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Neighborhood effects in depressive symptoms, social support, and mistrust: Longitudinal analysis with repeated measurements

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ABSTRACT

While many associations between neighborhood characteristics and individual well-being have been reported, there is a lack of longitudinal studies that could provide evidence for or against causal interpretations of neighborhood effects. This study examined whether neighborhood urbanicity and socioeconomic status were associated with within-individual variation in depression, mistrust and social support when individuals were living in different neighborhoods with different levels of urbanicity and socioeconomic status. Participants were from the Young Finns prospective cohort study (N = 3074) with five repeated measurement times in 1992, 1997, 2001, 2007, and 2011. Neighborhood urbanicity and socioeconomic status were measured at the level of municipalities and zip-code areas. Within-individual variation over time was examined with multilevel regression, which adjusted the models for all stable individual differences that might confound associations between neighborhood characteristics and individual well-being. Social support from friends was higher in urban areas and in areas with higher socioeconomic status, whereas social support from the family was higher in rural areas. These associations were observed also in the within-individual analyses, and they were partly accounted for by employment and socioeconomic status of the participants. There were no associations between neighborhood characteristics and depression or mistrust. These findings suggest that people receive less support from their families and more support from their friends when living in urban compared to rural regions of Finland. These differences are partly explained by people's changing socioeconomic and employment statuses.

1. Introduction

Physical and social characteristics of residential areas are considered important for people's health and well-being (Diez Roux and Mair, 2010). Several studies have reported that neighborhood differences in average socioeconomic status are related to mental health outcomes, such as depression (Kim, 2008). Other studies of "neighborhood effects" have suggested that features of the physical environment, such as presence of parks and supermarkets, may influence people's physical activity, diet and obesity risk (Diez Roux and Mair, 2010). However, most of these studies have not been able to determine whether these associations between neighborhood characteristics and individual well-being are causal, that is, whether neighborhood characteristics influence individual well-being—the social causation hypothesis. The alternative explanation is that the neighborhood associations arise due to selective residential mobility, that is, individuals with different levels of well-being tend to select different residential locations—the social selection hypothesis (Diez Roux and Mair, 2010; Diez Roux, 2001; Pampel et al., 2010; Sampson et al., 2002). In the present study, we used longitudinal data from a prospective cohort study to examine evidence for or against the social causation

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hypothesis of neighborhood effects in mental health and well-being, including depressive symptoms, social trust, and received social support.

Several studies of neighborhood effects in mental health have used depressive symptoms as the measure of mental health (Kim, 2008; Mair et al., 2008). These studies have shown that neighborhood characteristics, such as neighborhood disorder (Cutrona et al., 2006), socioeconomic status of neighborhoods (Galea et al., 2007; Ross, 2000), neighborhood social environment (Echeverría et al., 2008; Latkin and Curry, 2003) are associated with depressive symptoms of the residents. The level of urbanicity has also been associated with depressive symptoms (Sundquist et al., 2004), although the evidence has been mixed. Some studies have reported higher rates of depression in urban than rural areas (Peen et al., 2010) while other studies have reported the reverse (Miles et al., 2012).

Neighborhood characteristics may also influence how people trust other individuals. Social capital—the informal social ties that connect people and communities—has been associated with neighborhoods characteristics, such as income inequality and crime rates (Kawachi et al., 1997; Kennedy et al., 1998). Social mistrust can be considered as part of the broader concept of social capital, especially the cognitive dimensions of social capital (Fujiwara and Kawachi, 2008; Phongsavan et al., 2006) related to people's negative and suspicious beliefs other people's behavior and intentions (Lewicki et al., 1998). Mistrust is not merely the lack of trust but a more pronounced suspiciousness of the motives of other people's actions (Wang et al., 2009). Before the concepts of social capital and neighborhood effects, the role of neighborhoods in feeding social mistrust was already discussed under the theme of *urban alienation*. However, only a few studies have examined whether and how mistrust is associated with urban/rural differences—or with neighborhood socioeconomic status, which is strongly correlated with urbanicity. In a study of residents of Chicago and rural areas of Illinois, urban residents reported more mistrust than rural residents (Ross et al., 2002). This difference was largely attributed to differences in neighborhood disadvantage and social disorder. Another study reported an association between neighborhood disorder and mistrust, and suggested that these social risk factors may be mainly an urban phenomenon (Geis and Ross, 1998).

With respect to mental health, the concepts of mistrust and social capital are closely related to concepts of hostility and social support, which have been studied in health psychology and behavioral medicine. Hostile, cynic and suspicious interpretations of other people's motives have been associated with higher morbidity, such as coronary heart disease (Smith et al., 2004) and metabolic syndrome (Niaura et al., 2000), and all-cause mortality (Chida and Steptoe, 2009). Hostility has also been associated with depressive symptoms (Stewart et al., 2010). Social support, in turn, has been shown to buffer against the development of physical and mental illnesses (Berkman, 2001; Cohen and Wills, 1985), including depression (Heponiemi et al., 2006; Klineberg et al., 2006). In the United States, some studies have reported rural residents receiving more social support than urban residents (Mickelson and Kubzansky, 2003), especially from their families (House, 1987). These differences in social support might help to explain lower risk of depression in rural regions—or mitigate elevated risk of depression.

1.1. Current study

While many studies have shown differences in mental health and risk factors between neighborhoods, it remains unclear whether living in more or less adverse neighborhoods causes better or poorer mental health, or whether area-level differences are due to selective mobility (i.e. healthy people move to less adverse neighborhoods than those who are less healthy). A recent Australian study provided evidence against the social causation hypothesis (Jokela, 2014). People who moved across more and less disadvantaged neighborhoods did not have poorer self-rated health or health behaviors when they were living in the more disadvantaged neighborhood compared to another time when they were living in more advantaged neighborhood (Jokela, 2014).

The purpose of the present study was to examine whether and how depressive symptoms, social support, and mistrust are associated with neighborhood socioeconomic status and urban/rural regional differences. Following the methodological approach of the Australian study cited above (Jokela, 2014), we used longitudinal data with repeated measurements to separate the associations to (1) average differences between different individuals and (2) variation over time within the same individuals. The repeated measurements allow us to assess whether people's well-being is different when people are living in different neighborhoods. This setting provides a better test for the social causation hypothesis, as change in the exposure (i.e., neighborhood characteristics) should lead to change in the health outcome if the association is truly causal, as the within-individual analysis adjusts for all the stable individual characteristics that might confound the neighborhood effects via selective residential mobility. We focus on depressive symptoms as the main outcome. In addition, we examine social support and social trust as secondary outcomes, as they have been associated with depression risk (Cohen and Wills, 1985; Phongsavan et al., 2006; Wethington and Kessler, 1986). Furthermore, we also examine whether social support mitigates the association between depression/mistrust and neighborhood characteristics. To test the robustness of the associations against different measurement levels of neighborhoods, both neighborhood socioeconomic status and urbanicity at the level of municipalities and zip-code areas were used as exposures. Based on earlier research we hypothesized that living in deprived urban neighborhoods increases depressive symptoms, diminish social support, especially from family, and yields more distrust among residents.

2. Methods

2.1. Participants

The participants were 3074 individuals (1661 women) from the ongoing Young Finns prospective cohort study. The original sample ($n = 3596$) was gathered from five Finnish university cities with a medical school (Helsinki, Kuopio, Oulu, Tampere and Turku) and their surrounding suburban and rural areas in order to be broadly representative of the Finnish population (Raitakari et al., 2008). Healthy children and adolescents in six birth cohorts (aged 3, 6, 9, 12, 15, and 18 years at baseline) were randomly selected on the basis of their social security number. The study began in 1980 and participants have been followed subsequently in eight study waves in 1983, 1986, 1989, 1992, 1997, 2001, 2007 and 2010–2012. The study was approved by local ethics committees. In the current study data from the last five (from 1992 to 2012) study waves were used. Participants with all the relevant data for at least one study wave were included.

2.2. Depressive symptoms

Depressive symptoms were assessed using a modified version of the self-report Beck's Depression Inventory in all study waves. The original inventory consists of 21 items with four alternative statements for each item. In the modified version, used in the present study, participants were asked 21 items, which they answered on a

5-point scale (1 = totally disagree, 5 = totally agree), and the total scale was calculated as the mean of the items (range = 1–5) with higher values indicating more severe symptoms of depression. The items were the second mildest statements of each one of the original items. The modified version uses the second mildest statements, as it has been suggested that these are best in measuring the depressive tendencies of non-clinical population (Rosenström et al., 2012). Cronbach's alphas for the modified version of the inventory were 0.88, 0.91, 0.92, 0.93 and 0.93, respectively for each study wave.

2.3. Mistrust

Mistrust was measured in all study waves with the cynicism scale derived from the Minnesota Multiphasic Personality Inventory (Comrey, 1957, 1958; Hakulinen et al., 2014). Cynicism scale consists of seven items rated on a 5-point scale (1 = totally disagree, 5 = totally agree; total scale calculated as the mean of the items with higher values indicating higher mistrust), and includes items such as "I think most people would lie to get ahead" and "It is safer to trust nobody". Cronbach's alphas for each study wave were 0.75, 0.78, 0.80, 0.83 and 0.83.

2.4. Social support

Perceived social support was measured using Multidimensional Scale of Perceived Social Support (MSPSS) (Blumenthal et al., 1987). MSPSS is divided into three subcategories, which measure perceived social support from family, friends and a significant other, respectively. Each subcategory includes four items, which are rated on a 5-point scale (1 = totally disagree, 5 = totally agree; total scale calculated as the mean of the items with higher values indicating higher social support), and includes items such as "My friends really support me when I need support", "I get emotional help and support I need from my family", "I have a special person who comforts me". We had the measures for the study waves of 1992, 1997, 2001 and 2007. Cronbach's alphas for the social support by family for each study wave were 0.90, 0.92, 0.92 and 0.94. For support by friends the alphas were 0.89, 0.91, 0.92 and 0.93, and for significant other 0.95, 0.95, 0.96 and 0.96. For the purpose of the study the scales for support by friend and support by significant other were combined and divided by 2 to match the scale of the other outcome variables.

2.5. Municipality and zip-code area characteristics

Data for municipalities was gathered from SOTKAnet (SOTKAnet, 2014), which contains statistical information on welfare and health in Finland. Finland in divided into 320 municipalities of different sizes (6–15053 km^2 in land area). Median number of residents was 5878 (range: 103–595,384) and median population density 10.90 persons per square kilometer (range: ~0– 3051 persons/km^2). Each municipality is also divided into zip-code areas. Zip-code data were gathered from Statistics Finland (Statistics Finland, 2014). There are 3035 zip-code areas in Finland, with a median number of residents of 483 (range: less than 100 to 25,820). Data for zip code areas with population less than 100 were not available due to privacy reasons. Zip-code areas in Finland are originally drawn based on the distribution of post offices, so they are more homogenous in size and shape than the U.S. zip code areas. Especially in cities, zip codes characterize "social neighborhoods" quite well, but this may not be the case in more rural areas.

To account for the fact that zip-code areas can be situated in a densely populated municipality but still be more rural than urban in its characteristics, we measured the effect of socioeconomic status and level of urbanicity on depressive symptoms, social support and mistrust on both zip-code area and municipality level. On zip-code area level socioeconomic status was measured as median gross income per capita per year. On the municipality level, tax revenue per capita was used. The measures from different study waves were corrected for inflation to year 2012. Level of zip-code area urbanicity was measured as a combined measure of the proportion of high-rise buildings, available supermarkets and health services on the area, with a higher value representing higher urbanicity. On municipality level, level of urbanicity was measured using density of population as a proxy.

Neighborhood data for zip-code areas were not available before 2007, so zip codes were assigned data values based on data from 2007 for each study wave. Thus, these data did not take into account how the zip-code areas changed over time, and within-individual variation was caused only by people's migration across different zip-code areas. Municipality level socioeconomic data were available for the study waves of 2001, 2007 and 2012. For earlier waves, the data from 2001 were used as proxies. For the analysis, all municipality and zip-code area information were standardized (mean = 0; sd = 1) at the level of municipalities or zip-codes, and then matched with participant's self-reported place of residence for each study wave. Ranges for standardized variables were −1.33; 3.4 for zip-code area urbanicity, −4.01; 4.63 for zip-code area SES, −0.58; 3.08 for municipality urbanicity and −2.16; 4.23 for municipality SES.

2.6. Covariates

Covariates included age, quadratic age term, sex, education, labor force participation status and enrollment status. Education was measured in study waves of 1992, 2001, 2007 and 2012 as highest held degree. The education variable was divided into four categories: 1) vocational upper secondary school degree or similar, 2) polytechnic degree, 3) university studies (no degree) and 4) university degree. Labor force participation status and enrollment status were formed from self-reported held position measured in study waves 1992, 2001, 2007 and 2012, which included options "full-time employment", "part-time employment and studying" and "full-time studying". It was possible for a participant to be listed as belonging to both groups.

2.7. Statistical analysis

Associations of neighborhood characteristics with depressive symptoms, mistrust and social support were analyzed using random-intercept multilevel regression. Linear models were fitted separately for each outcome and neighborhood characteristic variable. The multilevel analysis is similar to ordinary least square regression with the difference that it considers the repeated measurements from the same individuals as non-independent. This produces correctly estimated error terms and therefore correctly estimated confidence intervals and p-values. The total regression coefficient is a weighted average of between-individual and within-individual variation in the exposure related to the outcome. Using repeated measurements, the between-individuals and within-individual components can be estimated separately. The within-individual regression can be used to examine within-individual dynamics in the associations between exposures and outcomes, within-individual regression controls for all constant differences between different individuals; only variables that vary over time can account for variance in the outcome variable.

To test whether social support can mitigate the relationship between depression/mistrust and neighborhood characteristics, we ran another set of analysis which included interaction term

between each neighborhood variable and social support variable combination. Thus, altogether eight models were run to test for interactions.

Finally we ran sensitivity analysis using balanced panel data. In this analysis we only included those participants who had measurements for all outcome variables for all study waves (n = 936; 615 women).

3. Results

The descriptive statistics of the variables are shown in Table 1. Of the 3074 participants (53.9% women) 30.3% had all the data from each of the five study waves (20.0% from four, 17.6% from three, 16.4% from two, and 15.7% from one). The number of participants for each wave was 2333, 2102, 2098, 2056 and 1714, for study waves 1992, 1997, 2001, 2007 and 2012, respectively. Altogether there were data for 10,304 person-observations of the possible 15,370 person-observations that would have been available if all the 3074 participants had participated in all the 5 study waves. Of the 3074 participants, 38.7% did not move between municipalities during the study period, 25.9% moved once, 21.5% moved twice, 12.1% moved three times and 1.8% moved between each study wave. On zip code area level the corresponding numbers were 19.2%, 23%, 29.3%, 21.9% and 6.6%. Of all the participants, 9.9% reported no change in social support by family between two consecutive study waves. Also 6.1% of the participants reported no change in social support by friends between two consecutive study waves. None of the participants responded in exactly the same way to depression or mistrust scale in two consecutive study waves.

Associations between neighborhood characteristics and outcome variables adjusted for sex, age and quadratic age term are reported in Fig. 1. None of the neighborhood characteristics were associated with depressive symptoms or mistrust. Higher level of socioeconomic status of municipality was associated with less social support from family, and there was no difference between within-individual and between-individuals associations. Higher level of urbanicity of municipality was associated with more social support from friends, and there was no difference between within-individual and between-individuals associations. Higher SES of municipality was also associated with more social support from friends. Again, there was no difference between the within-individual and between-individuals components. Higher urbanicity and SES of zip-code area were also associated with more social support from friends, with no difference between the components.

After adjusting for time-varying variables of education, employment status, and enrollment status of the participants the association between socioeconomic status of municipality and social support by family was no longer significant (Table 2). The association between zip-code urbanicity and social support by friends also became non-significant. Likewise, the within-individual component in the association between municipality urbanicity and social support by friends was attenuated by 28% (B = 0.04 to B = 0.03) and became non-significant. Similarly the within-individual component of the association between zip-code area urbanicity and social support by friends was attenuated by 39% (B = 0.03 to B = 0.02) and became non-significant. However, the coefficients for the total and within-individual associations were almost identical, and the within-individual associations were non-significant only because of the wider confidence intervals.

There were no interaction effects between social support and neighborhood characteristics when predicting depressive symptoms or mistrust, which provided no support for the buffer hypothesis of social support (all p > .05). The results from the sensitivity analysis were similar to those from the main analysis (see Supplementary Table 1). No statistically significant differences were found.

4. Discussion

This study used repeated-measurement data from a prospective

Table 1
Descriptive statistics of the 10,304 person-observations from 3074 unique individuals from the Young Finns Study (1992–2012), and municipality and zip-code area level measures.

Variable		Total no.	No. of persons	%	Mean (SD)	Within-person SD
Sex						
	Men	4317	1413	46.1		
	Women	5987	1664	53.9		
Age					32.1 (8.7)	7.1
Education					15.1 (3.4)	1.0
	Vocational	3537	1709	61.4		
	Polytechnic	731	428	12.7		
	University (no degree)	252	193	4.4		
	University degree	1241	614	21.5		
Labor force status						
	Working	5781	2515	49.2		
	Not working	5963	2664	50.8		
Enrollment status						
	Studying	1801	1415	15.3		
	Not studying	9943	3056	84.7		
Depressive symptoms[a]					2.1 (0.7)	0.4
Mistrust[a]					2.7 (0.7)	0.4
Social support by family[a]					4.2 (0.9)	0.5
Social support by friends[a]					4.2 (0.9)	0.5
Municipality						
	Urbanization				483 (891)	444
	SES				2976 (737)	356
Zip-code area						
	Urbanization				1.1 (1.2)	0.8
	SES				15205 (3087)	1680

Abbreviation: SD, standard deviation; SES, socioeconomic status. For categorical variables, the values are the number of total person-observations, number of unique persons, and percentages calculated from person-observations. For continuous variables, the values are means, overall standard deviations, and within-person standard deviations.
[a] Rated on a scale of 1–5.

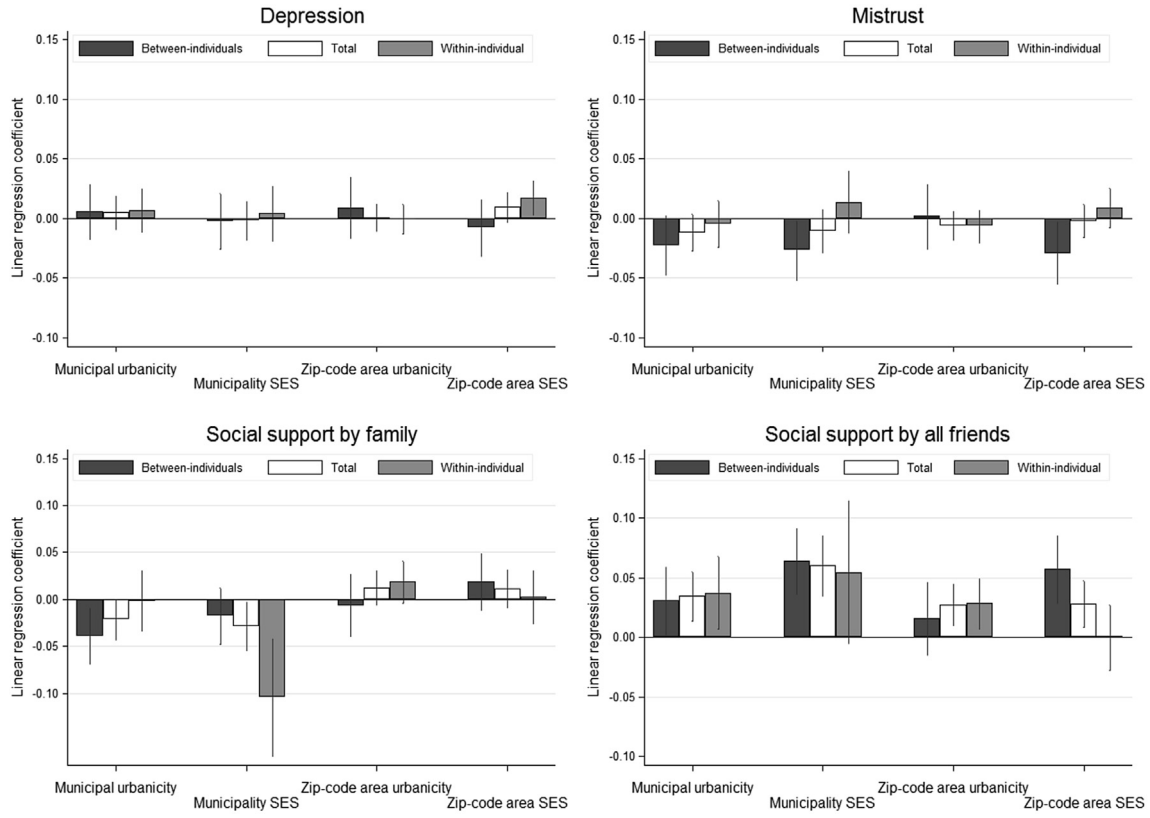

Fig. 1. Associations between municipality and zip-code area level of urbanicity (Municipality urb. and Zip-code area urb.), municipality and zip-code area socioeconomic status (Municipality SES and Zip-code area SES), and outcome variables separately for between-individuals, total and within-individual regressions adjusted for sex, age and quadratic age term. Bars represent the magnitude of linear regression coefficients. Error bars are 95% confidence intervals.

Table 2
Minimally and maximally adjusted associations between neighborhood characteristics and social support.

	Total		Within		Between	
	b	CI 95%	b	CI 95%	b	CI 95%
Adjusted for sex, age and age^2						
Soc.sup.family						
Mun. Urb.	−0.02	−0.04; 0.00	0.00	−0.03; 0.03	**−0.04**	**−0.07; −0.01**
Mun. SES	**−0.03**	**−0.05; 0.00**	**−0.10**	**−0.17; −0.04**	−0.02	−0.05; 0.01
Zip. Urb	0.01	−0.01; 0.03	0.02	0.00; 0.04	−0.01	−0.04; 0.03
Zip. SES	0.01	−0.01; 0.03	0.00	−0.03; 0.03	0.02	−0.01; 0.05
Soc.sup.friends						
Mun. Urb.	**0.03**	**0.01; 0.06**	**0.04**	**0.01; 0.07**	**0.03**	**0.00; 0.06**
Mun. SES	**0.06**	**0.03; 0.09**	0.05	−0.01; 0.11	**0.06**	**0.04; 0.09**
Zip. Urb	**0.03**	**0.01; 0.04**	**0.03**	**0.01; 0.05**	0.02	−0.01; 0.05
Zip. SES	**0.03**	**0.01; 0.05**	0.00	−0.03; 0.03	**0.06**	**0.03; 0.09**
Additionally adjusted for education, employment status and enrollment status						
Soc.sup.family						
Mun. Urb.	**−0.04**	**−0.06; −0.01**	−0.04	−0.08; 0.01	**−0.04**	**−0.07; 0.00**
Mun. SES	−0.01	−0.04; 0.03	−0.05	−0.14; 0.03	0.00	−0.03; 0.04
Zip. Urb	0.00	−0.03; 0.02	0.00	−0.04; 0.03	−0.01	−0.04; 0.03
Zip. SES	0.00	−0.02; 0.03	−0.01	−0.06; 0.03	0.01	−0.02; 0.04
Soc.sup.friends						
Mun. Urb.	**0.03**	**0.01; 0.06**	0.03	−0.02; 0.07	**0.03**	**0.00; 0.07**
Mun. SES	**0.05**	**0.02; 0.09**	0.06	−0.02; 0.14	**0.06**	**0.02; 0.09**
Zip. Urb	0.02	−0.01; 0.04	0.02	−0.02; 0.05	0.02	−0.02; 0.05
Zip. SES	**0.03**	**0.01; 0.06**	0.02	−0.03; 0.06	**0.04**	**0.01; 0.07**

Regression coefficients and 95% confidence intervals separately for total, within-individual, and between-individual regressions between neighborhood characteristics and social support by family and friends. Statistically significant b-values and confidence intervals in bold.

cohort study with 3074 participants to examine the association of neighborhood characteristics with resident's depressive symptoms, social support and mistrust. People living in urban municipalities reported less social support from their family than people living in rural municipalities. By contrast, urban municipality residents reported more social support from friends compared to rural municipality residents. These results were not observed on the level of zip-code neighborhoods. Higher area-level SES was also associated

with more social support from friends on both municipality and zip-code area level. These associations were replicated in within-individual analysis, suggesting that people's sources of social support change as they move across rural and urban regions. Adjusting for sociodemographic covariates attenuated these associations, suggesting that the changes in social support across rural and urban regions partly reflects people's socioeconomic and employment status. Depressive symptoms and mistrust were not associated with any neighborhood characteristics. Likewise, the interactions between social support and neighborhood characteristics did not change the association between depression and mistrust, and the neighborhood characteristics. In addition, the sensitivity analysis did not change results of the main analysis.

Our results are partly in line with earlier studies. In our sample, people living in rural areas reported more social support from their families than those living in urban areas. However, people living in urban areas reported more social support from their friends, suggesting that urban living is characterized by weaker ties with family members but stronger ties with non-relative friends. A review of social support studies (House et al., 1988) noted that social network size might not differ between rural and urban residents but rural social networks are more often based on family relationships compared to urban social networks. This difference may be partly related to differential migration rates in rural and urban areas—urban residents may be more likely to live farther away from their families than rural residents (Amato, 1993), which favors the social selection hypothesis.

Previous studies have shown that residents living in neighborhoods with high SES report more social support than those living in neighborhoods with low SES (Huurre et al., 2007; Mickelson and Kubzansky, 2003; Ziersch et al., 2009). In the present study, we only observed the association with social support from friends but not from family members. Perhaps affluent neighborhoods provide more opportunities to interact with other people and make new friends. In line with this interpretation are the results that income inequality has a negative effect on social capital. As part of the definition of social capital is civic participation (Putnam, 2000), it could be argued that residents of affluent areas are better connected, and thus have more possibilities to ask for help and actually receive help more often.

In contrast to our hypotheses, there were no associations between neighborhood SES and urbanicity with depressive symptoms or mistrust, and these associations did not emerge in separate between-individuals or within-individual analyses. Higher levels of depression or mental health issues have been reported among urban than rural residents, and among those living in poor areas (Galea et al., 2005; Peen et al., 2010; Ross, 2000; Jokela, 2014). Associations between neighborhood SES and depression have also been mixed (Kim, 2008), with approximately half of the studies reporting significant associations and the other half not observing any associations between neighborhood SES and depression. The mixed evidence may be related to different neighborhood definitions (Sampson et al., 2002), and to other methodological factors such as different measures of depression. On the other hand, it is possible that urban and rural areas have both adverse and protective effects on mental health, and the relative contributions of these effects depends on the social context or characteristics of the residents that have not yet been correctly identified.

4.1. Strengths and limitations

The main strength of the present study is the use of repeated-measurement longitudinal data to examine whether the same individuals reported different levels of social support, depressive symptoms, and mistrust when they were living in different neighborhoods. This within-individual analysis adjusts the regression model for all the differences between different individuals that are stable over time, and thereby adjusts for a broad range of potential confounding factors. However, time-varying individual characteristics can still confound within-individual associations, so the within-individual analysis does not adjust for all the possible confounders.

Other strengths of the study include a large sample size and assessment of neighborhood characteristics at the level of municipalities and zip-codes. The main limitations were the use of self-report data only, and that we did not have neighborhood data for zip-code areas from all of the measurement time but had to use neighborhood data from year 2007 to all the measurement times. This did not allow us to examine whether people's well-being is affected when the individuals remain in the same neighborhood but the neighborhood's characteristics change over time.

5. Conclusions

While many associations between neighborhood characteristics and various health outcomes have been reported, there are only few studies that have attempted to test whether these associations are causal, so that neighborhoods influence people's well-being. Our results with repeated-measurement longitudinal data suggest that people's sources of social support change as they move across urban and rural regions, with urban residents receiving more support from their friends but less support from their families. These associations appear to be partly explained by people's changing socioeconomic and employment statuses.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.socscimed.2015.04.034.

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