Urban neighbourhood unemployment history and depressive symptoms over time among late middle age and older adults

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Abstract

Background—Little is known about how a neighbourhood's unemployment history may set the stage for depressive symptomatology. This study examines the effects of urban neighbourhood unemployment history on current depressive symptoms and subsequent symptom trajectories among residentially stable late middle age and older adults. Contingent effects between neighbourhood unemployment and individual-level employment status (ie, cross-level interactions) are also assessed.

Methods—Individual-level survey data are from four waves (2000, 2002, 2004 and 2006) of the original cohort of the nationally representative US Health and Retirement Study. Neighbourhoods are operationalised with US Census tracts for which historical average proportion unemployed between 1990 and 2000 and change in proportion unemployed between 1990 and 2000 are used to characterise the neighbourhood's unemployment history. Hierarchical linear regressions estimate three-level (time, individual and neighbourhood) growth models.

Results—Symptoms in 2000 are highest among those residing in neighbourhoods characterised by high historical average unemployment beginning in 1990 and increasing unemployment between 1990 and 2000, net of a wide range of socio-demographic controls including individual-level employment status. These neighbourhood unemployment effects are not contingent upon individual-level employment status in 2000. 6-year trajectories of depressive symptoms decrease

over time on average but are not significantly influenced by the neighbourhood's unemployment history.

Conclusions—Given the current US recession, future studies that do not consider historical employment conditions may underestimate the mental health impact of urban neighbourhood context. The findings suggest that exposure to neighbourhood unemployment earlier in life may be consequential to mental health later in life.

INTRODUCTION

Few studies examine specific health effects of urban neighbourhood unemployment, and it is most often used as one of several indicators to compositely represent 'neighbourhood socioeconomic disadvantage'. However, neighbourhood unemployment is especially relevant as an important indicator of social context, given its fundamental role in characterising areas of 'accelerated decline'[1] and given the unprecedented expansion of the recent US recession, which began at the end of 2007.[2] Findings from previous studies have noted significant associations between neighbourhood unemployment and mental health,[3] self-rated health,[4] coronary heart disease[5] and mortality,[6,7] yet virtually nothing is known about how a neighbourhood's unemployment history may set the stage for depressive symptomatology or depressive symptom trajectories. In addition, little is known about how high unemployment in the community may interact with individual-level unemployment status to affect health (ie, 'cross-level interactions'), particularly among older adults who may be especially vulnerable to changing economic circumstances.[8]

This investigation examines the impact of change in urban neighbourhood unemployment on current depressive symptoms and subsequent depressive symptom trajectories among late middle age and older US adults. We use 1990 and 2000 US Census data as the operationalisation of neighbourhood combined with four waves of individual-level health and socio-demographic data (2000, 2002, 2004 and 2006) from the original cohort of the Health and Retirement Study (HRS).

Neighbourhood-level unemployment might be positively associated with depressive symptoms at the individual level because more unemployed persons live in neighbourhoods with high unemployment, a compositional effect, but we hypothesise that it is associated with depressive symptoms even among employed persons. In a recent review, Tausig[9] concludes that (1) unemployment has an adverse effect on mental health at the individual level, largely through threats to identity and financial strain; (2) unfavourable aggregate macroeconomic conditions such as unemployment rates are linked to poor mental health even among workers who do not directly experience unemployment and (3) job insecurity and fear of job loss have negative psychological effects. Neighbourhoods may have similar effects because they shape the types of people encountered in the social environment, such that people tend to associate with people of the predominant social class regardless of their own social class.[10] Thus, neighbourhoods with high unemployment may generate emotional distress because such neighbourhoods increase the rate of exposure to other residents who are unemployed, prompting anticipatory stress about possible job loss. This contact may be direct, such as having neighbours who are unemployed, or vicarious, such as hearing about job loss among people who live nearby. Furthermore, this effect may be compounded among persons in late middle age because of realistic anxiety that re-employment may be difficult as a result of age discrimination in hiring practices.

We focus on urban areas because of their high density of socioeconomically disparate populations[11] and because they serve as the cornerstone for theories explicating the adverse consequences of living within disadvantaged areas.[12–14] Only residentially stable persons are studied to capture the effects of neighbourhood unemployment on those 'ageing in

place',[15] persons who may be especially susceptible to health effects of the neighbourhood's unemployment history due to length of exposure. Late middle age and older adults are studied because these persons are embedded in long-term life-course trajectories (eg, work and marriage) that are subject to multiple transitions (eg, retirement, spousal bereavement) known to be associated with emotional well-being.[16] These individual-level processes occur in tandem with the neighbourhood's own evolving history, but whether there are long-lasting effects of earlier neighbourhood unemployment on subsequent health trajectories is not known.

We model change in neighbourhood unemployment, the rate of change in depressive symptoms over time and changes in life-course-related trajectories and transitions (eg, marital and employment roles), permitting stronger causal inference than the cross-sectional design of most other investigations of neighbourhood and depressive symptoms.[17] Most existing research implicitly assumes neighbourhood effects are fixed in time because changes in neighbourhood environments usually are not investigated.[18] Instead, we examine longitudinal mental health effects of the dynamic nature of neighbourhood unemployment.

METHODS

The sample

The HRS is a longitudinal survey of a community-based sample of persons aged 51–61 years at the 1992 initial interview, details of which have been published elsewhere.[19] The target population included all adults in the contiguous USA, born during the birth cohort years, who resided in households, with over-sampling of African–American, Hispanics, and residents of Florida. Spouses were included regardless of age. Time-varying sample weights are used to adjust for differential selection probabilities and attrition over time. Analyses were approved by the UCLA Office for Protection of Research Subjects.

Analytic sample derivation

As shown in figure 1, we use individual-level health and sociodemographic data for years 2000 (analytic baseline), 2002, 2004 and 2006 for participants who resided in the same residence between 1992 (HRS baseline) and 2006. These are the years leading up to the US recession,[8] thus precluding concerns with a period effect that would confound data collected immediately subsequent to this time. The neighbourhood component consists of unemployment data from the 1990 and 2000 US Census (normalised to 2000 boundaries) to capture 10-year change in neighbourhood unemployment. Urban neighbourhoods are operationalised as Census tracts within which at least 75% of the population lives in an urbanised area, as designated by the US Census.[20]

In 1992, there were 9500 age-eligible non-proxy interviews. Participants ineligible for this analysis were sequentially excluded as follows: 2331 not interviewed in 2000 (the analytic study baseline), 1233 who changed residence at any time between 1992 and 2006 and 2967 residing in non-urban neighbourhoods. The following were removed based on their 2000 data: 431 proxy interviews, 344 with missing or invalid data and 10 residing in nursing homes. The 2000 analytic baseline sample is 2184 urban-dwelling persons residing in the community in 864 Census tracts.

In 2002, 80 participants were known to have died and 162 were lost to follow-up; in 2004, there were 62 additional known deaths and 202 were lost to follow-up; in 2006, there were 70 additional known deaths and 205 were lost to follow-up. Participants were coded as missing after 2000 if they required a proxy interview or resided in a nursing home at that visit.

A logistic regression model indicated that those not included in the 2002 analytic sample were significantly (p<0.05) less likely than those included to be Hispanic (compared with non-Hispanic white) and male. Those not included in the 2004 sample were significantly less likely to be older and male. Results were similar in 2006, except that those not included had significantly lower baseline depressive symptom scores than those included.

Measures

The dependent variable is depressive symptoms measured in each of the four survey years with eight items (eg, felt depressed, felt that everything I did was an effort) from the Center for Epidemiological Studies–Depression Scale (CES-D),[21] with response codes of yes (1) or no (0) for experiencing the symptom during 'much of the time in the past week'.[22] Reliability is good for our analytic sample (2000, α=0.78), and construct validity for the eight-item version of the CES-D has been documented.[23][24] We use this non-diagnostic form of the eight-item CES-D to capture the full range of depressive symptom experiences over time, including subsyndromal symptomatology.

Individual-level socio-demographic covariates fall into two categories: (1) time invariant– gender, educational attainment (in years), age (in years) in 2000, ethnicity (Hispanic, African–American, 'Other', non-Hispanic white (reference)), household income in 2000 (natural log transformed after adding five hundred thousand to expunge negative values and dividing by one thousand), household wealth in 2000 (natural log transformed after adding 5 million to expunge negative values and dividing by one thousand), employment status in 2000 (retired, unemployed, disabled, not in labour force, employed (reference)) and marital status in 2000 (divorced, widowed, never married, married (reference)) and (2) time varying–change in marital status (lost a marital partner, with no change or gained a partner as the reference), change in household income or wealth (change of at least 15% since 2000, with no change or change <15% as the reference) and change in labour force participation (gained a labour force role or lost a labour force role, with no change since 2000 as the reference).

Although most studies report that depressive symptoms have a curvilinear association with age, being high in early adulthood and among the oldest old, the lower level during middle age is relatively stable.[25] A test for non-linearity was conducted by adding age squared to the model, with non-significant results for this narrow span of the life course.

As described above, neighbourhood is operationalised with US Census tracts. US Census tracts are designed to be relatively homogeneous units with respect to population characteristics at the time they are established, and ideally contain between 1000 and 8000 people, with an optimum size of 4000 people, although there is wide variation due to population shifts between the decennial Census data collections. Geographic size varies, depending on population density. Census tracts are particularly suitable representations of neighbourhoods in urban areas because of the dense concentration of persons, and their use is justified by the availability of official data concerning tracts, data that are not readily available for other definitions of neighbourhood. For our analyses, Census tracts were compiled by Geolytics Inc and the Urban Institute[20] based on 2000 tract boundaries. Neighbourhood unemployment is the proportion of residents over the age of 16 who are unemployed. There are 864 tracts, with 1–15 participants per tract (mean = 2.53). Two variables are used to capture the influence of neighbourhood unemployment history. The first is the historical average neighbourhood unemployment between 1990 (the US Census year most proximal to HRS baseline, see figure 1, normalised to 2000 boundaries) and 2000 (ie, 1990+2000, divided by two). The second is change in neighbourhood unemployment between 1990 and 2000 (ie, 2000–1990). To aid with interpretation, regression coefficients

and SEs for both neighbourhood variables are divided by 10 to assess mental health effects of 10% increments in neighbourhood unemployment.

Analysis

To adjust for the complex sample design, descriptive statistics were calculated with the SVY procedure in the Stata software package, V.10 (StataCorporation; Stata Statistical Software: Release 10.0). Three-level hierarchical linear growth models (level 1 for repeated observations of depressive symptoms over four survey collection points, level 2 for the individual and level 3 for neighbourhoods) with random intercepts and random time slopes at levels 2 and 3 were estimated with the HLMsoftware, V.6.08,[26] using full maximum likelihood estimation and robust SEs. With the exception of time (in years), all independent variables are grand mean centred. A quadratic time term was added to test the linear trend of depressive symptoms over time, but it did not substantially improve the models or alter findings and is not presented. Tests of statistical significance for random effects variances are one sided.[26] Deviance statistics are compared to assess sequential improvements of fit of multilevel models. Four hypotheses are tested: (1) there is statistically significant between-person and between-neighbourhood variation in depressive symptoms at baseline (2000), as well as significant between-person and between-neighbourhood variation in the rate of change (slope) of depressive symptoms over time; (2) historical average neighbourhood unemployment between 1990 and 2000 and change in neighbourhood unemployment between 1990 and 2000 are both significantly associated with depressive symptoms at baseline (2000) and with the rate of change in symptoms (slope) after 2000; (3) individual-level socio-demographic covariates account for some, but not all, of the between-person and between-neighbourhood variation in 2000 depressive symptoms and in the rate of change (slope per year) of depressive symptoms after 2000 and that neighbourhood unemployment effects on the 2000 level and slope of depressive symptoms will remain statistically significant, independent of individual-level covariates and (4) depressive effects of neighbourhood unemployment are conditional on individual-level employment status such that residing in neighbourhoods with high historical average unemployment or neighbourhoods with increasing unemployment have the greatest impact on depressive symptoms among persons who themselves are unemployed, that is, compound disadvantage.[27] This hypothesis flows from ecological theory,[28] which emphasises interactions between persons and their environment.

RESULTS

2000 Sample characteristics

As shown in table 1, the sample in 2000 is composed of more women than men, the average participant in their early 60s, three-quarters are non-Hispanic white and the majority were married. On average, participants are high school graduates, with near national average household incomes[29] and moderate household wealth. Nearly one-half are employed, with well over one-third being retired. On average, 8% of neighbourhood residents over age 16 are unemployed between 1990 and 2000 (the range is 0%–40%, not shown), and the average neighbourhood shows practically no change in unemployment between 1990 and 2000, although change scores range from −21% to +33% (not shown), indicating that some neighbourhoods experience dramatic fluctuations across the 10-year period.

Multilevel analysis

Hypothesis 1—As shown in table 2, model 1 indicates that the average number of depressive symptoms in 2000 is 1.36 (SE=0.05), with significant variation in depressive symptoms between persons and between neighbourhoods. In addition, there is significant between-person and between-neighbourhood variation in the rate of change (slope per year)

of depressive symptoms after 2000, although the mean slope is not significantly different from zero (p=0.22).

Hypothesis 2—As shown in model 2, the unadjusted model, there is a significant and positive effect of historical neighbourhood unemployment (average of 1990 and 2000 levels) on depressive symptoms in the year 2000 (ie, the intercept). Each 10% increment in historical average unemployment in the neighbourhood is associated with 0.57 additional depressive symptoms (95% CI 0.42 to 0.72, p<0.001). The average slope per year after 2000 remains nonsignificant; neighbourhood variables have no significant effect on the slope. Significant between-neighbourhood variation in 2000 symptoms (0.20) and the slope per year of symptoms (0.002) remains and model 2 represents a significant improvement in fit over model 1.

Hypothesis 3—As shown in model 3, adjusted for individual-level socio-demographic characteristics, the mean slope for depressive symptoms is now negative and significantly different from a zero slope, the historical average neighbourhood unemployment association with year 2000 depressive symptoms remains significant (0.19 additional symptoms per 10% increment in historical average unemployment; 95% CI 0.01 to 0.37, p<0.05), and increase in neighbourhood unemployment between 1990 and 2000 is now significantly and positively associated with year 2000 depressive symptoms (0.23 additional symptoms per 10% increase in unemployment between 1990 and 2000; 95% CI 0.02 to 0.44, p<0.05). There remains significant between-person and between-neighbourhood variation in both baseline (year 2000) depressive symptoms and in the annual rate of change (slope) of depressive symptoms after year 2000, and model 3 represents a significant improvement in fit over model 2. On average, being female, being widowed, separated or divorced (in comparison to being married), having few years of education and little household wealth, and being unemployed, retired, disabled or not in the labour force (in comparison with being employed) are significantly associated with higher baseline depressive symptoms. Household income is positively associated with baseline symptoms. Contemporaneously, losing a marital partner, decreasing wealth and losing a labour force role are positively associated with depressive symptoms. Being of 'other' ethnic background (in comparison with being non-Hispanic white) and being widowed (in comparison with being married) have significantly negative effects on the slope (ie, offset the average decline in depressive symptoms over time).

Hypothesis 4—Cross-level interactions between the neighbourhood-level unemployment variables and individual-level employment status (employed, unemployed, retired, disabled and not in the labour force) were not statistically significant (data not shown).

DISCUSSION

This study is unique in probing the dynamic influence of neighbourhood unemployment on depressive symptoms among residentially stable late middle age and older adults over an extended period. A distinguishing aspect is our exploration of whether previous neighbourhood unemployment conditions affect subsequent depressive symptom trajectories and whether neighbourhood effects might be conditional upon the individual's own employment status. Our results indicate that, net of individual-level socio-demographic characteristics, high historical average neighbourhood unemployment is harmful to motional health in 2000, the study's baseline. However, these harmful neighbourhood effects do not appear to influence emotional health over time: only individual-level factors (ethnicity and marital status) affect the average depressive symptoms slope, meaning that late middle age and older adults may take an emotional 'hit' from their neighbourhood's unemployment history but do not experience an accelerated rate of change in depressive symptoms due to

this unemployment history. Still, even in neighbourhoods with the most adverse employment histories, depressive symptoms subsequently decrease over time among this cohort of adults, consistent with larger epidemiological trends.[30]

Contrary to our expectations, we did not find evidence of compound disadvantage for current (2000) depressive symptoms or symptom trajectories (2000–2006) in that the mental health effect of neighbourhood unemployment was not significantly different among those who themselves were unemployed compared with the employed. Thus, neighbourhood employment-related mental health disparities appear to operate independent of individual-level employment status.

However, the absence of such a finding may be related to a lack of statistical power due to the presence of singleton Census tracts. It has become established that random intercept multilevel models do not need every cluster (or even a majority of clusters) to have multiple individuals when the objective is to examine the effects of measured neighbourhood characteristics on individual-level outcomes and there is enough variability in the neighbourhood characteristic of interest across the neighbourhoods in the study sample.[31] Yet having too few individuals per neighbourhood decreases the chances of detecting cross-level interactions if they exist.[32] This limitation is inherent to analysing data not originally intended for multilevel analysis.

We note other limitations to this investigation, including: the use of Census tracts as proxies for neighbourhoods, which is an imperfect approximation of neighbourhoods and may create artificial boundaries that do not match the subjective definitions of neighbourhood used by residents, leading to potential misestimations of neighbourhood effects; the possibility that the sample is biased by attrition; the possibility that the sample is biased towards a well-functioning retirement-aged population by the unavoidable exclusion of proxy-assisted interviews and persons not living in the community; and the fact that social selection may be an alternative explanation for our findings (eg, individuals may select into and out of neighbourhoods on the basis of its unemployment climate, predisposing them to mental health gains or deficits). In addition, treatment for depression is likely to affect an individual's depressive symptoms trajectory but we are unable to control for treatment status because it was measured for only a subset of the sample—participants who report having ever been told by a physician that they have had psychiatric, emotional or nervous problems —such that people who answered negatively to this question and had treatment are misclassified.

We also note several strengths of this investigation, including: the nationally representative HRS sample of retirement-aged adults; use of longitudinal depressive symptoms data and the innovative operationalisation of urban neighbourhood context, which specifically acknowledges that neighbourhoods are not fixed in time.

We conclude that studies that do not consider the mental health effects of previous neighbourhood characteristics, in conjunction with more current neighbourhood characteristics, may underestimate the broad impact of urban neighbourhood context on mental health among late middle age and older adults over time. We have shown that the assumption that neighbourhood effects are fixed in time is not entirely accurate because a neighbourhood's unemployment history is associated with depressive symptoms a decade later among late middle age and older persons, independent of the neighbourhood's current unemployment level. Our findings suggest that specific job growth interventions targeting low employment urban neighbourhoods may diminish the duration of unemployment exposure, offering a mental health reprieve to residentially stable late middle age and older

adults. Such interventions are especially relevant, given the current unfolding experience of prolonged exposure to neighbourhood unemployment due to the most recent US recession.

Acknowledgments

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What is already known on this subject

Findings from previous studies have noted significant associations between neighbourhood unemployment and various health indicators, yet virtually nothing is known about how a neighbourhood's unemployment *history* may set the stage for depressive symptomatology or for subsequent depressive symptom trajectories.

What this study adds

Controlling for individual-level socio-demographic characteristics, high historical average neighbourhood unemployment over the previous 10-year period is harmful to emotional health among residentially stable late middle age and older adults in 2000, the study's baseline. However, these harmful neighbourhood effects do not appear to influence emotional health over time (between 2000 and 2006), meaning that these individuals may take an emotional 'hit' from their neighbourhood's unemployment history but do not experience an accelerated rate of change in depressive symptoms due to this unemployment history. Job growth interventions targeting neighbourhoods entrenched in high unemployment may alleviate emotional distress due to prolonged exposure.
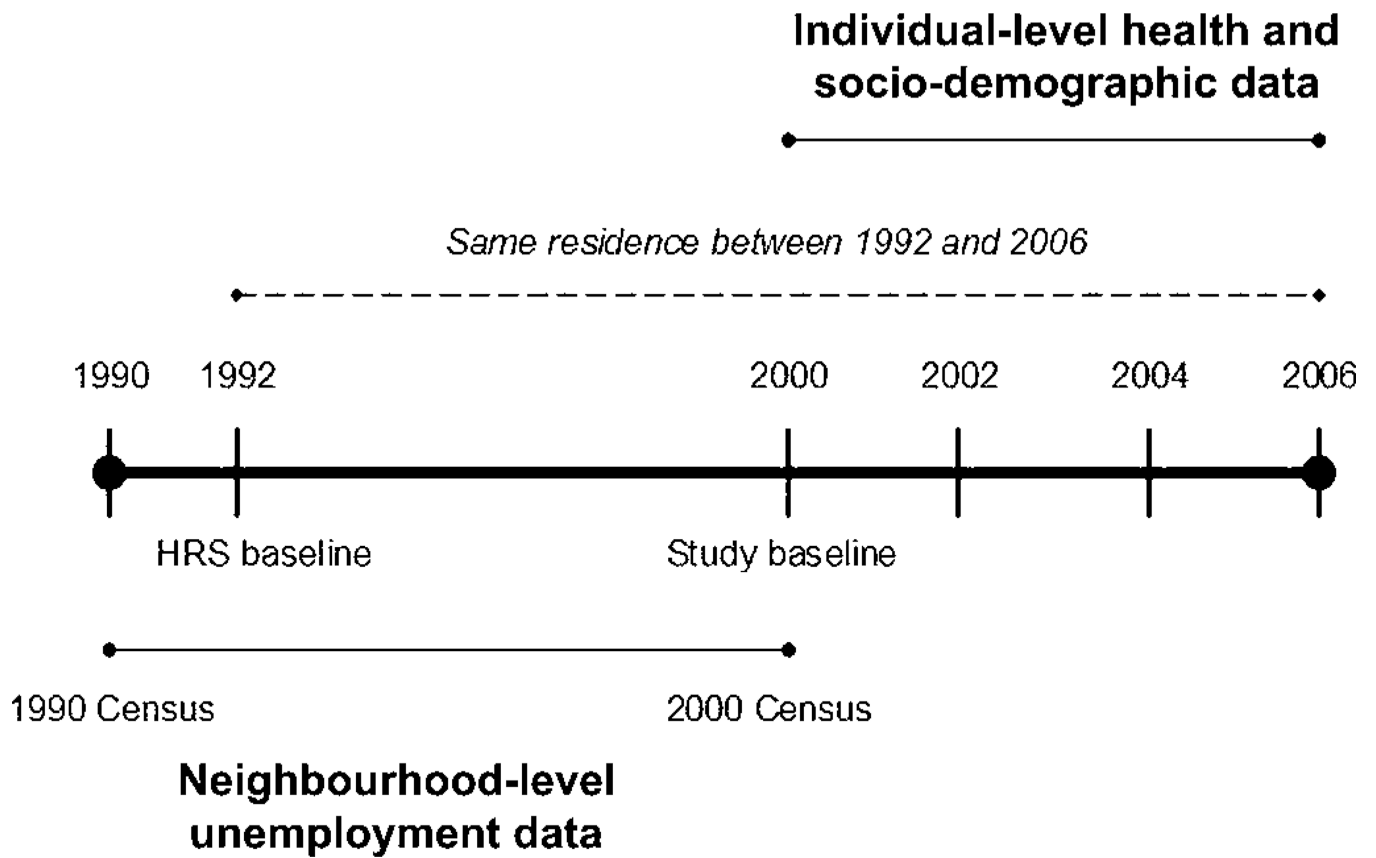
Figure 1.
Individual- and neighbourhood-level data for longitudinal sample. HRS, Health and Retirement Study.

Table 1

Characteristics of sample of US urban adults aged 58–69 years in 2000, n=2184

Individual-level socio-demographic characteristics	% or Mean	SD
Gender		
Female	57.57	
Male	42.43	
Age (years)	63.34	3.20
Ethnicity		
Non-Hispanic white	75.61	
AfricaneAmerican	14.20	
Hispanic	7.52	
Other	2.66	
Marital status		
Married	68.55	
Widowed	12.98	
Separated/divorced	13.36	
Never married	5.11	
Education (years)	12.77	2.97
Income (thousands $)	56.83	15.83
Wealth (thousands $)	545.42	153.08
Employment status		
Employed	47.40	
Unemployed	0.50	
Retired	39.06	
Disabled	3.20	
Not in labour force	9.83	
Neighbourhood-level characteristics (864 US Census tracts)		
Average proportion unemployed between 1990–2000	0.08	0.06
Change in neighbourhood unemployment between 1990 and 2000	−0.002	0.04

Individual-level data are weighted.

Table 2

Multilevel growth models of depressive symptoms between 2000 and 2006 among residentially stable US urban adults aged 59–69 years in 2000

	Model 1 B (SE)	Model 2 B (SE)	Model 3 B (SE)
Intercept: symptoms at baseline (year 2000)	1.36 (0.05)***	1.43 (0.04)***	1.49 (0.05)***
Slope (rate of change per year)	−0.008 (0.008)	−0.008 (0.008)	−0.03 (0.01)**
Associations of baseline symptoms with individual-level socio-demographics			
Age (in years)			0.002 (0.01)
Female (/male)			0.24 (0.08)**
Africane–American[†]			−0.06 (0.13)
Hispanic[†]			0.18 (0.19)
Other ethnicity[†]			0.24 (0.27)
Widowed[‡]			0.39 (0.13)**
Separated or divorced[‡]			0.41 (0.14)**
Never married[‡]			0.35 (0.20)
Years of education			−0.07 (0.02)***
Household wealth (natural log)			−1.41 (0.40)**
Household income (natural log)			0.87 (0.40)*
Unemployed[§]			1.30 (0.63)*
Retired[§]			0.30 (0.09)**
Disabled[§]			2.03 (0.28)***
Not in the labour force[§]			0.55 (0.16)**
Contemporaneous associations of change in individual-level variables on symptoms			
Change in marital status[¶]			
Lost a partner			0.95 (0.17)***
Change in household wealth[††]			
Wealth increased			0.02 (0.05)
Wealth decreased			0.17 (0.06)**
Change in household income[††]			
Income increased			−0.06 (0.05)
Income decreased			−0.01 (0.05)
Change in labour force participation[‡‡]			
Gained a labour force role			−0.24 (0.13)
Lost a labour force role			0.22 (0.07)**
Associations of baseline symptoms with neighbourhood-level unemployment			
Average unemployment, 1990–2000 (per 10%)		0.57 (0.08)***	0.19 (0.09)*
Increase in unemployment between 1990 and 2000 (per 10%)		0.19 (0.12)	0.23 (0.11)*

	Model 1 B (SE)	Model 2 B (SE)	Model 3 B (SE)
Associations of symptoms slope (after 2000) with individual-level socio-demographics			
Age (in years)			−0.002 (0.003)
Female (/male)			−0.009 (0.016)
AfricaneAmerican[†]			−0.03 (0.02)
Hispanic[†]			−0.05 (0.04)
Other ethnicity[†]			−0.10 (0.05)[*]
Widowed[‡]			−0.05 (0.02)[*]
Separated or divorced[‡]			0.02 (0.03)
Never married[‡]			−0.02 (0.03)
Years of education			−0.0009 (0.003)
Household wealth (natural log)			0.03 (0.08)
Household income (natural log)			−0.11 (0.08)
Unemployed[§]			0.11 (0.13)
Retired[§]			0.01 (0.02)
Disabled[§]			0.05 (0.09)
Not in the labour force[§]			0.05 (0.03)
Associations of symptoms slope with neighbourhood-level unemployment			
Average unemployment, 1990e2000 (per 10%)		0.01 (0.01)	0.01 (0.02)
Increase in unemployment between 1990 and 2000 (per 10%)		−0.03 (0.02)	−0.03 (0.02)
Random variance component			
Within-person symptoms	1.44	1.44	1.40
Between-person symptoms			
Baseline	1.63[***]	1.66[***]	1.46[***]
Slope (per year)	0.01[*]	0.01[*]	0.01[**]
Between-neighbourhood symptoms			
Baseline	0.56[***]	0.20[***]	0.12[***]
Slope (per year)	0.05[*]	0.002[*]	0.003[*]
Model comparison (to previous model)			
χ^2		56.76[***]	1389.94[***]
Degrees of freedom		4.0	37.0

[*] $p < 0.05$,

[**] $p < 0.01$,

[***] $p < 0.001$.

[†] Reference group = non-Hispanic white.

[‡] Reference group = married.

[§] Reference group = employed.

[¶] Reference group = no change or gained a partner.

†† Change of at least 15% since 2000; reference group = no change or change <15%.

‡‡ Reference group = no change in labour force participation since 2000.