Neighborhood effects in mental health and health behavior: Longitudinal analysis of social causation versus selective residential mobility

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Abstract

Differences in well-being between neighborhoods have long been recognized. These inequalities have been explained by neighborhood effects, in other words characteristics of the neighborhoods that affect well-being. However, the direction of causality in neighborhood effects is still unknown. This dissertation examines whether inequalities in well-being between neighborhoods are caused by neighborhood characteristics – social causation, or by selective residential mobility – social selection.

The participants in these studies were from the ongoing prospective longitudinal population-based Young Finns study. The aims of this study were: 1) to examine whether neighborhood urbanicity and socioeconomic status affected health behaviors, depressive symptoms and source of social support, and 2) to examine how those variables affect residential mobility behavior.

The results suggest that people in more urban and affluent neighborhoods are more interested in their health. However, simultaneously those people drink more alcohol, and also people in more urban areas smoke more. People in more rural areas received more social support from their family, whereas people in more urban areas received more social support from their friends. While part of the results were explained by social causation, most of the effects were attributed to social selection. People who received more social support from their friends were more likely to move and to move more frequently. Also, people with better health behaviors moved longer distances. None of the individual level variables were associated with selective residential mobility between municipalities.

This dissertation addressed the problem of causality in neighborhood effects. The findings do give some support for social causation in neighborhood effects, but most of the effects are explained by social selection. However, the results also imply that health behaviors or social support do not affect selective residential mobility. Therefore, it is likely that some other individual level variables govern selective residential mobility and the forming of differences in well-being between neighborhoods.
Tiivistelmä


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List of original publications


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Abbreviations

BDI  Beck’s Depression Scale
mBDI  Modified Beck’s Depression Scale
OR  Odds ratio
SES  Socioeconomic status
1 Introduction

The associations of physical and psychological well-being of people with different diseases are widely researched subjects. Understanding the risks of, for example, depression and lack of exercise on coronary heart disease (Whooley et al., 2008), can help in taking preventive action against such life threatening diseases. While there are many individual level characteristics, such as socioeconomic status and personality, that are associated with well-being and health behaviors (Hampson, Goldberg, Vogt, & Dubanoski, 2006; Hanson & Chen, 2007), the environment we live in can also influence our lives.

Neighborhoods’ social and environmental characteristics have been associated with well-being of individuals for quite some time (Pickett & Pearl, 2001; Wandersman & Nation, 1998). Neighborhood characteristics such as socioeconomic status, crime rate, and population density have been shown to correlate with various outcomes including coronary heart disease, health, alcohol consumption, and depression (Chaix, 2009; Fogelholm et al., 2006; Janssen, Boyce, Simpson, & Pickett, 2006; Kim, 2008; Peen, Schoevers, Beekman, & Dekker, 2010; Stockdale et al., 2007; Sundquist et al., 2006).

These associations are commonly known as neighborhood effects, meaning contextual variables that explain a wide range of human behavior or outcomes from voting tendency to depression. Neighborhood effects have been presented as a way of explaining the behavior of individuals but also why some neighborhoods offer better premises for a well-balanced life than others. Favorable neighborhood characteristics could, for example, facilitate social interaction between people, which in turn might increase cohesion within a community, thus creating a safer living environment.

While studies on neighborhood effect have associated many characteristics with a diverse set of individual level outcomes, most of these studies have not provided evidence to support the assumption that neighborhoods have a causal influence on people’s health (Diez Roux & Mair, 2010). One of the problems in providing such evidence is that people are not randomly assigned to
neighborhoods. For example, wealthy people have much more options when moving. They might prefer areas where there are other wealthy people, areas that are financially out of reach for poorer people. If people in that area have good health it might not be because the area itself makes is better for health, but because people there have a high socioeconomic status, which is in itself related to better health (e.g. Lynch, Kaplan, & Salonen, 1997; Winkleby, Jatulis, Frank, & Fortmann, 1992). Whether the associations found in earlier neighborhood effect literature are due to the neighborhood characteristics actually causing the outcomes – social causation – or whether certain type of people are in some ways selected to live in certain neighborhoods – social selection – is, as of yet, unclear.

This dissertation examines how people’s health behaviors, depressive symptoms, and perceived social support are related to their neighborhood characteristics. More specifically, we use longitudinal data with repeated measurements to examine if people’s health behaviors or well-being change as they move between urban and rural, and affluent and deprived neighborhoods. Furthermore, the effects of these variables on residential mobility are examined.

1.1 Neighborhood effects and measurement of neighborhoods

The term neighborhood effect was first coined in a study on peoples’ voting behavior (Cox, 1969). It was found that people from the same area tend to vote in the same way. More recent research has extended the study of neighborhood effects to sociology (e.g. Sampson, 2012), criminology (e.g. Kubrin & Stewart, 2006; Warner, 2007), and epidemiology (e.g. Balfour & Kaplan, 2002a; Lee, 2003). While the specific definition of neighborhood effect varies across academic disciplines and individual studies, it is usually assumed that characteristics of the residential area influence the behavior or other outcome of people living in that area (Dietz, 2002; Oakes, 2004). For example, neighborhood deprivation has been associated with smoking (Ivory, Blakely, Richardson, Thomson, & Carter, 2015), neighborhood rurality with higher body weight (Jokela et al., 2009), and neighborhood disadvantage with depression (Ross, 2000a).
Neighborhood effect can be divided into three groups: 1) endogenous effects 2) contextual effects and 3) environmental effects (Manski, 1995). Endogenous effects are the effects of the health or behavior of others that influence the health or behavior of an individual. For example, living in an area characterized by disorder – like, vandalism, public drinking and crime - can increase the feeling of powerlessness, which can lead to mistrusting other people (Ross, Mirowsky, & Pribesh, 2001). Contextual effects refer to the effects that the structural elements of a group, such as socioeconomic status or race, have on the behavior or the health of an individual that belongs to that group. Findings on contextual effects have suggested, for example, that elderly people have better mental health in neighborhoods populated with elderly people. Finally, environmental effects are the effects of social or environmental features, outside the immediate group in which the individual belongs to, that have an effect on individual level outcomes. For example, green spaces in neighborhoods, such as forest and parks, have been associated with lower levels of mental health disorders (Beyer et al., 2014).

The boundaries of neighborhoods can be defined in multiple ways, and there are no unequivocal definitions of neighborhoods. Neighborhoods are communities that are bound together by geography and social networks (Sampson, 2012). However, the measurement of neighborhoods is not completely straightforward. Neighborhood can be defined as a specific geographical area based on administrative boundaries, such as postal districts or subunits within cities (Roux, 2001). In the United States, the most used definitions include census tracts and census block groups (Sampson, Morenoff, & Gannon-Rowley, 2002). In Finland, the equivalent definition of a census block is zip-code areas. Although Finnish zip-code areas have originally been formed to ease mail delivery, they correspond roughly to the subjective view people have of their neighborhoods. (Statistics Finland, 2015) Neighborhood effects may also be examined at a higher level of geography, such as Finnish municipalities.

Neighborhood characteristics that are examined in neighborhood effect literature are nearly endless. Usually the characteristics of interest fall under physical or social environment of the neighborhood (Diez Roux & Mair, 2010). Examples of physical environment would be the density or condition of housing, amount of green space or street connectivity. Features of social environment that
are used include, for example, socioeconomic composition of the neighborhood and crime statistics. Studies in this dissertation focus on socioeconomic status and level of urbanicity of neighborhoods.

Often neighborhood effects are examined between urban and rural neighborhoods. The contrast between rural and urban neighborhoods illustrates the difficulty of having a single measure of urban vs. rural areas. Categorizing neighborhoods by population into urban and rural neighborhood leads to problems when comparing studies; for example, in an American study the cut-off point for a metropolitan area was set at 1,000,000 residents (Mickelson & Kubzansky, 2003), whereas in a few German studies a cut-off point of 500,000 were used (Donath et al., 2011; Völzke et al., 2006). The definition of an urban neighborhood is largely dependent on the population size of a country. Thus, treating urban-rural differentiation as a continuum is a more practical way of looking at the phenomena. In addition, inventive measures, such as home age, have also been used as a proxy for urban areas (Berrigan & Troiano, 2002).

Different measurements of neighborhoods often make it difficult to compare findings across different studies, because differences between studies may be due to differences in how neighborhoods are measured. Given that there is not a single correct way to define neighborhoods, it is important to assess neighborhood effects with more than one level. If results replicate on different levels of neighborhoods, they would indicate a more robust phenomena and generalizing from those results would be easier.

1.2 Neighborhood effects in health behaviors

Less optimal health behaviors such as smoking, alcohol consumption and physical inactivity are major contributor to loss of healthy life and mortality (Ezzati, Lopez, Rodgers, Vander Hoorn, & Murray, 2002; Warburton, Nicol, & Bredin, 2006). Identifying any factors that might promote such behaviors would allow for potential interventions be design that could limit the harm those behaviors cause. Indeed, numerous health and neighborhood associations have been reported over the years (Diez Roux & Mair, 2010; Pickett & Pearl, 2001). Different social and physical neighborhood characteristics such as poverty,
urbanicity, and the amount of green spaces have been linked with individual level health outcomes (e.g., Galea et al., 2007; Kim, 2008; Ross & Mirowsky, 2001; Song, Gee, Fan, & Takeuchi, 2007). For example, higher socioeconomic status of neighborhood has been associated with higher alcohol consumption among those who already drink (Galea, Ahern, Tracy, & Vlahov, 2007). There is a consensus that people living in deprived areas are less healthy and have less optimal health behaviors than people in more affluent areas (Janssen et al., 2006; Kleinschmidt, Hills, & Elliott, 1995). Many studies on health behaviors have concentrated on smoking, alcohol consumption and physical exercise (Berrigan & Troiano, 2002; Galea, Ahern, Nandi, et al., 2007; Ivory et al., 2015; Ross, 2000b). However, it is still under debate whether any of these associations are caused by the area characteristics or whether people are selected to live in those areas (Diez Roux & Mair, 2010; Pickett & Pearl, 2001).

1.2.1 Associations with urbanicity

Rural-urban difference in health behaviors have rarely been reported in population sample studies. However, studies involving specific groups of people are much more common (Donath et al., 2011; Fogelholm et al., 2006; Weaver, Palmer, Lu, Case, & Geiger, 2013). Studies from U.S. have shown that people in rural areas are likely to be more sedentary than their urban counterparts (Parks, Housemann, & Brownson, 2003; Wilcox, Castro, King, Housemann, & Brownson, 2000). Similar results were observed in a Finnish study, which found elderly rural dwellers to walk less and eat more unhealthy foods than those living in urban areas (Fogelholm et al., 2006). Association of urbanicity on alcohol have yielded somewhat mixed results. People in rural areas have been shown to drink more alcohol (Jackson, Doescher, & Hart, 2006), although it has also been reported that alcohol-related mortality is higher in urban areas (Erskine, Maheswaran, Pearson, & Gleeson, 2010). Studies on how urbanicity is linked with smoking are surprisingly scarce. A study from Netherlands concluded that at least in urban areas, a lower socioeconomic status of an area was associated with higher prevalence of smoking (Reijneveld, 1998). A more recent study covering large parts of Western Europe found smoking to be highest in urban areas (Idris et al.,
According to their findings urban/rural difference in smoking was higher among women and those of lower socioeconomic status.

As smoking, alcohol consumption and physical exercise are all associated with overall health (WHO, 2003), it is no surprise that there are differences in the health of urban and rural dwellers – those who live in rural areas seem to have poorer overall health than those living in urban areas (Pong, DesMeules, & Lagacé, 2009). However, the differences between health of rural and urban dwellers might not be as clear cut. Those living in the most rural areas have the poorest health, with the health of residents improving as the urbanicity of the area increases. Such results have been shown using both Canadian and Australian samples (Pong et al., 2009). Overall it seems rural people tend to be more sedentary, smoke less, and have poorer health than those living in urban areas. Findings regarding alcohol are mixed.

1.2.2 Associations with deprivation

Neighborhood effects of deprivation have been studied more extensively than the effects of urbanicity. Measure of neighborhood deprivation has been defined in various ways. Frequently used measures are mean income level of residents or some composite measure of various demographic characters including level of unemployment, number of tenant occupied housing units and lone parent families, or by other census based measures (e.g., Hill & Angel, 2005; Jokela, 2015; Pollack, 2005). The stress of living in a deprived neighborhood might lead people to try and cope with the adversities of daily living by engaging in disadvantageous health behaviors, such as drinking and smoking (Pampel, Krueger, & Denney, 2010). Looking beyond health behaviors, a recent meta-analysis confirmed that there is an association between neighborhood socioeconomic status and mortality (Meijer, Röhl, Bloomfield, & Grittner, 2012).

Neighborhood deprivation has been associated with lower physical activity, although the association seems to differ depending on race – the association is stronger for blacks than whites (Boone-Heinonen et al., 2011; Yen & Kaplan, 1998). However, a few other U.S. based studies have found that race does not affect the association between neighborhood deprivation and walking (Ross &
Mirowsky, 2001; Ross, 2000b). These studies also found that people walked more not only in affluent neighborhood, but also in deprived neighborhoods as well. It is possible that the structural environment of deprived neighborhoods might affect the association with more densely built areas encouraging walking, whereas in the more affluent neighborhood the social environment might encourage walking.

While people in deprived areas live near alcohol outlets (Hay, Whigham, Kypri, & Langley, 2009; Pollack, 2005), they might actually drink less than those living in affluent areas (Pollack, 2005). Still, many more studies have concluded that people in the most deprived neighborhoods tend to drink more heavily (Hill & Angel, 2005; Matheson, White, Maineddin, Dunn, & Glazier, 2012; Vinther-Larsen, Huckle, You, & Casswell, 2013). Also, alcohol related problems and mortalities seem to accumulate on more deprived neighborhoods (Erskine et al., 2010; Pollack, 2005).

Earlier findings utilizing cross-sectional data have linked neighborhood deprivation to increased smoking (Eberth, Olajide, Craig, & Ludbrook, 2014; Kleinschmidt et al., 1995; Pickett & Pearl, 2001; Virtanen et al., 2007). Recent findings using longitudinal data suggest that the association is indeed causal – that is, living in a deprived neighborhood increased smoking (Ivory et al., 2015). As the evidence on the association between neighborhood deprivation and smoking come from both studies using cross-sectional and longitudinal data, it is plausible that smoking is more prevalent in deprived areas due to both social causation and social selection.

Poor self-rated health has been associated with many different measures of deprivation. A study based on the Health survey of England concluded that poor quality residential environment and high unemployment, among other indicators, were associated with poorer self-rated health (Cummins, Stafford, Macintyre, Marmot, & Ellaway, 2005). Similar results were obtained in another British study that concentrated on the health of aging people (Balfour & Kaplan, 2002). According to their results, for people living in poorer quality neighborhoods the risk of loss of physical functionality was twice as high compared to people living in better neighborhoods.
Many of the earlier studies on the effects of urbanicity and deprivation on health behaviors are based on cross-sectional data. Therefore, it is still unclear whether urbanicity and deprivation themselves cause better or worse health behaviors, or whether people with certain kinds of health behaviors are somehow selected to live at certain kinds of areas. Taken together it seems that for smoking there is evidence suggesting that living in a deprived neighborhood increases the odds of smoking. For other health behaviors the evidence is still mixed, but most recent advances in the field do seem to suggest that the associations between neighborhood characteristics and health behaviors are most likely due to social causation.

1.3 Neighborhood effects in depression, mistrust and social support

Depression is one of the most prevalent psychological disorders around worldwide (Murray et al., 2015; Whiteford et al., 2013). Apart from the individual suffering depression causes, it also has an enormous impact on the economy as lost workdays and productivity (Kessler, Merikangas, & Wang, 2007). As such, there is great value, on many levels, in understanding how the environment influences the psychological well-being of people.

Several studies of neighborhood effects in mental health have used depressive symptoms as the measure of mental health (Kim, 2008; Mair, Diez Roux, & Galea, 2008). These studies have shown that neighborhood characteristics, such as neighborhood disorder (Cutrona, Wallace, & Wesner, 2006), socioeconomic status of neighborhoods (Galea, Ahern, Nandi, et al., 2007; Ross & Jang, 2000), neighborhood social environment (Echeverría, Diez-Roux, Shea, Borrell, & Jackson, 2008; Latkin & Curry, 2003) are associated with depressive symptoms of the residents. Overall the evidence from longitudinal studies examining neighborhood socioeconomic status associated with depression is rather mixed (Richardson, Westley, Gariépy, Austin, & Nandi, 2015).

Neighborhood characteristics also influence how people trust other individuals. Social capital—the informal social ties that connect people and
communities—has been associated with neighborhood characteristics, such as income inequality and crime rates (Kawachi, Kennedy, Lochner, & Prothrow-Stith, 1997; Kennedy, Kawachi, Prothrow-Stith, Lochner, & Gupta, 1998). Social mistrust can be considered as part of the broader concept of social capital, especially the cognitive dimensions of social capital (Fujiwara & Kawachi, 2008; Phongsavan, Chey, Bauman, Brooks, & Silove, 2006) related to people's negative and suspicious beliefs in other people's behavior and intentions (Lewicki & Bies, 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, cynical and suspicious interpretations of other people's motives have been associated with higher morbidity, such as coronary heart disease (Smith, Glazer, Ruiz, & Gallo, 2004) and metabolic syndrome (Niaura et al., 2000), and all-cause mortality (Chida & Steptoe, 2009). Hostility has also been associated with depressive symptoms (Stewart, Fitzgerald, & Kamarck, 2010). Social support, in turn, has been shown to buffer against the development of physical and mental illnesses (Cohen & Wills, 1985; Kawachi & Berkman, 2001), including depression (Heponiemi et al., 2006; Klineberg et al., 2006).

1.3.1 Associations with urbanicity

The level of urbanicity has been associated with depressive symptoms (Sundquist, Frank, & Sundquist, 2004), although the evidence has been rather mixed. Some studies have reported higher rates of depression in urban than in rural areas (Peen, Schoevers, Beekman, & Dekker, 2010) while other studies have reported the reverse (Miles, Coutts, & Mohamadi, 2012). There is also evidence that some features of urban neighborhoods, such as high-rise housing and traffic noise (Evans, 2003; Song et al., 2007) may increase psychological distress. However, opposite results have also been reported (Miles, Coutts, & Mohamadi, 2012).

Only a few studies have examined whether and how mistrust is associated with urban/rural differences. In a study of residents of Chicago and rural areas of
Illinois, urban residents reported more mistrust than rural residents (Ross, Mirowsky, & Pribesh, 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 & Ross, 1998).

In the United States, some studies have reported rural residents receiving more social support than urban residents (Mickelson & 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.

**1.3.2 Associations with deprivation**

Social problems at neighborhood level tend to cumulate and neighborhoods with high crime rates also tend have, for example, higher social and physical disorder. Such area level measures have been linked with higher mental distress (Sampson et al., 2002). Indeed, people facing negative life events whilst living in high disorder neighborhoods are more likely to develop depression than those living in low disorder neighborhoods (Cutrona et al., 2005).

While it seems that neighborhood deprivation is associated with depression and psychological distress, the evidence for the level of social support is scarcer. A study on elderly people found that those who lived alone in more deprived areas expected to receive less social support than those who lived in more affluent areas (Thompson & Krause, 1998). A later study noted that the associations were largely explained by the social skills of individuals. Those with adequate social skills fared fine even in deprived neighborhoods (Krause, 2006).

As with health behaviors and neighborhood characteristics, many studies have also shown differences in mental health and risk factors between neighborhoods, but 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).
1.4 Quasi-experimental studies on neighborhood effects

Providing evidence for causality in neighborhood effects is difficult. Some even view it as probably impossible when using data from observational studies (Oakes, 2004). The main difficulties are, as mentioned before, selective residential mobility and confounding variables that cannot be controlled. Nevertheless, attempts to show evidence for or against causality have been made.

A recent study using a British dataset showed that people living in more deprived areas suffered more from psychological distress and also from neuropsychiatric illnesses (Jokela, 2015). However, the associations seem to favor social selection – that is, people who are worse off, end up living in the more deprived areas. Similar results were obtained using an Australian dataset - 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). On specific health behaviors, a study of neighborhood effects in smoking found evidence for causality. Their results showed that moving to a more deprived neighborhood increased the odds of being a smoker (Ivory et al., 2015).

Common to all the studies mentioned above are the use of longitudinal study design and fixed-effects regression analysis. Following people over an extended period of time as they move from one neighborhood to another and measuring their smoking habits or other behavior is essentially a quasi-experimental study. People act as their own controls and as they move to a new neighborhood changes in their behavior can be compared to changes in the neighborhood characteristics. This kind of a design allows for controlling all time-invariant variables using fixed-effect regression. Therefore, a lot of possibly confounding factors are controlled. Still, any individual or area level characteristics that change over time and are omitted from the analysis may confound the findings.

Even though the approach is not without its faults (Oakes, 2004), the benefits outweigh the problems to justify its use (Subramanian, 2004). Therefore the studies included in this dissertation follow the same principles as Jokela’s studies (Jokela, 2014, 2015).
1.5 **Selective residential mobility**

Residential mobility behavior refers to the frequency and distance of moves by an individual. Already in the 1950’s sociologists recognized that dissatisfaction with current living conditions or other exogenous circumstances was a driving force that made people move (Rossi, 1955). Especially changes in these are likely to contribute to moving. Changes in health or health related issues could also potentially create a need for a move. Furthermore, changes in life circumstance or health issues might also enable or restrict available opportunities in where to move.

1.5.1 **Health selective residential mobility**

Studies of neighborhood effects have implied that adverse neighborhood characteristics may cause poor physical and mental health and health behaviors (Ivory et al., 2015; Ross & Mirowsky, 2001). While health behaviors, depressive symptoms and social support may be affected by neighborhood characteristics, it is also plausible that they affect the residential mobility behavior of individuals. Some recent neighborhood effect studies suggest that the social inequalities between neighborhoods may be partly caused by selective residential mobility (Curtis, Setia, & Quesnel-Vallee, 2009; Jokela, 2014, 2015). Other studies have also reported similar findings on health-related residential mobility (Halliday & Kimmitt, 2008; Larson, Bell, & Young, 2004; Tunstall, Mitchell, Pearce, & Shortt, 2014).

In an Australian study of middle-aged women, poorer health was associated with higher likelihood of moving, and smokers were more likely to move than non-smokers (Larson et al., 2004). Likewise, individuals suffering from serious mental health problems such as schizophrenia have been shown to move more frequently (DeVerteuil et al., 2007; Lix et al., 2006). Frequent residential mobility in itself has been associated with various social and health problems ranging from unemployment to mortality (Exeter, Sabel, Hanham, Lee, & Wells, 2015; Jelleyman & Spencer, 2008; Oishi & Schimmack, 2010). People suffering
from chronic illnesses are likely to seek locations that offer appropriate health services (Larson et al., 2004). Furthermore, such illnesses can affect other aspects of life and have severe impact on an individual’s financial situation, which in turn limit the possibilities for relocating (Rabe & Taylor, 2010). However, evidence that migrants have poor health come mainly from studies examining specific groups of people (Jelleyman & Spencer, 2008; Larson et al., 2004; Tunstall et al., 2014), rather than from population-based studies (Champion, 2005).

Few exceptions to this are recent studies using samples from The Household, Income and Labor Dynamics in Australia survey (n=20,012) and The British Household Panel Survey (n=17,001) that support the notion of health-selective residential mobility (Jokela, 2014, 2015). The studies found associations between neighborhood disadvantage/deprivation and health outcomes. Health outcomes were worse in deprived neighborhoods. However, the results suggested that individuals’ health did not change significantly as they moved from deprived neighborhoods to affluent ones. Instead, it seemed that those who already had poor health were more likely to move to deprived neighborhoods. Another large British study (n=278,425) showed that nearly one third of the urban-rural inequalities in mortality could be attributed to health-selective residential mobility (Riva, Curtis, & Norman, 2011). Their results suggest that people living in rural areas are healthier than those living in urban areas.

Earlier studies have suffered from imprecise measures of residential mobility, such as annually recorded addresses (Halliday & Kimmitt, 2008; Norman, Boyle, & Rees, 2005; Tunstall et al., 2014; Verheij, van de Mheen, de Bakker, Groenewegen, & Mackenbach, 1998), and self-reports, which are vulnerable to memory bias, especially for those who have moved numerous times (Jelleyman & Spencer, 2008; Oishi & Schimmack, 2010). Thus, more detailed data on health-related factors and especially residential mobility are needed to evaluate the contributions of social causation and selective residential mobility on the development of regional health inequalities.
2 Aims of the study

There has been a demand for longitudinal studies in neighborhood effects as they can shed light into whether neighborhood effects truly exists or whether the associations are caused by social selection – that is, by selective residential mobility. The aim of the current study is to examine possible neighborhood effects on health behaviors, social support and depressive symptoms in Finland. Furthermore, this study examines how the above mentioned factors affect residential mobility. The specific research question are as follows:

1) Do people's health behaviors (consumption of alcohol, smoking, frequency of exercise, and interest in one's own health) change as they move across different neighborhoods? (Study I)

2) Do people's depressive symptoms, mistrust, and perceived social support change as they move across different neighborhoods? (Study II)

3) Do people's health behaviors, depressive symptoms, and social support predict the frequency and distance of residential mobility, and are these individual characteristics associated with health selective residential mobility between municipalities in Finland? (Study III)
3 Methods

3.1 Participants: The Cardiovascular Risk in Young Finns Study

The participants in the three studies of this dissertation all came from the ongoing Cardiovascular Risk in Young Finns prospective cohort study. The original sample of the Young Finns Study (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 broadly represent the Finnish population (Raitakari et al., 2008). A detailed attrition analysis was done 2001. The results showed that those who had dropped out were more often male and more often younger participants. Also, early drop-outs were more often smokers (Raitakari et al., 2008). That is, those who dropped out at some point, returned later. 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 2012. The study was approved by the local ethics committees of each five participating universities.

The number of participants and total number of observations for each study are presented in Table 1. Also included are the individual and area level variables of interest in each study.

Study I included 3,145 participants (52.9% women) who had data on all health behavior measurements in at least one of the study waves 1992, 2001, 2007 and 2012 that were included. The number of participants in each study was 2339, 2600, 2230 and 2005, for study waves 1992, 2001, 2007 and 2012, respectively.
Table 1. Descriptive statistics and variables of interest in each study

<table>
<thead>
<tr>
<th></th>
<th>Study I</th>
<th>Study II</th>
<th>Study III</th>
</tr>
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<td>3017</td>
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Individual level variables
- Interest in health
- Depressive symptoms
- Number of moves
- Mistrust
- Social support by family
- Distance of moves
- Social support by friends
- Smoking
- Social support by friends
- Social support by family
- Frequency of exercise
- Health behaviors

Area level variables
- Municipality SES
- Municipality urbanicity
- Municipality SES
- Zip-code area SES
- Zip-code area urbanicity
- Municipality health index
- Zip-code area urbanicity
- Municipality mortality index
- Municipality unemployment index

All studies included age, sex, and education as covariates.

In study II participants with data on all social support, mistrust, and depressive symptoms scales on at least one of the study waves 1992, 1997, 2001, 2007 and 2012 that were included. This left us with a subsample of 3,074 participants (53.9% women). The number of participants for each wave were 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 3,074 participants had participated in all the 5 study waves. Of the 3,074 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%.

Study III used data from waves 1992, 1997, 2001 and 2007, and included those participants who had data for all individual characteristics (depressive symptoms, social support and health behavior) on at least one of the study waves. Altogether 3,017 participants (54% women) were included in the study. From waves 1992, 1997, 2001 and 2007, data was available for 2,322, 2,091, 2,066, and 2,024 participants respectively. Of the 3017 participants (54% women), 1124 had all the data from each of the four study waves (735 from three, 644 from two, and 514 from one). 267 of the participants did not move during the study period. Total
number of moves made by an individual ranged from 1 to 21. Moves between municipalities accounted for 35% of all the moves.

### 3.2 Individual level measures

Participants’ health behaviors were assessed using self-report questionnaires in study waves 1992, 2001, 2007, and 2012. Information was collected on consumption of alcohol, smoking, frequency of exercise and self-rated interest in health. Alcohol consumption was rated on a 6-point scale on the question “How often do you drink 6 units of alcohol or more?” (1=less than twice a year or never, 2=2-6 times a year, 3=Once a month, 4=2-3 a month, 5=once a week, 6=twice a week or more often). Smoking was reported on 5-point scale (1=I have never smoked, 2=I have quit /I am on a break, 3=less than once a week, 4=once a week or more, but not daily, 5= one or more cigarettes a day). Frequency of exercising was rated on a 6-point scale (1=never, 2=once a month, 3=once a week, 4=2-3 a week, 5=4-6 a week, 6=daily). Self-rated interest in health was reported on a 5-point scale (1=I barely pay any attention on my health, 2=I only pay a little attention on my health, 3=Neither little nor a lot, 4=I pay some attention on my health, 5=I pay a lot of attention on my health).

For the use of study III a combined measure for health behavior was formed by dichotomizing the responses on the scales described above and summing the resulting scores together. Scales were dichotomized according to the responses as follows: alcohol 0 = 1–3, 1 = 4–6; smoking 0 = 1–2, 1 = 3–5; exercise 0 = 1–3, 1 = 4–6; and interest in health 0 = 1–2, 1 = 3–5. The final scale ranged from 0 to 4, with the higher value representing better health behaviors.

A modified version of Beck’s Depression Inventory (BDI) was used to assess depressive symptoms of the participants (Katainen, Räikkönen, & Keltikangas-Järvinen, 1999). The symptoms were assessed in study waves 1992, 1997, 2001, and 2007. The original BDI consists of 21 items with four alternative statements for each item. The modified version (mBDI) uses the second mildest statement of each original item, which are answered on a 5-point Likert scale (1=totally disagree, 5=totally agree). The mBDI was selected for use in the current study, because it has been suggested that it captures depressive tendencies of non-
clinical population more efficiently than the original BDI (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.

Social support was assessed using the Multidimensional Scale of Perceived Social Support (Blumenthal et al., 1987) in study waves 1992, 1997, 2001 and 2007. The measurement scale was divided into three subcategories, i.e., social support by family, social support by friends and social support by significant other. Each subcategory had four items, which were rated on a 5-point Likert scale (1=totally disagree, 5=totally agree). Items included were, for example, “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”. As a part of our participants were 15 years of age in the first study wave included, the “significant other” subcategory was translated as “close friend” and that translation was used for all the study waves. For the purpose of the studies the scales for support by friend and support by significant other were combined and divided by 2 to match the scale of the social support by family variable. 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.

Mistrust was measured in study waves 1992, 1997, 2001, 2007 and 2012 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.

The Population Register Centre of Finland provided a complete history of residential mobility up to year 2013 for each participant. The history included the date and accurate coordinates of each move of each participant. The number of moves of a participant was derived from the data by counting the moves in the following three years after each study wave. As the exact measurement date
varied between participants, beginning of the year of a study wave was used as the starting date and end of year three as the end date (e.g. 1.1.1992-31.12.1995).

Coordinates were used to calculate the distance of each move during the three years following each study wave. As most moves were relative short the distribution of the distances was very positively skewed. Therefore, the distance of moves were categorized into five categories as follows: 1 = less than 5km, 2 = 5-20km 3 = 20-50km, 4 = 50-100km, and 5 = over 100km.

3.3 Area level measures

Area level data were gathered from SOTKAnet (SOTKAnet, 2014) for municipality level data and Statistics Finland (Statistics Finland, 2014) for zip-code area level data. On municipality level, socioeconomic status was measured using tax revenue per capita. Municipality level socioeconomic data were available for the study waves of 2001, 2007 and 2012. For study waves 1992 and 1997, the data from 2001 were used as proxies. On zip-code area, median gross income per resident in a year was used. Data on socioeconomic status for zip-code areas were only available for the year 2007, that data were used for each study wave. The measures from different study waves were corrected for inflation to year 2012.

On municipality level, level of urbanicity was measured using density of population as a proxy. Urbanicity level of zip-code areas was measured as a combined measure of the proportion of high-rise buildings, available supermarkets and health services on the area. For the combined measure, we standardized the variables and used the average of the variables.

As several area level characteristics might influence where people move, we also gathered To describe the health of residents in a municipality, a health index was used that includes seven different groups of diseases: cancer, coronary heart disease, cerebrovascular diseases, diseases of the musculoskeletal system, mental health problems, accidental injuries, and dementia. The index is compared to national level of health (national index =100). The prevalence of each diseases group is weighted within the index. The age and sex adjusted index was available for study waves 2001 and 2007.
For the mortality characteristic, an index describing the portion of mortalities within the municipality residents was used. The index is computed for all the municipalities of Finland and compared to the mortality rate of the nation (national index = 100). The mortality index is adjusted for age and sex, and was available for all study waves used.

For unemployment, an index describing the portion of unemployed of the total work force was used. The total work force included all residents 15 – 64 years old. The index was available for all study waves.

### 3.4 Covariates

In study I, education was measured as self-reported years of schooling in study waves 2001, 2007 and 2012. In studies II & III, education was measured as the highest held degree in study waves of 1992, 2001, 2007 and 2012. 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.

Study II included dummy variables for labor force participation status and enrollment status, which were formed from self-reported held position measured in study waves 1992, 2001, 2007 and 2012. The measure included the following options: “full-time employment”, “part-time employment and studying” and “full-time studying”.

All studies included age and sex as covariates. Study II further included quadratic age term as a covariate. In study III, in addition to individual level covariates mentioned above, we included health, mortality, and unemployment indices as area level covariates.
3.5 Statistical analyses

3.5.1 Studies I and II

Associations of neighborhood socioeconomic status and urbanicity with health behaviors, depressive symptoms, mistrust, and social support were analyzed using random-intercept multilevel regression (Rabe-Hesketh & Skrondal, 2008). Linear models were fitted separately for each outcome and neighborhood characteristic variable. The longitudinal data were structured so that the repeated measurements from the participants (level-1 person-observations) were nested within participants (level-2 units). The multilevel analysis is similar to ordinary least square regression with the difference that it considers the repeated measurements from the same individual 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. As such, the model \( y_{it} = \alpha + \beta_i + \beta_W (x_{it} - \bar{x}_i) + \beta_B \bar{x}_i + \epsilon_{it} \), where \( \alpha \) is the overall intercept, \( \beta_i \) is the intercept for \( i^{th} \) participant, \( x_{it} \) is the independent variable for \( i^{th} \) participant at the \( t^{th} \) measurement point, \( \bar{x}_i \) is the mean of the independent variable across all measurement points for the \( i^{th} \) participant, and \( \epsilon_{it} \) is the error term, allows separate examination of within-individual, \( \beta_W \), and between individual, \( \beta_B \), components (Curran & Bauer, 2012). The within-individual component can be used to examine within-individual dynamics in the associations between exposures and outcomes, as it controls for all constant differences between different individuals; only variables that vary over time can account for variance in the outcome variable. In other words the within-individual component answers to the question of whether there are changes individual level measures as the area level measures change. The between-individual component on the other hand answers to the question of whether people in certain kinds of neighborhoods are different from people in other kinds of neighborhoods. Age, sex and education were included as covariates in all analyses. In study II, quadratic age term was also included as a covariate.
3.5.2 Study III

Associations between individual characteristics (depressive symptoms, social support and health behavior) with different aspects of residential mobility were examined using regression analyses. Multilevel logistic regression analysis was used to examine the association between individual characteristics with whether participants moved at all or not. As the number of moves by a participant was an over-dispersed count variable, multilevel negative binomial regression analysis was used to examine the association between individual characteristics with number of moves. Finally, multilevel ordered logistic regression analysis was used to examine the association between individual characteristics and categorically coded moving distance.

As a preliminary analysis, we examined whether municipality characteristics were associated with whether participants moved or not. For the main analysis, we examined separately the associations between individual characteristics and residential mobility adjusting for area socioeconomic status, area population density, area health index, area mortality index, area unemployment, age, sex and education. We also ran interaction analyses to see whether individual characteristics were associated with residential mobility differently in different municipalities.

Finally we ran multilevel logistic regression analysis to examine the direction of moving according to the area characteristics used for municipalities. We created dummy variables for the moves based on whether the move was to a municipality with lower or higher population density, socioeconomic status, health index, mortality index or unemployment. We ran separate multilevel logistic regression analyses for comparing those who did not move to those who moved upward in the area characteristics, and those who did not move to those who moved downward in the area characteristics. Additionally we also compared those who moved upwards to those who moved downwards in the area characteristics.

Age, sex and education were included as individual level covariates in all analyses. Municipality health, mortality, and mortality indices were included as area level covariates.
4 Results

4.1 Health behaviors and neighborhood effects

Associations between neighborhood characteristics and health behaviors are shown in Figure 1 & 2. Higher level of urbanicity and higher socioeconomic status were associated with increased alcohol consumption on both municipality and zip-code area level. The differences between within-individual and between-individuals associations were significant, except for municipality urbanicity. The within-individual associations, on both municipality and zip-code area socioeconomic status, were not statistically significant, and the between-individual associations accounted for nearly all of the effect on both cases. On zip-code area level, higher urbanicity was associated with increased alcohol consumption. However, the between-individual association was twice as large as the corresponding within-individual association (b=0.18 vs. b=0.08).

Higher zip-code area level urbanicity was associated with increased smoking. There was no difference between the within-individual and between-individual association, even though the former was 50% weaker than the latter. There were no other associations between neighborhood characteristics and smoking.

Higher level of urbanicity and higher socioeconomic status were associated with increased interest in own health at both municipality and zip-code area level, and there were no differences between within-individual and between-individuals associations in any of the indicators. Also, none of the indicators were associated with frequency of exercising.

To test whether missing data biased the results, we applied pattern mixture models on our analyses (Hedeker & Gibbons, 1997). No differences in the results were observed (data not shown). We also ran multilevel logistic regression analyses on dichotomized outcome variables. Results from those analyses were effectively the same as those described above (data not shown).
Figure 1. Associations between municipality and zip-code area level of urbanicity, municipality and zip-code area socioeconomic status (municipality SES and zip-code area SES, respectively), and health behavior outcomes separately for within-individual, total, and between-individuals regressions. Bars represent the magnitude of linear regression coefficients. Error bars are 95% confidence intervals.
Figure 2. Associations between municipality and zip-code area level of urbanicity, municipality and zip-code area socioeconomic status (Municipality SES and zip-code area SES, respectively), and health behavior outcomes separately for within-individual, total, and between-individuals regressions. Bars represent the magnitude of linear regression coefficients. Error bars are 95% confidence intervals.
4.2 Depression, social support, mistrust and neighborhood effects

Associations between neighborhood characteristics and outcome variables adjusted for sex, age and quadratic age term are reported in Figure 3 & 4. None of the neighborhood characteristics were associated with depressive symptoms or mistrust. Higher 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 socioeconomic status 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 socioeconomic status 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 area 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.
Figure 3. Associations between municipality and zip-code area level of urbanicity, municipality and zip-code area socioeconomic status (Municipality SES and Zip-code area SES, respectively), 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.
Figure 4. Associations between municipality and zip-code area level of urbanicity, municipality and zip-code area socioeconomic status (Municipality SES and Zip-code area SES, respectively), 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.

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

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 (data not shown). No statistically significant differences were found.

4.3 Selective residential mobility

Of the area characteristics, higher population density (OR=1.21, 95% CI=1.12, 1.29) and higher socioeconomic status (OR=1.31, 95% CI=1.20, 1.43) were associated with higher likelihood of moving. Higher mortality index was
associated with lower likelihood of moving (OR=0.92, 95% CI=0.86, 0.99). Municipality unemployment and health indexes were not associated with the likelihood of moving.

Results for the associations between depressive symptoms, social support and health behaviors with different aspects of residential mobility are shown in Table 3. Higher social support from friends was associated with higher propensity of moving, whereas depressive symptoms, social support from family, and health behaviors were not associated with moving propensity. Higher social support from family was associated with lower number of moves, and higher social support from friends with higher number of moves. All these associations remained after additionally controlling for area level characteristics. Depressive symptoms and health behaviors were not associated with the number of moves, but better health behaviors were associated with longer moving distances. None of the associations between depressive symptoms, social support or health behaviors with moving upwards or downwards in area characteristics were significant (Table 4).

**Table 3.** Associations between depressive symptoms, social support, health behaviors and moving, number of moves and moving distance.

<table>
<thead>
<tr>
<th></th>
<th>Move/No Move</th>
<th>Number of moves</th>
<th>Distance of moves</th>
</tr>
</thead>
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<tr>
<td></td>
<td>b 95% CI</td>
<td>b 95% CI</td>
<td>b 95% CI</td>
</tr>
<tr>
<td><strong>Adjusted for age, sex and education.</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Depressive symptoms</td>
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<td>0.04 (-0.02; 0.10)</td>
<td>-0.15 (-0.31; 0.01)</td>
</tr>
<tr>
<td>Social support by family</td>
<td>-0.02 (-0.10; 0.06)</td>
<td>-0.03 (-0.08; 0.01)</td>
<td>-0.04 (-0.16; 0.08)</td>
</tr>
<tr>
<td>Social support by friends</td>
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<td><strong>0.16 (0.11; 0.21)</strong></td>
<td>0.02 (-0.11; 0.15)</td>
</tr>
<tr>
<td>Health behaviors</td>
<td>-0.05 (-0.12; 0.03)</td>
<td>-0.03 (-0.08; 0.01)</td>
<td><strong>0.14 (0.06; 0.23)</strong></td>
</tr>
<tr>
<td><strong>Additionally adjusted for density of population, municipality SES, unemployment, health index and mortality index.</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depressive symptoms</td>
<td>-0.01 (-0.15; 0.13)</td>
<td>0.02 (-0.06; 0.10)</td>
<td>-0.15 (-0.33; 0.02)</td>
</tr>
<tr>
<td>Social support by family</td>
<td>-0.08 (-0.19; 0.03)</td>
<td><strong>-0.08 (-0.14; -0.02)</strong></td>
<td>-0.11 (-0.26; 0.03)</td>
</tr>
<tr>
<td>Social support by friends</td>
<td><strong>0.20 (0.08; 0.31)</strong></td>
<td><strong>0.08 (0.01; 0.14)</strong></td>
<td>0.03 (-0.12; 0.18)</td>
</tr>
<tr>
<td>Health behaviors</td>
<td>-0.07 (-0.14; 0.01)</td>
<td>-0.03 (-0.07; 0.01)</td>
<td><strong>0.14 (0.04; 0.24)</strong></td>
</tr>
</tbody>
</table>

Regression coefficients and 95% confidence intervals from logistic regression (Move/No Move), negative binomial regression (Number of moves) and ordinal logistic regression (Distance of Moves). Statistically significant b-values and confidence intervals in bold.

Interaction between individual characteristics and municipality characteristics with residential outcomes are shown in Table 5. Of the 60 potential interactions (4 individual characteristics * 5 municipality characteristics * 3 residential
mobility outcomes) only depressive symptoms and social support with municipality unemployment were associated with distance of moving. Those with higher depressive symptoms made shorter moves in low unemployment municipalities and longer moves in high unemployment municipalities. Those who received more support from friends or family made shorter moves in high unemployment municipalities and longer moves in low unemployment municipalities. However, these interaction effects need to be interpreted with caution because we tested for 60 interactions without specific hypotheses, and statistically significant interactions can be found by chance with multiple testing.
Table 4. Associations between depressive symptoms, social support, health behaviors and direction of moving as characterized by area variables.

<table>
<thead>
<tr>
<th></th>
<th>Population density</th>
<th>Area SES</th>
<th>Area health index</th>
<th>Area mortality index</th>
<th>Area unemployment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR 95% CI</td>
<td>OR 95% CI</td>
<td>OR 95% CI</td>
<td>OR 95% CI</td>
<td>OR 95% CI</td>
</tr>
<tr>
<td><strong>Up movers vs. stayers</strong></td>
<td>(N=1503; 3030)</td>
<td>(N=1502; 3006)</td>
<td>(N=645; 973)</td>
<td>(N=1508; 3022)</td>
<td>(N=1500; 2985)</td>
</tr>
<tr>
<td>Depressive symptoms</td>
<td>0.81 (0.57; 1.31)</td>
<td>0.97 (0.52; 1.33)</td>
<td>1.30 (0.62; 1.36)</td>
<td>1.00 (0.53; 1.31)</td>
<td>1.23 (0.64; 1.47)</td>
</tr>
<tr>
<td>Social support by family</td>
<td>1.40 (0.62; 1.16)</td>
<td>1.19 (0.57; 1.11)</td>
<td>0.77 (0.6; 1.06)</td>
<td>0.78 (0.55; 1.03)</td>
<td>0.82 (0.59; 1.07)</td>
</tr>
<tr>
<td>Social support by friends</td>
<td>0.85 (0.71; 1.3)</td>
<td>0.68 (0.62; 1.22)</td>
<td>0.69 (0.69; 1.21)</td>
<td>0.63 (0.64; 1.19)</td>
<td>0.81 (0.67; 1.21)</td>
</tr>
<tr>
<td>Health behaviors</td>
<td>1.13 (0.73; 1.12)</td>
<td>0.99 (0.77; 1.21)</td>
<td>0.87 (0.68; 1.03)</td>
<td>1.04 (0.71; 1.16)</td>
<td>1.00 (0.68; 1.08)</td>
</tr>
<tr>
<td><strong>Down movers vs. stayers</strong></td>
<td>(N=1528; 3003)</td>
<td>(N=1534; 3031)</td>
<td>(N=643; 966)</td>
<td>(N=1526; 3012)</td>
<td>(N=1539; 3054)</td>
</tr>
<tr>
<td>Depressive symptoms</td>
<td>0.94 (0.56; 1.42)</td>
<td>0.92 (0.47; 1.32)</td>
<td>0.99 (0.52; 1.24)</td>
<td>0.92 (0.57; 1.38)</td>
<td>1.05 (0.49; 1.2)</td>
</tr>
<tr>
<td>Social support by family</td>
<td>0.89 (0.53; 1.05)</td>
<td>0.84 (0.54; 1.15)</td>
<td>0.83 (0.6; 1.15)</td>
<td>0.79 (0.59; 1.15)</td>
<td>0.83 (0.55; 1.07)</td>
</tr>
<tr>
<td>Social support by friends</td>
<td>1.01 (0.7; 1.47)</td>
<td>0.92 (0.74; 1.66)</td>
<td>0.95 (0.75; 1.52)</td>
<td>0.91 (0.74; 1.54)</td>
<td>0.94 (0.76; 1.52)</td>
</tr>
<tr>
<td>Health behaviors</td>
<td>0.93 (0.64; 1.03)</td>
<td>0.99 (0.62; 1.07)</td>
<td>0.86 (0.76; 1.2)</td>
<td>0.93 (0.64; 1.06)</td>
<td>0.88 (0.75; 1.14)</td>
</tr>
<tr>
<td><strong>Up movers vs. down movers</strong></td>
<td>(N=731; 1103)</td>
<td>(N=728; 1099)</td>
<td>(N=723; 363)</td>
<td>(N=730; 1102)</td>
<td>(N=727; 1097)</td>
</tr>
<tr>
<td>Depressive symptoms</td>
<td>0.81 (0.32; 1.3)</td>
<td>0.97 (0.31; 1.62)</td>
<td>1.30 (0.57; 2.03)</td>
<td>1.00 (0.36; 1.63)</td>
<td>1.23 (0.52; 1.93)</td>
</tr>
<tr>
<td>Social support by family</td>
<td>1.40 (0.71; 2.09)</td>
<td>1.19 (0.54; 1.85)</td>
<td>0.77 (0.44; 1.11)</td>
<td>0.78 (0.4; 1.16)</td>
<td>0.82 (0.47; 1.17)</td>
</tr>
<tr>
<td>Social support by friends</td>
<td>0.85 (0.47; 1.23)</td>
<td>0.68 (0.3; 1.06)</td>
<td>0.69 (0.39; 0.99)</td>
<td>0.63 (0.31; 0.96)</td>
<td>0.81 (0.45; 1.18)</td>
</tr>
<tr>
<td>Health behaviors</td>
<td>1.13 (0.78; 1.49)</td>
<td>0.99 (0.64; 1.35)</td>
<td>0.87 (0.62; 1.11)</td>
<td>1.04 (0.68; 1.39)</td>
<td>1.00 (0.68; 1.31)</td>
</tr>
</tbody>
</table>

Odds ratios and 95% confidence intervals from logistic regression analysis. Adjust for age, sex, education, density of population, municipality SES, unemployment, health index and mortality index. Up movers refers to participants who moved to either a municipality with higher population density, higher SES, better health index, higher mortality index or higher unemployment index. Down movers refers to opposite move on each scale. The number of observation in each regression analysis is shown as number of unique participants and number of total observations.
<table>
<thead>
<tr>
<th></th>
<th>Move/No Move</th>
<th>Number of moves</th>
<th>Distance of moves</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Depressive symptoms</strong>&lt;sup&gt;*&lt;/sup&gt;<strong>Population density</strong></td>
<td>-0.01</td>
<td>-0.02</td>
<td>0.00</td>
</tr>
<tr>
<td><strong>Depressive symptoms</strong>&lt;sup&gt;*&lt;/sup&gt;<strong>Area SES</strong></td>
<td>-0.04</td>
<td>-0.04</td>
<td>-0.02</td>
</tr>
<tr>
<td><strong>Depressive symptoms</strong>&lt;sup&gt;*&lt;/sup&gt;<strong>Area unemployment</strong></td>
<td>-0.03</td>
<td>-0.03</td>
<td>0.20</td>
</tr>
<tr>
<td><strong>Depressive symptoms</strong>&lt;sup&gt;*&lt;/sup&gt;<strong>Area Health Index</strong></td>
<td>0.02</td>
<td>0.00</td>
<td>0.12</td>
</tr>
<tr>
<td><strong>Depressive symptoms</strong>&lt;sup&gt;*&lt;/sup&gt;<strong>Area Mortality Index</strong></td>
<td>-0.05</td>
<td>-0.03</td>
<td>0.05</td>
</tr>
<tr>
<td><strong>Social support by family</strong>&lt;sup&gt;*&lt;/sup&gt;<strong>Population density</strong></td>
<td>-0.01</td>
<td>-0.02</td>
<td>-0.01</td>
</tr>
<tr>
<td><strong>Social support by family</strong>&lt;sup&gt;*&lt;/sup&gt;<strong>Area SES</strong></td>
<td>-0.02</td>
<td>-0.01</td>
<td>-0.02</td>
</tr>
<tr>
<td><strong>Social support by family</strong>&lt;sup&gt;*&lt;/sup&gt;<strong>Area unemployment</strong></td>
<td>0.01</td>
<td>0.03</td>
<td>-0.13</td>
</tr>
<tr>
<td><strong>Social support by family</strong>&lt;sup&gt;*&lt;/sup&gt;<strong>Area Health Index</strong></td>
<td>0.03</td>
<td>0.02</td>
<td>-0.09</td>
</tr>
<tr>
<td><strong>Social support by family</strong>&lt;sup&gt;*&lt;/sup&gt;<strong>Area Mortality Index</strong></td>
<td>-0.03</td>
<td>0.02</td>
<td>-0.13</td>
</tr>
<tr>
<td><strong>Social support by friends</strong>&lt;sup&gt;*&lt;/sup&gt;<strong>Population density</strong></td>
<td>0.01</td>
<td>-0.03</td>
<td>0.01</td>
</tr>
<tr>
<td><strong>Social support by friends</strong>&lt;sup&gt;*&lt;/sup&gt;<strong>Area SES</strong></td>
<td>0.00</td>
<td>-0.04</td>
<td>0.02</td>
</tr>
<tr>
<td><strong>Social support by friends</strong>&lt;sup&gt;*&lt;/sup&gt;<strong>Area unemployment</strong></td>
<td>-0.02</td>
<td>0.03</td>
<td>-0.17</td>
</tr>
<tr>
<td><strong>Social support by friends</strong>&lt;sup&gt;*&lt;/sup&gt;<strong>Area Health Index</strong></td>
<td>-0.04</td>
<td>0.01</td>
<td>-0.08</td>
</tr>
<tr>
<td><strong>Social support by friends</strong>&lt;sup&gt;*&lt;/sup&gt;<strong>Area Mortality Index</strong></td>
<td>-0.06</td>
<td>0.00</td>
<td>-0.02</td>
</tr>
<tr>
<td><strong>Health behaviors</strong>&lt;sup&gt;*&lt;/sup&gt;<strong>Population density</strong></td>
<td>-0.03</td>
<td>-0.01</td>
<td>-0.01</td>
</tr>
<tr>
<td><strong>Health behaviors</strong>&lt;sup&gt;*&lt;/sup&gt;<strong>Area SES</strong></td>
<td>-0.04</td>
<td>-0.01</td>
<td>-0.04</td>
</tr>
<tr>
<td><strong>Health behaviors</strong>&lt;sup&gt;*&lt;/sup&gt;<strong>Area unemployment</strong></td>
<td>0.02</td>
<td>0.01</td>
<td>0.03</td>
</tr>
<tr>
<td><strong>Health behaviors</strong>&lt;sup&gt;*&lt;/sup&gt;<strong>Area Health Index</strong></td>
<td>0.00</td>
<td>0.00</td>
<td>0.02</td>
</tr>
<tr>
<td><strong>Health behaviors</strong>&lt;sup&gt;*&lt;/sup&gt;<strong>Area Mortality Index</strong></td>
<td>0.02</td>
<td>0.02</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Regression coefficients and 95% confidence intervals for the interaction between individual characteristics and municipality characteristics with residential outcomes. Statistically significant b-values and confidence intervals in bold.

Table 5. Interactions between depressive symptoms, social support, health behaviors, and area characteristics with residential mobility.
5 Discussion

The present thesis examined the possible causality of neighborhood effects in health behaviors, depressive symptoms and social support, and how those variables were associated with residential mobility. Alcohol consumption and smoking were found to change as people moved between urban and rural neighborhoods. Likewise the source of support differed as people moved between urban and rural neighborhoods. The results lend some evidence for social causation in neighborhood effects. Furthermore, the effects of health behaviors, depressive symptoms and social support in residential mobility behavior were examined. People were found to move more likely and more often if they received a lot of social support from their friends. Also, those who had better health behaviors moved longer distances.

5.1 Neighborhood effects on health behaviors

People living in urban zip-code areas were more likely to smoke and drink alcohol than those living in rural areas, and these associations were partly replicated in within-individual analysis — supporting social causation. Neighborhood socioeconomic status and urbanicity were associated with higher interest in maintaining personal health, and these associations were similar in between-individuals and within-individual analysis. Physical exercise was not associated with neighborhood characteristics. The within-individual associations were generally about 50% weaker compared to the overall associations, suggesting that stable differences between individuals may introduce upward bias in estimating potentially causal neighborhood effects.

Previous findings on the association between neighborhood socioeconomic status and consumption of alcohol have been mixed. A study involving 93,747 Canadians reported that the association is u-shaped, so that people in affluent and in deprived areas drink more than people in mid-range neighborhoods (Matheson et al., 2012). We found no such quadratic association between
neighborhood socioeconomic status and consumption of alcohol in our sample (data not shown). Another study on people (n=8197) living in California, found that those living in the least deprived areas were most likely to be heavy drinkers (Pollack, 2005). There are also studies showing that people living in highly disordered neighborhood tend to drink more than people in more peaceful neighborhoods (Hill & Angel, 2005; Pampel et al., 2010). However, all these results were from cross-sectional studies. Our results suggest that people living in more affluent neighborhoods of Finland drink alcohol more frequently than those living in poorer neighborhoods, but this association is due to differences between different individuals living in different areas — moving across affluent and poor neighborhoods does not influence drinking habits. The degree of neighborhood urbanicity may be more relevant for social causation, as individuals moving to more urban neighborhoods drank more frequently compared to another time when they were living in a more rural neighborhood.

While urbanicity and neighborhood socioeconomic status were not associated with better health behaviors, people living in more urban and affluent areas paid more attention to their own health than people living in more rural and deprived areas. There was no difference between the within-individual and between-individual components of the associations, so a causal association is plausible but not strongly supported by the present data. This discrepancy between health behaviors and self-reported interest in health in urban and rural areas could be related to how people interpret their level of interest in health. When reporting how interested they are in monitoring and maintaining their health, urban people might think of other health behaviors besides alcohol, smoking and exercise, such as eating healthy food. The association may also reflect reporting bias where urban people are more inclined to report higher interest in health even though they may not act accordingly.
5.2 Neighborhood effects on depressive symptoms, mistrust and source of social support

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 area neighborhoods. Higher area-level socioeconomic status 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 depressive symptoms 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, Landis, & Umberson, 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 socioeconomic status report more social support than those living in neighborhoods with low socioeconomic status (Huurre, Eerola, Rahkonen, & Aro, 2007; Mickelson & Kubzansky, 2003; Ziersch, Baum, Darmawan, Kavanagh, & Bentley, 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.

There were no associations between neighborhood socioeconomic status 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, Ahern, Rudenstine, Wallace, & Vlahov, 2005; Jokela, 2014; Peen et al., 2010; Ross, 2000). Associations between neighborhood socioeconomic status 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 socioeconomic status 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.
5.3 Depressive symptoms, social support, and health behaviors and residential mobility behavior

Results from study III suggest that those who receive more social support from their friends are more likely to move, and to move more often than those who receive less support from their friends. By contrast, those who receive more social support from their family tend to move less often than those who do not receive as much support from their family. Additionally, individuals with optimal health behaviors move longer distances than those whose health behaviors were less optimal. Depressive symptoms were not associated with residential mobility. Surprisingly, none of the health characteristics were associated with selective residential mobility with respect to regional health profiles of municipalities.

The source of social support affected whether or not and how often people moved. A recent study found that individuals anticipating a mobile lifestyle in the near future were motivated to expand their social network (Oishi et al., 2013). Thus, it is plausible that the association between social support from friends and increased probability to move is partly explained by a preceding anticipation of a future move. Furthermore, as moving is an anxiety provoking life-event (Holmes & Rahe, 1967; Oishi, Miao, Koo, Kisling, & Ratliff, 2012), a certain amount of social support might be needed for an individual to be able to cope with the stress that is associated with moving. It is also possible that a large social network of friends can create pull factors for moving. Having friends in other cities could potentially enable, for example, better employment chances (Burns, Godlonton, & Keswell, 2010). Those who mainly receive social support from their family might not have a wide enough social network in place to receive adequate social support after a move, and hence choose not to move in the first place. Higher social support from family may also indicate closer ties to relatives more generally, and the possibility of losing these social ties may decrease people’s willingness to move (Wellman & Wortley, 1990).

Social support was not associated with residential mobility on the rural-urban continuum. In study II, we found that people who moved to more urban areas received more social support from their friends than those living in rural areas.
The evidence suggested that the difference could be equally explained by the fact that living in urban environment increased social support from friends, and that people who receive a lot of support from their friends were likely to move to urban areas. Together with the results from study III, however, it seems more likely that urban living increases social support received from friends, as there was no evidence for selective mobility.

The Australian study of middle-aged women found that smokers moved longer distances than non-smokers (Larson et al., 2004). We found that those with good health behaviors moved longer distances. The samples of the two studies are markedly different and thus, it is conceivable that the effects of health behaviors are different in broader sample of a population. In order to get a more general view of the effects on residential mobility, we used an aggregate measure for health behaviors rather than looking at individual behaviors. As such, it is possible that any opposite effect that smoking might have had on residential mobility was obscured by the effects of alcohol consumption, frequency of exercise and self-rated interest in health. As expected, we did not find any association between depressive symptoms and residential mobility. Earlier studies have linked serious mental disorders to more frequent residential mobility (DeVerteuil et al., 2007; Lix et al., 2006). However, participants in our study were relatively healthy. Thus, they would have not have to deal with negative consequences that a severe mental health issue might cause, such as inability to work, which in turn might force people to move to a different residential area.

Two previous studies in Australia and the United Kingdom reported that health and health behaviors were associated with selective residential mobility across levels of neighborhood deprivation, so that individuals with poorer health were more likely to move to more than less deprived neighborhoods (Jokela, 2014, 2015). We found no evidence for selective residential mobility across municipalities with different levels of socioeconomic status, unemployment rate, population density, health index, or mortality rate. This suggests that health-related selective mobility is unlikely to create regional health inequalities in Finland, although our focus on moves across municipalities may have ignored selective residential mobility at a smaller scale. Two thirds of the moves in our
sample were made within municipalities, and examining the direction of residential mobility at zip-code area level could have yielded different results. In addition, the influence of health on residential mobility may depend on people's life course characteristics, such as marital status, parenthood, and employment status. Life course characteristics have been associated with migration behavior (Kley, 2011), and age-dependent health inequalities between neighborhoods have been reported in the UK (Norman & Boyle, 2014). A detailed analysis of life-course dependent health selection was beyond the scope of our current analysis, but this topic should be investigated in future studies.

5.4 Methodological considerations

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 alcohol consumption, smoking, exercising, self-rated health, 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. Other strengths of studies I & II include a large sample size and assessment of neighborhood characteristics at the level of municipalities and zip-code areas. The major strength of study III is the accurate mobility history of individuals. It allowed us to get a precise number of moves of each participant without having to deal with memory bias. Also, it allowed us to calculate the exact distance of each move.

However, as with any other study, there are some limitations to be considered. In studies I & II, time-varying individual characteristics can still confound within-individual associations, so the within-individual analysis does not adjust for all the possible confounders. For example, a possible confounder of neighborhood effects could be the personality of the residents. Even though personality traits are relatively stable, they have been shown to change the most during young adulthood (Roberts, Walton, & Viechtbauer, 2006), the age period in which most our participants fall during some of our study waves. As neighborhoods are not
likely to affect every person in the same way, future studies should examine how personality affects the results of neighborhood effects (Cutrona et al., 2006).

Furthermore, it must be noted that all outcome measurements in studies I & II were based on single-item for each behaviour. Multiple items could have increased the reliability of those measurements. All outcome measurements in studies I & II were also based on self-reports, which may be subject to social desirability bias (Adams, 2005). In addition, we only had data for neighborhood characteristics at the zip-code area level from 2007. 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.

It also has to be noted that studies I & II only looked at the causal neighborhood effects of deprivation and urbanicity. Other possible neighborhood characteristics, for example, amount of green spaces (Bell, Wilson, & Liu, 2008) or traffic noise (van Kempen & Babisch, 2012) could also affect the well-being of individuals.

In study III we did not have the data for health, mortality or unemployment for zip-code areas. Thus, we could only look at selective residential mobility between municipalities. Even though there is variation between municipalities, there is also a lot of variation between neighborhoods within municipalities. As nearly two thirds of all the moves in the study were made within municipalities, it is more likely that selective residential mobility could be observed at zip-code area level.

A problem with majority of neighborhood effect studies is that they concern adults, as is the case with the studies included in this dissertation. However, children are the ones how spend majority of their time in the neighborhood they live in. It has been argued that early life exposure to different neighborhood characteristics have a lasting influence on many outcomes that are measured in neighborhood effect studies (Glass & Bilal, 2016). As such, looking at how neighborhood characteristics impact, for example, health behaviors in adults, may produce biased results if early life neighborhood exposures are not controlled for. Similarly, adverse experiences in childhood may strengthen the association between neighborhood deprivation and poor health behaviors (Halonen et al., 2014).
5.4 Conclusions and practical implications

The results from this study show that neighborhood urbanicity and socioeconomic status do affect health behaviors and source of social support of individuals. People in urban and affluent neighborhoods were found to pay more attention to their health, but at the same time consume more alcohol. Also people in more urban neighborhoods were found to smoke more. While part of the results could be explained by social causation, the evidence was stronger for social selection – that is, people who moved to more urban and affluent areas already paid more attention to their health, drank more alcohol and smoked more. Results for source of social support followed suit. People in more rural areas received social support from their family and people in more urban and affluent areas received more support from their friends. Like with health behaviors, the results provided more support for social selection than for social causation.

The study also examined how health behaviors, depressive symptoms and source of social support affected residential mobility behavior. We found that people who got more social support from their friends were more likely to move and to move more frequently. Also, people who got more support from their family were less likely to move. In addition, people with better health behaviors moved longer distances.

These findings answer to the existing gaps in neighborhood effects literature, mainly the issue of causality in neighborhood effects (Diez Roux & Mair, 2010). Studies focusing on the issue have been long overdue. In a rather demographically homogenous country, such as Finland, neighborhood characteristics do seem to affect the physical and psychological well-being of individuals to a certain extent. However, most of the difference in the well-being of individuals between neighborhoods are likely to be caused by social selection. Studies using samples from more culturally diverse countries support this view (Jokela, 2014, 2015).

Drawing the findings of the three studies together raises an interesting question. In studies I & II the results showed that certain kinds of people tend to move to certain kinds of neighborhoods – on both municipality and zip-code area
level. However, in study III the results were quite clear on that no health selective residential mobility occurred between municipalities. Taken together, the results imply that there are other factors, which affect selective residential mobility and create neighborhood differences in health. Even in studies were health has been associated with selective residential mobility (Dunn, Winning, Zaika, & Subramanian, 2014), the results have been anything but consistent. The results varied based on the number and nature of health problems people had. Results from health selective residential mobility studies may be further confounded by omitted individual level variables. For example, personality traits have been found to affect the well-being of individuals (Josefsson et al., 2011). Personality can, however, also affect residential mobility behavior (Rentfrow, 2014). Such results only highlight the complexity of studying the formation of health inequalities between neighborhoods. Thus, it is not surprising that neighborhood effects studies have faced harsh criticisms (Oakes, Andrade, Biyoow, & Cowan, 2015).

It is important to recognize that the effects sizes of neighborhood effects studies in general, and also in the studies included in this dissertation, are relative small. Thus, the practical implications of the findings are quite insignificant for a given individual. Even if part of our findings support the causality of neighborhood effects, for example, in consumption of alcohol, it does not mean that an individual’s consumption of alcohol would increase in a problematic way after a move to a more affluent neighborhood.

At societal level, however, the effects can be very significant. Social segregation by health behaviors or other means can lead to neighborhoods were health problems accumulate. Furthermore, results from the studies included in this dissertation would indicate the counterintuitive possibility that affluent areas could be those were people in general might have problematic drinking behaviors. This in turn could reflect to social policy and intervention planning. As people of lower socioeconomic status tend have worse health in general, health services should be directed towards deprived areas. Intervention programs against drinking, however, should be directed to more affluent areas.

The present study has addressed important issues in neighborhood effect studies – causality of neighborhood effects and selective residential mobility. The
findings suggest that majority of health inequalities between neighborhoods are caused by social selection. Future studies should concentrate on differentiating the factors that govern selective residential mobility. In addition, the findings of social causation in neighborhood effects can be of possible use in social policy planning.
6 References


