disabilities and disease when thinking about ‘optimal aging’ (Reichstadt et al. 2007), further reinforcing the need to understand what factors are associated with positive well-being in this group.

Evidence suggests that physical and social aspects of the neighborhood environment play a role in the health of older individuals and can predict health outcomes over individual deprivation and psychosocial characteristics (Bierman 2009;Kubzansky et al. 2005;Yen et al. 2009). Aspects of the neighborhood environment may also be important for the emotional well-being of older adults because such individuals are more likely to be confined to their residential neighborhood due to retirement and mobility issues (Yen, Michael, & Perdue 2009). A substantial body of research has investigated the association between mental health and objective characteristics of the neighborhood (Mair et al. 2008;Paczkowski and Galea 2010). However only limited evidence exists on the relationship between psychological well-being and individual perceptions of the neighborhood environment. Individual perceptions may refer to a range of characteristics from aspects of the built environment such as amenities, services and housing to concepts such as social cohesion, sense of belonging and perceived safety. The neighborhood disorder construct addresses both social and physical elements of the neighborhood, encapsulating concepts such as solidarity and safety as well as incivilities such as vandalism, graffiti and trash (Stafford et al. 2003;Stafford et al. 2007).

Cross-sectional studies have found safety concerns, street-level incivilities, and neighborhood disorder to be associated with depressive symptoms and anxiety (Ellaway et al. 2009;Step toe and Feldman 2001;Wilson-Genderson and Pruchno 2013). Both social cohesion and neighborhood climate have also been found to predict depressive symptoms over time (Brown et al. 2009;Stafford et al. 2011). We are aware of only four studies to document an association between neighborhood perceptions and positive well-being. Using large population samples of older individuals living in England, neighborhood cohesion was found

to show a positive association (Elliott et al. 2014;Gale et al. 2011) and neighborhood problems a negative association (Gale, Dennison, Cooper, & Sayer 2011) with scores on the Warwick-Edinburgh Mental Well-being Scale, a measure of well-being which focuses exclusively on positive features of mental health such as positive affectivity and psychosocial functioning. Using the same well-being scale with a general population sample, a greater sense of belonging to the neighborhood was found to be associated with higher positive well-being (Jones et al. 2014). While these studies were cross-sectional, Webb and colleagues found a positive association between improved perceptions of neighborhood and quality of life measured over a 4-year period (Webb et al. 2011). To the best of our knowledge, this is the only study to examine longitudinal associations between perceptions of neighborhood and positive well-being in older adults. Thus, more evidence is needed in order to understand whether poor mental health leads to more negative perceptions of one's neighborhood or vice versa. Additionally, as seen above, the majority of previous research has focused on depression with little attention paid to positive affective states.

However it is understood that solely the absence of depression does not signify good mental health (Seligman and Csikszentmihalyi 2000). Several mental disorders may occur not only because of the presence of negative states and events in one's life, but also because of the lack of positive states (Lee Duckworth et al. 2004;Seligman et al. 2006;Wood and Joseph 2010). In fact, it is understood that well-being and ill-being have an orthogonal relationship (Depp and Jeste 2010), meaning that positive and negative affectivity can coexist, and that their effects on biological outcomes can be somewhat independent (Cacioppo et al. 1999;Folkman 2007;Ryff et al. 2006;Stephoe et al. 2012). This suggests that in order to fully understand the link between environment and health, positive mental states need also to be taken into account.

This study aims to extend previous work in this area by assessing the association between perceived physical and social neighborhood environment, and a conceptualization of well-being which focuses on positive aspects of psychological functioning, rather than solely examining negative mental states. We use a measure of *neighborhood disorder* which encapsulates elements of the physical and social neighborhood environment such as area cleanliness/physical neglect, relationship with neighbors and perceived safety, which may be particularly relevant for the individual (Bell et al. 2014). We assess three indicators of well-being namely, satisfaction with life, enjoyment of life, and quality of life. There is general consent that these indicators, although related can be distinguished (Dolan, Layard, & Metcalfe 2011; Kahneman and Deaton 2010). Enjoyment with life represents the hedonic perspective, quality of life is more concerned with psychosocial functioning with a focus on control, personal growth and purpose in life; features which are more in line with the eudaimonic approach, while life satisfaction with its focus on the evaluation of life in general is regarded as evaluative well-being. For the rest of this manuscript, we use the terms hedonic, eudaimonic and evaluative well-being respectively. In this analysis depression was included as a covariate in order to determine whether the associations of neighborhood perceptions with positive well-being were independent of negative mental states.

The main aims of these analyses were (a) to determine whether neighborhood disorder was associated with well-being in a cross-sectional analysis, as this would allow us to replicate previous work in the area, as well as to extend it to other measures of well-being, (b) to examine if neighborhood disorder was associated with change in well-being over a four-year period, as there is limited previous research that address this question, and (c) to establish whether these associations, if any, persist after controlling for depression. We hypothesized that greater neighborhood disorder would be associated with lower positive well-being on all measures, as well as a greater decrease in well-being over time. We also

hypothesized that adjustment for depression would attenuate but not completely eliminate the association between neighborhood disorder and positive well-being.

## **Methods**

### **Participants**

The present analysis draws on data from the English Longitudinal Study of Ageing (ELSA), which is a nationally representative panel study of adults aged 50 years and over. The first wave of ELSA was in 2002, with participants drawn from the annual, nationally representative cross-sectional Health Surveys for England (HSE) in 1998, 1999 and 2001. All participants were aged 50 years or over at the start of fieldwork for wave 1. To ensure representativeness, subsequent waves of ELSA have included refreshment samples. Participants in ELSA are followed up every 2 years and alternate waves include a nurse visit. Further details regarding the sample and methodology are available elsewhere (Stephens et al. 2013).

Wave 3 of ELSA (2006/7) was the first wave to include both a measure of neighborhood disorder and evaluative well-being and was hence used as the baseline for this analysis. This wave included a refreshment sample drawn from HSE 2001-2004 (Scholes et al. 2008) and consisted of a total of 8810 participants who completed the study interview (fully or partially) in person. The present analyses were carried out on a sample of 6134 participants who also provided data at follow up 4 years later (wave 5, 2010/11). Dropout between the waves was significantly higher among men, participants who were older at baseline, those belonging to an ethnic minority, individuals in lower wealth groups and those with lower levels of education. When compared with those in the study, participants who

dropped out were less likely to be married/cohabiting or in work. They also had significantly higher scores on depression and significantly lower scores on all three measures of well-being. Further, individuals who dropped out had significantly more negative perceptions about their neighborhood.

## Measures

*Neighborhood disorder* was measured at baseline using a 9-item semantic differential scale incorporating different features of the environment. Participants were asked, ‘*How do you feel about your local area, that is, everywhere within a 20-minute walk or about a mile of your home?*’. The following items were included ‘*I really feel part of this area,*’ ‘*Vandalism and graffiti are a big problem in this area,*’ ‘*I often feel lonely living in this area,*’ ‘*Most people in this area can be trusted,*’ ‘*People would be afraid to walk alone in this area after dark,*’ ‘*Most people in this area are friendly,*’ ‘*People in this area will take advantage of you,*’. An opposing statement (e.g. ‘*There is no problem with vandalism and graffiti in this area*’) anchored the other end of a 7-point scale. Certain items were recoded and responses were summed such that scores on the scale ranged from 0-54, with higher scores indicating more negative perceptions of the neighborhood, i.e. greater neighborhood disorder. The scale showed acceptable internal reliability (Cronbach’s  $\alpha = 0.80$ ).

*Hedonic well-being* was measured using the four-item Pleasure subscale of the CASP-19 scale (Hyde et al. 2003). An example of an item would be ‘*I enjoy the things I do*’ with response options *Never, Not often, Sometimes* and *Often*. Responses were summed and scores ranged from 0-12 with higher scores indicating greater hedonic well-being. The scale showed acceptable internal reliability in the present sample ( $\alpha = 0.70$  at baseline and 0.71 at follow-up).

*Eudaimonic well-being* was measured using the remaining 15 items of the CASP-scale, corresponding to the Control, Autonomy and Self-realisation subscales (Hyde, Wiggins, Higgs, & Blane 2003). Typical items include ‘*My age prevents me from doing the things I would like to do*’ (Control), ‘*I feel that I can please myself what I do*’ (Autonomy), and ‘*I choose to do the things that I have never done before*’ (Self-realization). As above response options were *Never, Not often, Sometimes* and *Often*. Certain items were reverse coded and responses were summed to form a scale with scores ranging from 0-45, with higher scores indicating more eudaimonic well-being. This scale showed good internal reliability ( $\alpha = 0.87$  at baseline and at follow-up).

*Evaluative well-being* was measured using the Diener Life Satisfaction scale (Diener, Emmons, Larsen, & Griffin 1985; Pavot and Diener 2009). The scale consists of 5 items examining how satisfied the individual is with his/her life, with response options on a 7-point scale ranging from *Strongly agree* to *Strongly disagree*. An example of a typical item would be ‘*In most ways my life is close to my ideal*’. Responses were reversed and summed so scores ranged from 0 to 30, with higher scores indicating greater evaluative well-being ( $\alpha = 0.91$  at baseline and at follow-up).

*Depressive symptoms* were assessed using the 8-item Centre for Epidemiologic Diseases Depression scale (CES-D). Participants were asked to respond yes or no to 8 symptoms and scores ranged from 0 to 8. A cut-off of a score of 4 or more is used to indicate depression casesness. Reliability and validity of the scale have been demonstrated elsewhere (Steffick 2000).

*Covariates:* Data on age and gender were obtained during the main interview. Participants were asked if they suffered from a long-standing illness and if this illness limited their activities in any way. Responses to both questions were combined to create a variable

indicating if participants had a limiting long-standing illness or not. Participants were also asked if they had any difficulties with 6 activities of daily living, i.e. *dressing, including putting on shoes and socks; walking across a room; bathing or showering; eating, such as cutting up food; getting into or out of bed and using the toilet, including getting up or down.* Responses were summed to calculate the total number of difficulties with activities of daily living. Total non-pension wealth and education were used as measures of socioeconomic status. Wealth best represents the economic resources available to older adults (Banks et al. 2003) and the current analysis uses wealth groups corresponding to wealth quintiles in entire baseline population. Education was classified as having no formal qualifications versus having education corresponding to high school level or higher. Relationship status was classified as married/cohabiting versus not (single/separated/divorced/widowed and not living with a partner). Work status was classified as being in full or part-time work versus not. As the ELSA sample is predominantly White (~98%), ethnicity was classified as White and non-White. The analysis additionally adjusted for the total number of years the respondent had lived in the same house. Finally we determined whether the participant moved between baseline and follow-up.

### **Statistical analysis**

Item-wise missing values were imputed using PROC MI in SAS (for items imputed, mean percentage missing = 7.0, median = 8.1, max = 12.2). Five datasets were created and analyzed. Pooled estimates are reported. Results were substantively similar for the analysis including participants with complete data on all variables of interest (N = 4741) and we hence only report the analysis for the imputed dataset. All measures of positive well-being were negatively skewed and hence a square root transformation was applied. Scores on

neighborhood disorder were positively skewed, however the distribution was not significantly improved following transformation and hence untransformed scores were used in the analyses. Correlations between neighborhood disorder scores and covariates included in the analysis were examined. Correlations were also used to examine the associations between well-being measures at baseline. Following this, measures of well-being were regressed onto neighborhood disorder scores and analyses were adjusted for all covariates and depression. For each well-being measure three models were run: Model A adjusting for neighborhood disorder and baseline well-being (cross-sectional analysis included only neighborhood disorder); Model B, additionally adjusting for all covariates and Model C further adjusting for depressive symptoms at baseline. Analyses were also repeated excluding all participants who moved between baseline and follow-up. For all regression models, the unstandardized coefficient (B), corresponding 95% confidence interval, and the standardized regression coefficient ( $\beta$ ) are reported. Analyses were carried out using SAS 9.4 (SAS Institute, Cary NC) and SPSS 20.

## **Results**

### *Sample characteristics*

At baseline the mean age of participants was just under 65 years, 56.6% were women, nearly 98% were White and just over 70% were married or cohabiting (Table 1). About a quarter of participants had no formal educational qualifications, 14.8% were in the lowest wealth group and nearly two-fifths were in full or part-time work. The mean number of depressive symptoms reported was quite low, with 13.4% reporting scores of 4 or above. Around 30% of participants reported suffering from a limiting long-standing illness and 16% had difficulties with 1 or more activities of daily living. Overall, participants reported

positive perceptions of their neighborhood. Scores on positive well-being measures were quite high. Hedonic and eudaimonic well-being showed small decreases over the 4-year period, while evaluative well-being increased slightly (all  $ps < 0.001$ ).

#### *Relationship of neighborhood disorder with covariates*

Less negative perceptions about the neighborhood were seen among older participants ( $r = -0.11$ ,  $p < 0.001$ ), White participants ( $r = -0.06$ ,  $p < 0.001$ ), wealthier participants ( $r = -0.19$ ,  $p < 0.001$ ), those with at least some formal educational qualifications ( $r = -.05$ ,  $p < 0.001$ ) and those who were married ( $r = -0.08$ ,  $p < 0.001$ ). In contrast, those with a limiting long-standing illness ( $r = 0.10$ ,  $p < 0.001$ ), those with more difficulties with activities of daily living ( $r = 0.09$ ,  $p < 0.001$ ) and those in work ( $r = 0.04$ ,  $p < 0.001$ ) were found to have a more negative perception of their neighborhood. There were no significant gender differences ( $r = -0.01$ ,  $p = 0.42$ ) in neighborhood disorder scores.

#### *Associations between measures of well-being*

Measures of well-being showed moderate to strong positive correlations with each other. The strongest correlations were seen between hedonic and eudaimonic well-being ( $r = 0.71$ ,  $p < 0.001$ ), while those of evaluative well-being with hedonic ( $r = 0.58$ ,  $p < 0.001$ ) and eudaimonic ( $r = 0.65$ ,  $p < 0.001$ ) well-being were slightly lower. All measures of positive well-being showed moderate negative correlations with depressive symptoms ( $r = -0.44$  for hedonic well-being,  $r = -0.47$  for eudaimonic well-being, and  $r = -0.41$  for well-being; all  $ps < 0.001$ ).

### *Neighborhood disorder and measures of well-being: Cross-sectional analysis*

At baseline, greater neighborhood disorder was significantly associated with less hedonic well-being (see Table 2, Model A). The associations persisted following adjustment for covariates, including depression (Table 2, Models B and C). Similarly, greater neighborhood disorder was associated with lower levels of eudaimonic and evaluative well-being (see Table 3 and 4, Model A). Adjusting for all covariates and depression led to small decreases in these associations, but more negative perceptions of the neighborhood were still associated with decreased eudaimonic and evaluative well-being (Table 3 and 4, Models B and C).

### *Neighborhood disorder and measures of well-being: Longitudinal analysis*

Higher levels of neighborhood disorder were associated with lower levels of hedonic, eudaimonic and evaluative well-being at follow-up, independent of baseline well-being (Table 5, 6 and 7, Model A). Following adjustment for covariates, including depressive symptoms, these associations persisted (Table 5, 6 and 7, Models B and C).

All analyses were repeated excluding participants who changed residence between baseline and follow-up. The pattern of results remained unchanged.

## **Discussion**

Our results show that individuals with more negative perceptions of their neighborhood had lower levels of wellbeing. We also found that more negative perceptions of the neighborhood were associated with greater decreases in wellbeing over a 4-year period.

These associations were independent of a range of sociodemographic and health status variables, as well as depression. In general, participants reported fairly high scores on all three measures of well-being at baseline. Levels of well-being were still reasonably high at follow-up although enjoyment of life and QOL decreased slightly, while satisfaction with life increased. A possible explanation for the different pattern of results for the different measures of well-being could be that worsening life circumstances, such as onset of disability, may affect people's enjoyment of life or their sense of control or optimism about the future, but may have a smaller effect on life satisfaction because this represents a global retrospective appraisal of how satisfied people are with their lives. These explanations are supported by previous research (Luhmann et al. 2012) suggesting that life events common in old age, like bereavement and retirement, have a greater impact on affective than on cognitive well-being. Furthermore after adversity strikes people may lower their expectations and believe that they should be satisfied considering their conditions (Oswald and Powdthavee 2008).

When adjusting for sociodemographic variables the relationship between neighborhood disorder and well-being measures was somewhat reduced in both cross-sectional and longitudinal analyses, indicating that part of the variance in well-being was explained by these variables. However neighborhood disorder remained highly significant. Indeed, it was a better predictor of positive well-being than many individual level factors. These findings are largely in line with previous research supporting the association between neighborhood perceptions and positive well-being (Elliott, Gale, Parsons, & Kuh 2014; Gale, Dennison, Cooper, & Sayer 2011) after adjusting for covariates. Jones et al. (2014), using a large sample of adults living in Scotland reported cross-sectional associations between a measure of positive well-being and aspects of the neighborhood which included perceived incivilities, perceived safety and a measure of social integration (cognitive social capital),

although the effects were much stronger for social integration than for perceived safety and incivilities.

Our findings show that the effects of neighborhood were independent of some of the strongest determinants of well-being in older people such as health status and of baseline well-being. These findings are in line with a previous study (Webb, Blane, McMunn, & Netuveli 2011) investigating proximal predictors of change in quality of life at older age using an ELSA sample, which reported that improved perceptions of neighborhood quality reduced decline in quality of life at four years follow-up. While we are not aware of any other prospective studies directly investigating the association of neighborhood factors with positive well-being, our findings add to the existing body of longitudinal research examining the role of neighborhood perceptions on depressive symptoms. Using an ELSA sample, Stafford et al. (2011) found that greater social cohesion was associated with fewer depressive symptoms at two years follow-up, after controlling for covariates and baseline depressive symptoms. In a large sample of older Australian women, sense of neighborhood and feelings of safety were prospectively associated with better mental health on the SF-36 at three years follow-up (Young et al. 2004). Bierman (2009) also reports an association between neighborhood disorder and increased depressive symptoms over a 2- year period.

There is growing support for the idea that negative and positive emotional states are independent from each other and can be experienced simultaneously, and that assessing mental health exclusively as absence of depression does not account for the variability of emotional states that a person can experience (Depp & Jeste 2010). Indeed well-being and ill-being seem not to be the opposite poles of a continuum, rather each needs to be considered for a fuller picture of psychological wellbeing (Kahneman and Krueger 2006). Our findings suggest that the impact of living in a neighborhood that one views as being unsafe,

unattractive and isolating has implications for positive well-being, independent of depression. Thus living in such a neighborhood is potentially very damaging to overall psychological functioning.

It has been proposed that usually people get attached to their environments through length of residence (Shenk et al. 2004), and that they tend to adapt to their effects. In fact cross-sectional research has indicated that residential stability is associated with better mental health (De Graaf et al. 2002). However, in line with Jones et al. (2014), we did not observe any effect of length of residence in our study. Furthermore sensitivity analyses did not show any difference between those who still lived at the same address at follow-up and those who did not. The fact that the residential environment could be associated with change in well-being even after the participants had been living in the same neighborhood for an average of 21 years implies that one's neighborhood plays an important role for well-being throughout the life span.

### *Strengths and Limitations*

One of the main strengths of this study is the focus on positive aspects of mental health and the use of a more comprehensive conceptualization of well-being which draws from the hedonic and eudaimonic traditions, by encompassing affective states and psychosocial functioning. This study benefits from a nationally representative sample with information on various sociodemographic and health variables collected with high quality methodology. The longitudinal design allows us to examine change in well-being over time. Furthermore it will allow this cohort to be tracked over time making it possible to determine how the observed relationships may evolve at older ages.

Despite these strengths, there are certain limitations to be considered. It may be argued that the CASP-19 used in this study cannot be considered a measure of eudaimonic well-being per se, but rather a more general assessment of psychosocial functioning. In fact, although it addresses some critical features of the eudaimonic approach, it does not address all of them (e.g. relations with others). Further, the conceptualization adopted for some of the features (e.g. autonomy) may diverge from the mainstream eudaimonic tradition which conceptualizes autonomy mainly as self-determination and freedom to follow one's own convictions (Ryan & Deci 2001), rather than as independence and freedom from external constraints as purported by the CASP-19. It must also be recognized that both approaches may reflect assumptions largely in tune with western values, which may not be shared by different cultures (Keyes et al. 2002). Nearly 98% of participants in this study were White and hence the results of our analysis may not be generalizable to individuals of other cultures. This is problematic especially in the light of recent cross-cultural research (Karasawa et al. 2011; Miyamoto and Ryff 2011) suggesting that the way different dimensions of well-being affect health is culturally determined. Investigations involving emotional well-being would benefit from more studies incorporating ethnically diverse communities. Non-response and drop out in ELSA are higher among ethnic minorities and we were unable to adjust for this in our analyses.

Hedonic and eudaimonic well-being were more strongly associated with each other than with evaluative well-being. As in previous research (e.g. Steptoe et al., 2012), this is to be expected since these two measures are both components of the same scale, therefore common method variance could be implicated. The use of self-report measures raises the issue that associations may be in part attributable to same source bias. Although previous studies (Ellaway et al. 2001; Sampson et al. 1997) have shown a high correlation between subjective and objective measures of neighborhood disorder, the same studies have also

suggested that neighborhood perceptions are also shaped by individual factors. Thus this research would be strengthened by introducing some objective measures of neighborhood alongside perceptions. New methods are being increasingly used in neighborhood research and which consist of gathering the perceptions of a separate sample of local individuals together with those of the participants, so adding an independent neighborhood-level measure. This method would address both same source bias and measurement error (Raudenbush and Sampson 2014). Some qualitative interviews alongside quantitative analyses would also provide an in-depth understanding of how these social phenomena can affect people's health. Since we used a composite measure of neighborhood disorder we could not identify which specific features of the neighborhood disorder construct had the most impact on each measure of well-being and indeed it is possible that separate subscales may show differential associations with positive and negative mental well-being measures (O'Campo et al. 2009). Thus by examining specific area attributes separately, it is possible to get more insights into the complex relationship between environment and health.

## **Conclusions**

These findings suggest that higher levels of perceived disorder are associated with decreased well-being over time, independent of sociodemographic and health factors and baseline depressive symptoms. Future interventions are needed to examine if improving these features of the environment can induce positive health outcomes, given that perceptions partly reflect objective reality. However it would also be useful if policy makers become more aware of residents' perceptions and the type of features of the environment that are most relevant to them. There is potential for high levels of positive well-being in older age despite challenges such as declining health, and the neighborhood an area is where that

potential can be maximized through policies that take into account the needs and preferences of the local residents. Positive wellbeing is an indicator of mental health in its own right, independent of depression and there is a need for not only researchers but for society as a whole to move beyond negative criteria in an attempt to improve human wellbeing. A better understanding of the mechanisms involved in the relationship between neighborhood and mental health through theory-driven mediation and moderation analyses could help devise more targeted interventions toward enhancing health in old age. These findings provide an important contribution to the limited body of research investigating neighborhood environment in relation to positive mental health in the among older adults, and highlights the need for future research to move beyond negative standards in the assessment of psychological functioning.

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**Table 1. Participant characteristics (N = 6134)**

Variable	Analytic sample
Age – Mean (SD)	64.1 (9.3)
Women (%)	56.6
Married/cohabiting (%)	70.7
Has limiting long-standing illness (%)	30.5
Has difficulties with 1 or more activities of daily living (%)	16
In full or part-time work (%)	38.5
In lowest wealth group (%)	14.7
No formal qualifications (%)	25.1
White (%)	97.6
Years lived the current house - Mean (SD)	21.6 (13.8)
Changed house between baseline and follow-up (%)	8.3
Depressive symptoms – Mean (SD)	1.4 (1.9)
Neighborhood disorder score – Mean (SD)	14.8 (8.8)
Hedonic well-being – Mean (SD)	
Baseline	9.9 (1.8)
Follow-up	9.8 (1.8)
Eudaimonic well-being – Mean (SD)	
Baseline	31.5 (7.1)
Follow-up	30.9 (7.3)
Evaluative well-being – Mean (SD)	
Baseline	19.8 (6.5)
Follow-up	20.5 (6.2)

**Table 2. Regressing baseline hedonic well-being on scores of neighborhood disorder and covariates (N = 6134)<sup>a</sup>**

	Model A		Model B		Model C	
	B (95%CI)	$\beta$	B (95%CI)	$\beta$	B (95%CI)	$\beta$
Neighborhood perceptions	-0.018 (-0.019 to -0.016)	-0.322	-0.014 (-0.016 to -0.013)	-0.263	-0.012 (-0.013 to -0.010)	-0.214
Age			0.002 (0.001 to 0.003)	0.033	0.001 (-0.001 to 0.002)	0.006
Female gender			0.070 (0.047 to 0.093)	0.072	0.097 (0.074 to 0.119)	0.100
Married			0.086 (0.058 to 0.114)	0.081	0.045 (0.019 to 0.072)	0.043
In full or part-time work			0.025 (-0.004 to 0.054)	0.026	0.008 (-0.020 to 0.035)	0.008
At least high-school level education			0.023 (-0.006 to 0.052)	0.021	0.003 (-0.025 to 0.031)	0.002
Wealth			0.032 (0.023 to 0.041)	0.093	0.022 (0.013 to 0.030)	0.062
Non-white			-0.019 (-0.091 to 0.053)	-0.006	0.029 (-0.041 to 0.098)	0.009
Has a limiting long-standing illness			-0.213 (-0.240 to -0.186)	-0.204	-0.147 (-0.173 to -0.121)	-0.141
Number of difficulties with activities of daily living			-0.051 (-0.067 to -0.035)	-0.088	-0.022 (-0.038 to -0.006)	-0.038
Years lived in the same house			0.001 (-0.001 to 0.001)	0.010	0.001 (-0.001 to 0.001)	0.009
Depressive symptoms					-0.080 (-0.087 to -0.074)	-0.321

<sup>a</sup>Square root transformation applied to the outcome

**Table 3. Regressing baseline eudaimonic well-being on scores of neighborhood disorder and covariates (N = 6134)<sup>a</sup>**

	Model A		Model B		Model C	
	B (95%CI)	$\beta$	B (95%CI)	$\beta$	B (95%CI)	$\beta$
Neighborhood perceptions	-0.037 (-0.040 to -0.035)	-0.341	-0.030 (-0.033 to -0.028)	-0.279	-0.025 (-0.027 to -0.023)	-0.228
Age			-0.005 (-0.008 to -0.002)	-0.051	-0.008 (-0.011 to -0.005)	-0.078
Female gender			0.041 (-0.004 to 0.087)	0.021	0.096 (0.052 to 0.140)	0.050
Married			0.026 (-0.027 to 0.079)	0.013	-0.056 (-0.108 to -0.005)	-0.027
In full or part-time work			-0.006 (-0.062 to 0.049)	-0.003	-0.042 (-0.094 to 0.010)	-0.021
At least high-school level education			0.046 (-0.009 to 0.101)	0.021	0.004 (-0.048 to 0.056)	0.002
Wealth			0.106 (0.089 to 0.123)	0.152	0.084 (0.068 to 0.100)	0.121
Non-white			-0.151 (-0.313 to 0.010)	-0.024	-0.054 (-0.208 to 0.100)	-0.009
Has a limiting long-standing illness			-0.485 (-0.538 to -0.432)	-0.233	-0.350 (-0.400 to -0.300)	-0.169
Number of difficulties with activities of daily living			-0.133 (-0.162 to -0.105)	-0.114	-0.074 (-0.101 to -0.047)	-0.063
Years lived in the same house			-0.001 (-0.002 to 0.001)	-0.009	-0.001 (-0.002 to 0.001)	-0.010
Depressive symptoms					-0.165 (-0.178 to -0.151)	-0.330

<sup>a</sup>Square root transformation applied to the outcome

**Table 4. Regressing baseline evaluative well-being on scores of neighborhood disorder and covariates (N = 6134)<sup>a</sup>**

	Model A		Model B		Model C	
	B (95%CI)	$\beta$	B (95%CI)	$\beta$	B (95%CI)	$\beta$
Neighborhood perceptions	-0.034 (-0.037 to -0.031)	-0.311	-0.027 (-0.030 to -0.025)	-0.249	-0.022 (-0.025 to 0.020)	-0.202
Age			0.012 (0.009 to 0.016)	0.121	0.010 (0.007 to 0.013)	0.096
Female gender			0.008 (-0.038 to 0.054)	0.004	0.059 (0.015 to 0.103)	0.030
Married			0.416 (0.361 to 0.470)	0.197	0.339 (0.286 to 0.391)	0.160
In full or part-time work			-0.007 (-0.066 to 0.051)	-0.004	-0.040 (-0.096 to 0.016)	-0.020
At least high-school level education			-0.119 (-0.179 to -0.060)	-0.054	-0.159 (-0.216 to -0.102)	-0.072
Wealth			0.050 (0.031 to 0.068)	0.071	0.030 (0.012 to 0.047)	0.042
Non-white			0.043 (-0.113 to 0.198)	0.007	0.133 (-0.015 to 0.282)	0.021
Has a limiting long-standing illness			-0.273 (-0.328 to -0.218)	-0.131	-0.148 (-0.201 to -0.095)	-0.071
Number of difficulties with activities of daily living			-0.099 (-0.130 to 0.068)	0.084	-0.043 (-0.073 to -0.014)	-0.037
Years lived in the same house			0.001 (-0.001 to 0.002)	0.011	0.001 (-0.001 to 0.002)	0.010
Depressive symptoms					-0.153 (-0.167 to -0.140)	-0.306

<sup>a</sup>Square root transformation applied to the outcome

**Table 5. Regressing follow-up hedonic well-being on baseline scores of neighborhood disorder and covariates (N = 6134)<sup>a</sup>**

	Model A		Model B		Model C	
	B (95%CI)	$\beta$	B (95%CI)	$\beta$	B (95%CI)	$\beta$
Neighborhood perceptions	-0.004 (-0.005 to -0.003)	-0.074	-0.004 (-0.005 to -0.003)	-0.075	-0.004 (-0.005 to -0.003)	-0.069
Baseline well-being	0.631 (0.609 to 0.654)	0.614	0.582 (0.559 to 0.605)	0.566	0.556 (0.532 to 0.580)	0.541
Age			-0.003 (-0.004 to -0.001)	-0.049	-0.003 (-0.004 to -0.001)	-0.055
Female gender			0.008 (-0.013 to 0.029)	0.008	0.017 (-0.004 to 0.038)	0.017
Married			0.044 (0.020 to 0.067)	0.041	0.036 (0.012 to 0.059)	0.033
In full or part-time work			0.034 (0.008 to 0.059)	0.033	0.030 (0.005 to 0.055)	0.029
At least high-school level education			0.050 (0.026 to 0.075)	0.044	0.046 (0.021 to 0.070)	0.40
Wealth			0.011 (0.003 to 0.019)	0.031	0.009 (0.001 to 0.017)	0.026
Non-white			0.007 (-0.064 to 0.078)	0.002	0.019 (-0.051 to 0.090)	0.006
Has a limiting long-standing illness			-0.074 (-0.099 to -0.049)	-0.069	-0.062 (-0.087 to -0.038)	-0.058
Number of difficulties with activities of daily living			-0.018 (-0.031 to -0.005)	-0.029	-0.011 (-0.024 to 0.002)	-0.019
Years lived in the same house			-0.001 (-0.001 to 0.001)	-0.001	-0.001 (-0.001 to 0.001)	-0.001
Depressive symptoms					-0.021 (-0.027 to -0.015)	-0.081

<sup>a</sup>Square root transformation applied to the outcome

**Table 6. Regressing follow-up eudaimonic well-being on baseline scores of neighborhood disorder and covariates (N = 6134)<sup>a</sup>**

	Model A		Model B		Model C	
	B (95%CI)	$\beta$	B (95%CI)	$\beta$	B (95%CI)	$\beta$
Neighborhood perceptions	-0.006 (-0.008 to -0.004)	-0.054	-0.007 (-0.010 to -0.005)	-0.067	-0.007 (-0.009 to -0.005)	-0.064
Baseline well-being	0.722 (0.703 to 0.742)	0.707	0.660 (0.639 to 0.681)	0.647	0.643 (0.620 to 0.667)	0.630
Age			-0.010 (-0.013 to -0.008)	-0.099	-0.011 (-0.013 to -0.008)	-0.104
Female gender			-0.008 (-0.047 to 0.031)	-0.004	0.001 (-0.039 to 0.040)	0.001
Married			0.010 (-0.029 to 0.050)	0.005	-0.001 (-0.041 to 0.039)	-0.001
In full or part-time work			0.024 (-0.022 to 0.070)	0.012	0.019 (-0.027 to 0.065)	0.009
At least high-school level education			0.047 (0.005 to 0.090)	0.021	0.042 (-0.001 to 0.084)	0.019
Wealth			0.031 (0.017 to 0.045)	0.044	0.030 (0.016 to 0.044)	0.042
Non-white			-0.091 (-0.213 to 0.032)	-0.014	-0.079 (-0.200 to 0.042)	-0.012
Has a limiting long-standing illness			-0.157 (-0.201 to -0.114)	-0.074	-0.145 (-0.189 to -0.102)	-0.069
Number of difficulties with activities of daily living			-0.024 (-0.048 to -0.001)	-0.020	-0.017 (-0.041 to 0.006)	-0.015
Years lived in the same house			-0.001 (-0.002 to 0.001)	-0.015	-0.001 (-0.002 to 0.001)	-0.015
Depressive symptoms					-0.024 (-0.036 to -0.013)	-0.048

<sup>a</sup>Square root transformation applied to the outcome

**Table 7. Regressing follow-up evaluative well-being on baseline scores of neighborhood disorder (N =6134)<sup>a</sup>**

	Model A		Model B		Model C	
	B (95%CI)	$\beta$	B (95%CI)	$\beta$	B (95%CI)	$\beta$
Neighborhood perceptions	-0.010 (-0.012 to -0.008)	-0.091	-0.009 (-0.012 to -0.007)	-0.085	-0.009 (-0.011 to -0.007)	-0.081
Baseline well-being	0.630 (0.609 to 0.652)	0.625	0.603 (0.580 to 0.625)	0.598	0.588 (0.565 to 0.611)	0.584
Age			-0.004 (-0.006 to -0.001)	-0.036	-0.004 (-0.007 to -0.001)	-0.038
Female gender			-0.027 (-0.066 to 0.012)	-0.014	-.019 (-0.058 to 0.020)	-0.010
Married			0.060 (0.015 to 0.106)	0.028	0.054 (0.008 to 0.099)	0.025
In full or part-time work			0.031 (-0.019 to 0.082)	0.016	0.026 (-0.024 to 0.076)	0.013
At least high-school level education			-0.031 (-0.078 to 0.016)	-0.014	-0.039 (-0.086 to 0.008)	-0.017
Wealth			0.037 (0.021 to 0.053)	0.038	0.035 (0.018 to 0.051)	0.036
Non-white			-0.034 (-0.164 to 0.095)	-0.035	-0.019 (-0.149 to 0.111)	-0.020
Has a limiting long-standing illness			-0.132 (-0.177 to -0.086)	-0.136	-0.116 (-0.162 to -0.070)	-0.119
Number of difficulties with activities of daily living			-0.012 (-0.037 to 0.013)	-0.012	-0.005 (-0.030 to 0.021)	-0.005
Years lived in the same house			0.001 (-0.001 to 0.002)	0.001	0.001 (-0.001 to 0.002)	0.001
Depressive symptoms					-0.025 (-0.036 to -0.013)	-0.025

<sup>a</sup>Square root transformation applied to the outcome