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Neighborhood-Based social capital and life satisfaction: the case of Rotterdam, The Netherlands

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ABSTRACT

In this study, we examine the relationship between neighborhood-based social capital and residents' life satisfaction by considering resident heterogeneity. Using a database of the city of Rotterdam, The Netherlands, we find a small but significant positive association between neighborhood-based social capital and individual life satisfaction. However, we also find considerable differences among residents because neighborhood-based social capital is important mainly for people who are more likely to spend considerable time in the neighborhood or who are more neighborhood dependent (i.e. less-educated people, people who live on welfare, people with poor health, retired people, and those who are divorced or widowed). Our results confirm the importance of neighborhood-based social capital for residents' life satisfaction in terms of both actual social contacts with neighbors and the perceived social cohesion within a neighborhood. At the same time, the importance of neighborhood-based social capital varies among different groups of residents. These findings have important implications for policy-makers.

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Life satisfaction; social cohesion; social contacts; neighborhoods; heterogeneity

1. Introduction

In light of the current waves of globalization and individualization in Western societies, several scholars have argued that residential neighborhoods have lost their significance as a source of social capital. Increased mobility, changing working patterns, and the pluralization of lifestyles have gradually weakened traditional neighborhood contacts (Guest & Wierzbicki, 1999; Putnam, 2000), and social networks have become increasingly more regional, national, international, and virtual in scope (Urry, 2012). Accordingly, because many of the social relationships in which people are engaged can be found outside their residential neighborhood, the definition of “local community” has become less dependent on geographical boundaries. The decline in neighborhood-based social capital is evidenced not only by a decreasing number of people who have frequent contact with their neighbors (Guest & Wierzbicki, 1999) but also by a declining social cohesion at the neighborhood level

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(Putnam, 2000). In opposing this “lost community” perspective (cf. Wellmann & Leighton, 1979), various scholars have argued that neighborhoods are still relevant as an important source of social capital (Völker, Flap, & Lindenberg, 2007), where social capital can be regarded as the “*connections among individuals – social networks and the norms of reciprocity and trustworthiness that arise from them.*” (Putnam, 1995: 19). Following Forrest and Kearns (2001), the globalization and individualization of society can even result in a greater significance of neighborhoods because local social interactions and familiar neighborhood landmarks may become increasingly recognized as sources of comfort and security for residents. These authors argued that location is relevant and that “*the neighbourhood becomes an extension of the home for social purposes and hence extremely important in identity terms*” (Forrest & Kearns, 2001, p. 2130). In support of this “saved community” perspective, Mollenhorst (2015) found that neighborhoods have become a more important source of social capital in The Netherlands since the 2000s.¹ Neighbors are more often asked for practical help, and the degree to which neighbors are trusted and liked has also increased over the years. Although neighbors are often not part of an inner circle and are considered “weak” ties (Henning & Lieberg, 1996; cf. Granovetter, 1973), almost 20% of people’s individual social networks are still neighborhood-based (Mollenhorst, 2015).

The importance of neighborhood social capital is evidenced not only by the frequency and evaluation of social contacts but also by their effects on individual life satisfaction. In this regard, several studies have reported a positive relationship between neighborhood social capital and life satisfaction. Helliwell and Putnam (2004) and Powdthavee (2008) found that frequent interactions with neighbors are associated with higher assessments of happiness, and Shields, Wheatley Price, and Wooden (2009) concluded that social support and social interaction are positively correlated with individual life satisfaction. Likewise, Farrell, Aubry, and Coulombe (2004) found that a sense of community, as an important neighborhood characteristic, is positively associated with individual well-being, and Oshio (2016) concluded that trust in neighbors, social contacts in the neighborhood and participation in neighborhood activities are positively associated with happiness.

The association between neighborhood-based social capital and individual life satisfaction is likely to differ among people: for some people, neighborhood-based social capital may have neither a positive nor a negative influence on their life satisfaction, whereas for other people, the neighborhood still plays an important role in their daily lives (Howley, Neill, & Atkinson, 2015). In particular, the importance of neighborhood social networks is expected to depend on an individual’s connection to the networks that are outside of neighborhood boundaries (Ellen & Turner, 1997; Freiler, 2004; Völker et al., 2007) or the amount of time that is spent in the neighborhood on a daily basis (Henning & Lieberg, 1996). Accordingly, for individuals who are less physically mobile and less affluent (including retired and unemployed persons), which makes them more reliant on neighborhood social capital (see, among others, Meegan & Mitchell, 2001), we expect a stronger positive relationship between neighborhood-based social capital and life satisfaction. In contrast, the life satisfaction of individuals who have strong family, friendship, or collegial networks that extend beyond the community in which they live is less likely to be influenced by the neighborhood.

This paper aims to contribute to the discussion of the importance of neighbor relations by examining the heterogeneous relationship between neighborhood-based social capital and life satisfaction. Using a database of the city of Rotterdam, The Netherlands, we empirically test the importance of social contacts and perceived social cohesion within a neighborhood for different groups of people. Building on the urban sociology literature on neighbor relations and the happiness studies literature on the importance of the living environment for well-being, we examine the association between neighborhood-based social capital and self-reported life satisfaction for different groups of people.² This paper contributes to the existing life satisfaction literature by examining the importance of social capital within the context of the neighborhood. This research makes a distinction between actual social contacts with neighbors and the perceived social cohesion within the neighborhood. Although social contacts might be primarily important for people who are dependent on their neighborhood, this is not necessarily true for perceived social cohesion, as values such as trust and safety might be more important for certain groups, such as families with young children or young (female) adults in general. Furthermore, this paper analyzes a range of personal characteristics (employment status, marital status, education level, age groups and objective health), whereas previous studies mainly focused on one or two aspects. Here, self-reported life satisfaction as an acceptable and valid estimate for individually experienced welfare or utility (Frey, Luechinger, & Stutzer, 2009; Veenhoven, 2000) can be considered a good outcome measure to assess the importance of neighborhood-based social capital while taking into account other life domains. Most notably, overall life satisfaction can be regarded as the ultimate outcome in many domains of life (Headey, Veenhoven, & Wearing, 1991; Michalos, 1985), where some domains can be more important than other domains, and the importance of a domain can differ among individuals (Tiefenbach & Kohlbacher, 2015). Hence, the same circumstances do not necessarily have the same impact on people. Accordingly, we expect that neighborhood-based social capital has a large impact on the life satisfaction of the people who spend a considerable amount of their time in their residential neighborhood, while for other people, other types of contacts or even other life domains play a larger role.

The remainder of this paper is organized as follows. The next section provides a theoretical overview of the research on life satisfaction and on neighborhood-based social capital. Section 3 presents the data and methodology, and the results are reported in section 4. Section 5 discusses the findings and concludes the paper.

2. Related literature

2.1. Life satisfaction and social capital

Life satisfaction can generally be defined as an overall appreciation of life as a whole (Veenhoven, 1984, 2000). Life satisfaction can be regarded as one of the components of subjective well-being because this concept includes people's emotional responses, domain satisfaction and global judgments of life satisfaction (Diener, Suh, Lucas, & Smith, 1999). Life satisfaction is often measured by asking people how satisfied they are with their lives. After all, individuals are in the best position to gauge their own life satisfaction. Kahneman (2011) discussed the possible biases that result from evaluation

and memory. By answering this question, people might elicit specific and recent memories, and there might be biases of recall. Despite these possible biases, survey data about life satisfaction are generally regarded as valid and reliable (Blanchflower & Oswald, 2004; Kahneman & Krueger, 2006), even when only a single question is asked to determine how satisfied one is with one's life (Cheung & Lucas, 2014; Schimmack & Oishi, 2005).

The literature contains a fairly broad consensus on the main determinants of life satisfaction (Diener & Seligman, 2004; Frey & Stutzer, 2002; Oswald, 1997). People's life satisfaction can to a large extent be explained by genetic factors and personality traits (Bartels, 2015; Diener & Lucas, 1999; Lykken & Tellegen, 1996). In addition, various socio-economic individual characteristics play a role, such as health (e.g. Graham, 2008), income, socio-economic status (e.g. Dolan, Peasgood, & White, 2008), marital status (e.g. Diener & Lucas, 1999), and employment status (e.g. Oswald, 1997).

This research focuses on the relationship between social capital and life satisfaction. Following Putnam (1995), social capital can be regarded as the "*connections among individuals – social networks and the norms of reciprocity and trustworthiness that arise from them.*" (Putnam, 1995, p. 67). Hence, social capital has a more individual component (social relationships and reciprocity) and a more collective component (trust and social cohesion) (Portes, 2000). Important aspects of social capital include interpersonal relationships with family, friends, colleagues, relatives and neighbors, formal and informal social networks, group membership and trust, reciprocity and civic engagement. People invest in social capital because doing things with others has important benefits for personal well-being. This tendency is one of the main reasons why people are involved in relationships that vary from friendships to community involvement in, for example, sport clubs, churches or voluntary organizations. In general, the empirical literature has found a positive association between social capital and subjective well-being (e.g. Arampatzi, Burger, & Novik, 2018; Ateca-Amestoy, Aguilar, & Moro-Egido, 2014; Portela, Neira, & Salinas-Jiménez, 2013; Rodríguez-Pose & Von Berlepsch, 2014; Van der Horst & Coffé, 2012).³ In this study, we further explore this relationship by focusing on the connection between specific components of social capital namely, social contacts with neighbors and the perceived social cohesion within the neighborhood. However, we do not neglect the importance of other forms of social capital, such as friendships.

2.2. Neighborhood-based social capital and life satisfaction

Geographers contribute in many ways to the wider interdisciplinary debates on life satisfaction by examining, among other factors, the role of geography in life satisfaction or happiness (Ballas & Tranmer, 2012; Pacione, 2003; Schwanen & Atkinson, 2015) and, more specifically, the importance of context and space. Scholarship regarding spatial variations in subjective well-being is rapidly expanding, and one emerging insight is that spatial differences are multiscalar (Schwanen & Wang, 2014). At the regional and interurban scale, researchers have focused on the preferences among cities in different regions and of diverse types by attempting to use various means to identify the characteristics that make some cities more attractive as places of residence than other cities (e.g. Ballas, 2013; Chen, Davis, Wu, & Dai, 2015; Florida, Mellander, & Rentfrow,

2013; Leyden, Goldberg, & Michelbach, 2011; Poon & Shang, 2014) or the reasons why people are happier in the countryside than in cities (e.g. Berry & Okulicz-Kozaryn, 2011; De Vos, Van Acker, & Witlox, 2016; Lenzi & Perucca, 2016; Okulicz-Kozaryn, 2015; Okulicz-Kozaryn & Mazelis, 2016). The scale of the neighborhood has often been analyzed in the context of social problems and individual life opportunities; many studies have explored how neighborhood living conditions affect educational achievement, occupational status and health. Previous research that discussed the importance of the neighborhood context for people's individual life satisfaction focused on neighborhood characteristics such as the ethnic composition of the neighborhood (Knies, Nandi, & Platt, 2016), widening income and wealth inequalities (Ballas, Dorling, & Shaw, 2007) and neighbors' income level (Luttmer, 2005).

In addition, several scholars have analyzed the influence of neighborhood relations on individual life satisfaction or personal well-being (Farrell et al., 2004; Helliwell & Putnam, 2004; Howley et al., 2015; Powdthavee, 2008; Shields et al., 2009). According to Putnam (2000), a neighborhood is important in facilitating social connections and the connections to a place itself. These connections, in turn, are important to the life satisfaction of the residents and to one's own perceived quality of life (Layard, 2005; Putnam, 2000; Rukumnuaykit & Pholphirul, 2016). Neighborhood social capital can positively affect life satisfaction in several manners, whereby a distinction can be made between individual and collective components (Portes, 2000). The individual component focuses on the *social contacts* that people have with their neighbors, whereas the collective component refers to the perceived *social cohesion* within the neighborhood.

The neighborhood can be an important source of social capital, and there are many possible ties that bind neighbors (Blokland, 2003). In addition to providing pleasant company, neighbors can help when needed (e.g. by delivering groceries when one is sick or watching one's home when one is away). Neighbors can also provide useful information by sharing their knowledge. Völker and Flap (2007) found that the most popular activities among neighbors include borrowing small items, taking care of one another's children and helping one another with minor repairs and other odd jobs in and around the house. Moreover, neighbors need one another in circumstances that require quick, immediate action, particularly when direct availability is an important issue.

More recently, the attention has shifted to the question of how advances in technologies and online communication tools influence neighboring. Hampton and Wellman (2003) discussed whether the Internet weakens neighboring by leading people away from meaningful in-person interactions, transforming neighboring by creating new forms of community online, or enhancing neighboring by adding a news means of connecting with existing relationships. They found that the Internet supports neighboring because it supports increased contact with weaker ties. Moreover, municipalities and local government should pursue the development and study of tools for web-based socialization between local community members. The use of web-based tools (e.g. wikis, chats, and forums) would make it easier to collaborate with other community members to solve local problems and to promote public initiatives (Capece & Costa, 2013).

Social cohesion is indicative of the quality of public and civic life through feelings of commitment and trust (Tolsma, Van der Meer, & Gesthuizen, 2009). Putnam (2000) found that people are happier when they feel that the people in their community can be

trusted. Social cohesion provides more information regarding people's general or collective perceptions of the neighborhood. According to Forrest and Kearns (2001, p. 2130), residentially based networks are “*an important function in the routines of everyday life and these routines are arguably the basic building-blocks of social cohesion – through them we learn tolerance, co-operation and acquire a sense of social order and belonging*”. Most people consider neighborhoods important because they like to trust people in close proximity; therefore, they invest time in maintaining good relationships with their neighbors. The question of how comfortable one is when walking around in the neighborhood after dark indicates whether a person feels safe in the area in which they live in. If people feel safe, they may develop stronger ties within the community and display a high level of satisfaction. Social cohesion and support decrease residents' perception of danger in a neighborhood, despite the actual level of danger, and people who feel safe in their neighborhoods report higher levels of satisfaction than people who do not feel safe (Baba & Austin, 1989). For example, social media can contribute to perceived social cohesion within neighborhoods as neighbors make use of social media connections such as WhatsApp groups to warn each other in case they see something suspicious in their neighborhood.

2.3 Heterogeneous relation between neighborhood-based social capital and life satisfaction

Although previous research has shown that neighborhood-based social capital is positively associated with individual life satisfaction, the level of its importance may differ across various groups. To explore the potential of social capital to make cities better places for the people who live in them, Blokland (2003) claims that there is a need to understand the networks that produce social capital in their specific urban contexts. For some persons, their neighborhood can arguably be highly important, whereas for other persons, it may not be an important determinant of their life satisfaction. Various reasons can be offered to explain why the association between neighborhood-based social capital and life satisfaction is heterogeneous or varies among people.

First, the relative importance of neighborhood-based social capital to life satisfaction depends on a person's connection to the networks that are outside of neighborhood boundaries. For young adults, the neighborhood in which they live may be less important because their social networks often extend beyond the boundaries of their neighborhood because of work or school. Individuals are less likely to be influenced by their immediate surroundings when they have strong family, friendship, or collegial networks that extend beyond the neighborhood in which they live. These individuals can easily obtain information, services, opportunities and support from other sources (Ellen & Turner, 1997). Accordingly, one can argue that neighborhood-based social capital is more important to the people who are limited in their choice of interaction partners or who have fewer alternatives to neighborhood contacts (Völker et al., 2007).

Therefore, people who have limited mobility or who are restricted in their means of transportation tend to develop more local contacts. Thus, neighborhood-based social capital is expected to be more important to people who are neighborhood dependent than to other people (Meegan & Mitchell, 2001). Most notably, the elderly, low-income individuals, the unemployed, and single-parent families – for whom time and personal

resources are scant – may depend more on support from neighbors and neighborhood institutions. In this regard, Freiler (2004) argued that neighborhoods are more important to people with limited incomes, people with limited mobility, people who spend more time in their neighborhoods, people who rely on their neighborhood as a source of social networking and people who use services that are close to where they live. This idea is supported by other studies that argue that a neighborhood is particularly important to poorer residents in building their social capital because a lack of resources limits their mobility (see, e.g. MacDonald, Shildrick, Webster, & Simpson, 2005; Pinkster, 2007; Sampson, Morenoff, & Gannon-Rowley, 2002).⁴ Similarly, Howley et al. (2015) found that the association between neighborhood contacts and subjective well-being was stronger for unemployed and retired people.

In addition, the importance of neighborhood-based social capital is likely to vary with the stage of life cycle or major life events. Evidence from large-scale panel studies on changes in subjective well-being after major life events (Lucas, 2007) show how life events as divorce, death of a spouse, unemployment and disability are associated with lasting changes in subjective well-being. These studies also show that there are considerable individual differences in the extent to which people adapt to the new situation. The influence of major life events is one of the explanations why life satisfaction varies between subgroups and can change over time. Another explanation is the life cycle stage of the respondents which is tapped with amongst others age, the presence of children, gender, and education. The neighborhood may become more important when individuals start their own family or when they retire. Especially for families with young children, the perceived social cohesion in their neighborhood is important to their life satisfaction, particularly for women with young children (Freiler, 2004). For parents, it is important that their children are safe when they are walking or playing in the neighborhood. As a result, these individuals are more likely to invest in the community and actively participate in formal or informal community activities.

3. Data and methodology

3.1. Data

In this research, we analyze the relationship between neighborhood-based social capital and life satisfaction in the city of Rotterdam. Rotterdam is (after Amsterdam) the second-largest city in The Netherlands, with more than 600,000 inhabitants and is a highly diverse city with more than 170 nationalities. A majority of the households in Rotterdam have a low household income that results in an annual average household income of 217,000 euro (which is below the Dutch average). Rotterdam has both rich and poor neighborhoods, with an annual household income of 39,000 and 16,500 euro, respectively. In terms of inequality, Rotterdam reports a Gini-coefficient of 0.27, which is relatively low compared to other major cities in The Netherlands. Similar to many other large (European) cities, Rotterdam is facing severe social problems, such as urban poverty, crime and segregation. Consequently, the findings of this research may be of interest to larger urban areas in general. Recently, the city of Rotterdam launched an action program to reduce loneliness and social isolation among elderly people because these are considered major problems in this modern aging society.

For this study, we use the Health Survey 2012 of the Department of Public Health of the municipality of Rotterdam (GGD, 2012). The survey was conducted with adults (17 years and older) from October 2012 to November 2012. The respondents were asked to complete a questionnaire on physical and mental health on either paper or online. To obtain a representative sample for the city of Rotterdam, specific groups were approached personally by calling or visiting them at home. For this research, survey sample weights are being used.⁵ In total, 14,113 inhabitants of the city of Rotterdam completed the survey and included all local administrative areas of the municipality. Not everyone had to respond to all modules of the questionnaire; thus, the common sample was reduced to 9,776 respondents.⁶

3.2. Dependent, independent and control variables

Life satisfaction was measured with a 10-point scale that measures life satisfaction based on the following question: “How satisfied are you with your life as a whole these days? Express in a number 1 = very dissatisfied to 10 = very satisfied”.⁷ People who answered “don’t know” (1.6%) were omitted from the sample.⁸ Overall, Rotterdam residents are rather satisfied with their lives, because their average score is 7.7, and only 8.3% of the respondents rated their life satisfaction as 5 or lower (See Figure 1).

Our main independent variable of interest, neighborhood-based social capital, is measured by social contacts and social cohesion in the neighborhood. Social contacts in the neighborhood were measured by using an index that consists of the following four questions and reflects how frequently the respondents interact with the people in their neighborhood:

- How often do you have contact with your neighbors?
- How often do you or one of your neighbors ask one another for advice on personal matters?
- How many adults in your neighborhood do you know by face?
- If your neighbors are not home, how often do you watch out for them?

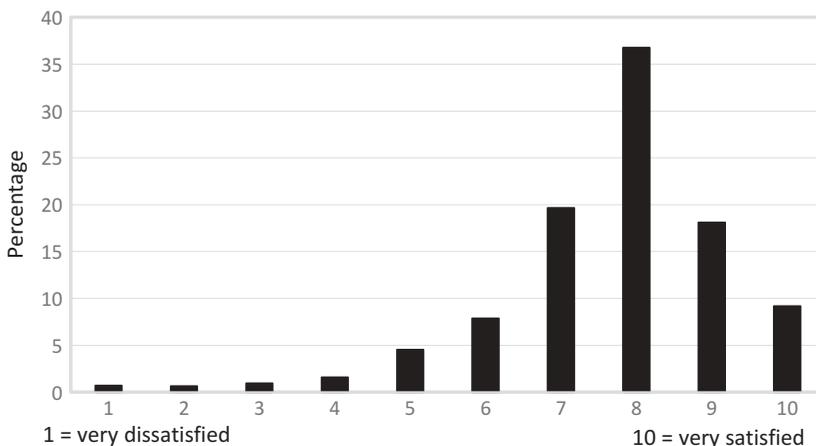


Figure 1. Distribution of the dependent variable: self-reported life satisfaction.

For all four questions, the responses were scored on a 4-point scale that ranged from 1 “never/none” to 4 “often/many” (see Figure 2). The respondents who answered “don’t know” or “not applicable” were excluded from our sample. The Cronbach’s alpha (0.69) indicated that the index had an acceptable degree of internal consistency.⁹

The perceived social cohesion in the neighborhood was measured by an index that consisted of the following four items¹⁰ (Harpham, Grant, & Thomas, 2002):

- People around here are willing to help their neighbors;
- People in this neighborhood feel connected to one another;
- People in this neighborhood can be trusted; and
- People in this neighborhood generally do not get along with one another.

For all four statements, the respondents were asked to give their level of agreement with the responses on an index that ranged from 1 “strongly disagree” to 5 “strongly agree”. A higher score on the index (on a 5-point scale) reflects higher perceived social cohesion within the neighborhood (see Figure 2). The Cronbach’s alpha ($\alpha = 0.82$) indicated that the social cohesion index is internally consistent.

In our analysis, we included individual control variables that could affect the relationship between neighborhood-based social capital and life satisfaction, such as gender, age, ethnicity, marital status, household composition, educational level, employment status, annual household income, health and other forms of social capital (in terms of having friends). These control variables were chosen because they could potentially affect the relationship between neighborhood-based social capital and life satisfaction or because they are commonly regarded as important drivers of life satisfaction (Layard, 2005). For additional robustness checks, we use information on the number of friends living in the same neighborhood, residential duration, satisfaction with the living environment, and satisfaction with green space in the neighborhood. The summary statistics and the correlation matrix of the variables that were included in the analysis can be found in Appendixes A1 and A2, respectively.

3.3. Method and estimation strategy

To examine the relationship between social contacts and social cohesion in neighborhoods and self-reported life satisfaction, we specify a simple reduced-form life

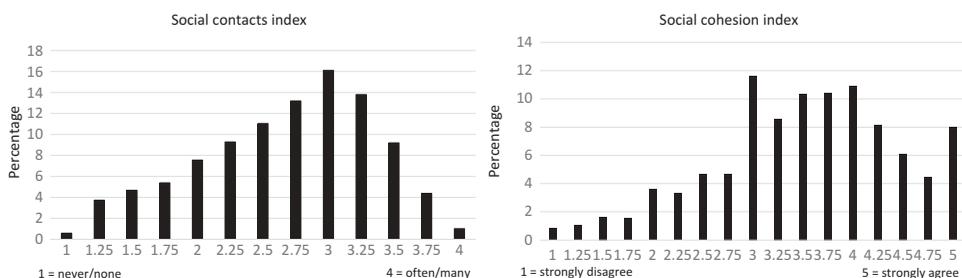


Figure 2. Distribution of the independent variables: Social contacts index and perceived social cohesion index.

satisfaction model (see also Arampatzi, Burger, & Veenhoven, 2015; Di Tella, MacCulloch, & Oswald, 2003). The models are estimated by using OLS and neighborhood-fixed effects to reduce endogeneity, because individuals are not randomly assigned to neighborhoods but instead choose them for unobserved reasons. The effect of the unknown factors that influence residential decisions may be improperly assumed to be a neighborhood effect. Specifically, we estimate the following model:

$$LS_{ij} = \text{Social Cohesion}_{ij} + \text{Social Contacts}_{ij} + \Sigma \text{Personal}_{ij} + \Sigma \text{Local Area}_j + \epsilon_{ij}$$

where LS_{ij} is a self-reported measure of life satisfaction for individual i in neighborhood j . $\text{Social Cohesion}_{ij}$ is the social cohesion that is experienced by individual i in neighborhood j , and $\text{Social Contacts}_{ij}$ is the amount of social contact by individual i who lives in neighborhood j . $\Sigma \text{Personal}_{ij}$ is a vector of the control variables that relate to the individual characteristics of individual i and the individual's perceptions of the neighborhood, whereas $\Sigma \text{Local Area}_j$ is a vector of local area dummies for which the neighborhood delineation of the local government is used.¹¹ ϵ_{ij} is the residual error term.

To examine the heterogeneity of the variables for various individual characteristics, interaction effects are introduced into our life satisfaction model (1). Specifically, we focus on the effects of (a) the interaction between social cohesion and the objective individual characteristics of the respondents and (b) the interactions between social contacts and the same individual characteristics (employment status, marital status, age, education level, and health).

4. Results

4.1. Baseline regression

Table 1 provides the baseline regression for the effects between social contacts and social cohesion in the neighborhood and life satisfaction. Model I of Table 1 reports the coefficients of the individual control variables, and the results are consistent with previous studies and are indicative of the importance of personal characteristics to individual life satisfaction (Helliwell, 2003; Layard, 2005). People who report being in good health, being in a relationship, having friends, being employed and having higher income levels generally report higher levels of life satisfaction. In addition, the life satisfaction levels in Rotterdam are also higher among women, people without children, and people of Western ethnicity.

In examining our main variables of interest, we find a significant association between social contacts and social cohesion in the neighborhood and life satisfaction (Models II and III, Table 1). These results hold when we jointly include social contacts and social cohesion in one model (Model IV). The survey respondents who scored 1 point higher on the social contacts index (on a scale from 1 to 4) scored generally 0.09 points higher on life satisfaction. Likewise, the respondents who scored 1 point higher on the social cohesion index (on a scale from 1 to 5) scored, on average, approximately 0.11 points higher on life satisfaction (on a scale from 1 to 10). Compared to neighborhood-based social capital, the association between having friends and life satisfaction seems to be stronger. Compared to the respondents with no circle of friends, the respondents with a small and large circle of friends scored, on average, 0.53 and 1.09 points higher,

Table 1. Baseline regression analysis.

	Model I	Model II – Social contacts	Model III – Social cohesion	Model IV – Social contacts & cohesion	Model V – + local friends	Model VI – + satisfaction neighborhood
Social contacts neighborhood		0.167*** (0.027)	0.144*** (0.017)	0.091** (0.030)	0.080** (0.030)	0.076** (0.029)
Perceived social cohesion neighborhood				0.114*** (0.019)	0.110*** (0.019)	0.046** (0.018)
<i>Individual controls</i>						
Gender (ref. male)						
Female	0.054** (0.027)	0.056** (0.027)	0.048 (0.026)	0.050* (0.026)	0.048* (0.026)	0.033 (0.026)
Age squared	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)	0.000 (0.000)	-0.000 (0.000)
Ethnicity (ref. Dutch)						
Non-Western immigrants	-0.164** (0.044)	-0.144** (0.044)	-0.166*** (0.045)	-0.158** (0.045)	-0.158** (0.044)	-0.168*** (0.043)
Western immigrants	0.047 (0.047)	0.062 (0.046)	0.054 (0.046)	0.061 (0.045)	0.060 (0.045)	0.056 (0.047)
Marital status (ref. Married/registered partner)						
Cohabiting	-0.146** (0.041)	-0.112** (0.043)	-0.135** (0.041)	-0.119** (0.043)	-0.120** (0.043)	-0.136** (0.043)
Single	-0.400*** (0.46)	-0.355*** (0.045)	-0.380*** (0.046)	-0.360*** (0.045)	-0.367*** (0.045)	-0.370*** (0.044)
Divorced/widowed	-0.550*** (0.052)	-0.526*** (0.053)	-0.542*** (0.051)	-0.531*** (0.052)	-0.537*** (0.052)	-0.517*** (0.053)
Household composition (ref. With children)						
Without children	0.120** (0.037)	0.151*** (0.038)	0.136*** (0.037)	0.149*** (0.038)	0.149*** (0.038)	0.137** (0.038)
Household income (ref. 0–20%)						
20–40%	0.129** (0.052)	0.109** (0.052)	0.120** (0.052)	0.111** (0.052)	0.114** (0.052)	0.123** (0.051)
40–60%	0.135** (0.053)	0.111** (0.054)	0.124** (0.053)	0.114** (0.054)	0.116** (0.053)	0.119** (0.055)
60–80%	0.213*** (0.046)	0.189*** (0.045)	0.200*** (0.046)	0.190*** (0.045)	0.195*** (0.044)	0.201*** (0.044)
>80%	0.256*** (0.046)	0.225*** (0.044)	0.231*** (0.045)	0.220*** (0.044)	0.222*** (0.043)	0.206*** (0.045)
Education level (ref. Lowest)						
Low	0.041 (0.063)	0.037 (0.062)	0.038 (0.064)	0.036 (0.063)	0.043 (0.063)	0.052 (0.063)
Middle	0.069 (0.062)	0.062 (0.062)	0.059 (0.062)	0.058 (0.062)	0.065 (0.062)	0.088 (0.060)
High	0.110* (0.063)	0.105 (0.062)	0.089 (0.062)	0.091 (0.062)	0.101 (0.063)	0.130** (0.061)
Employment status (ref. Full-time)						
Part-time	0.059* (0.034)	0.059* (0.033)	0.065* (0.034)	0.064* (0.034)	0.062* (0.034)	0.071** (0.035)
Retired	0.125** (0.055)	0.122** (0.055)	0.134* (0.054)	0.131** (0.054)	0.126** (0.054)	0.099* (0.054)
Living on welfare	-0.783*** (0.077)	-0.793*** (0.077)	-0.781*** (0.076)	-0.787*** (0.076)	-0.789*** (0.076)	-0.800*** (0.074)
Student	0.167** (0.060)	0.187** (0.061)	0.168** (0.059)	0.175** (0.060)	0.174** (0.060)	0.163** (0.060)
Housewife/man	0.075 (0.068)	0.071 (0.068)	0.078 (0.068)	0.075 (0.068)	0.066 (0.068)	0.067 (0.070)
Health – number of chronic diseases (ref. 0)						
1	-0.184*** (0.035)	-0.187*** (0.035)	-0.175*** (0.035)	-0.179*** (0.035)	-0.178*** (0.035)	-0.158*** (0.036)
2	-0.362*** (0.049)	-0.366*** (0.044)	-0.349*** (0.049)	-0.354*** (0.049)	-0.354*** (0.050)	-0.336*** (0.052)
3	-0.650*** (0.059)	-0.635*** (0.058)	-0.617*** (0.059)	-0.622*** (0.059)	-0.619*** (0.060)	-0.578*** (0.055)
>4	-1.151*** (0.065)	-1.155*** (0.065)	-1.120*** (0.064)	-1.129*** (0.064)	-1.130*** (0.065)	-1.085*** (0.068)
Social capital (ref. No circle of friends)						
Small circle of friends	0.551*** (0.071)	0.531*** (0.070)	0.535*** (0.072)	0.527*** (0.071)	0.524*** (0.071)	0.519*** (0.067)
Large circle of friends	1.146*** (0.061)	1.106*** (0.059)	1.097*** (0.061)	1.086*** (0.060)	1.074*** (0.060)	1.037*** (0.059)

(Continued)



Table 1. (Continued).

	Model I	Model II – Social contacts	Model III – Social cohesion	Model IV – Social contacts & cohesion	Model V – + local friends	Model VI – + satisfaction neighborhood
<i>Additional controls</i>						
Dummy many/most friends in same neighborhood					0.091** (0.031)	0.060* (0.031)
Dummy residential duration (>10 years)					0.002 (0.033)	0.016 (0.034)
Dummy satisfaction with living environment						0.429*** (0.031)
Dummy satisfaction with green space						0.151*** (0.029)
Local area dummies	YES	YES	YES	YES	YES	YES
Constant	6.997*** (0.102)	6.568*** (0.138)	6.548*** (0.121)	6.409*** (0.140)	6.432*** (0.140)	6.428*** (0.142)
Number of observations	9,776	9,776	9,776	9,776	9,776	9,596
R ²	0.235	0.240	0.243	0.243	0.245	0.262

a. Dependent variable: self-reported life satisfaction

b. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Ref. = Reference Category

respectively, in terms of life satisfaction.¹² In Model V and VI we include four additional control variables. We control for residential duration as people who have lived for many years in the same neighborhood may have more social contacts. Residential duration in an area has often been cited as an important element in the development of neighboring, as it creates a sense of community with other people in the district (Young & Willmott, 1957). Hence, we control for having local friends as respondents who have many or most of their friends living in the same neighborhood may report more frequent social contacts and/or higher scores for social cohesion. To isolate the effect of having social contacts with neighbors and perceived social cohesion in the neighborhood we added both variables in a separate model (Model V, Table 1). The model shows the same pattern of results for both independent variables. Additionally, we included two variables that may confound the relationship between neighborhood-based social capital and life satisfaction, namely satisfaction with the living environment and satisfaction with green space in the neighborhood.¹³ However, the inclusion of both variables does not alter our conclusions regarding the associations among social contacts, social cohesion and life satisfaction (Model VI, Table 1), although the association between perceived social cohesion and life satisfaction becomes substantially smaller. This result can be explained in part by the fact that social cohesion is inherent to the evaluation of the satisfaction with a neighborhood.

4.2. Robustness checks

Our findings are robust to several robustness checks, as reported in Table 2. Although the fixed effects model better captures omitted variable bias, at the same time the fixed effects estimation may underestimate the neighborhood-based social capital effect because the neighborhood-level effect of social capital is absorbed by the local area dummies. Therefore, in the first robustness check, we re-estimated our baseline estimation by using a multilevel random effects estimation (Model I, Table 2). Our main conclusions do not change when re-estimating our model using multilevel modelling (Snijders & Bosker, 2012). In the second robustness check, we run a multilevel model adding the average level of perceived social cohesion and social contacts of the people in

Table 2. Robustness checks.

	Model I	Model II	Model III
	Multilevel Estimation – Random effects	Multilevel Estimation – Mundlak correction	Happiness – Ordinal Probit
Social contacts neighborhood	0.090*** (0.025)	0.091** (0.030)	0.058** (0.026)
Perceived social cohesion neighborhood	0.118*** (0.018)	0.114*** (0.019)	0.117*** (0.015)
Local area averages			
Local area average social contacts		–0.055 (0.340)	
Local area average perceived social cohesion		0.106 (0.171)	
Individual controls	YES	YES	YES
Local area dummies	NO	NO	YES
Constant	6.384*** (0.108)	7.189*** (1.002)	
Number of observations	9,776	9,776	9,641
Log pseudolikelihood	–16,797.45	–16,792.89	–8,201.44

a. Dependent variable: self-reported life satisfaction for Models I and II

b. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.001$

a local area (i.e. incorporation of Mundlak corrections; see also Burger, Van Oort, & Raspe, 2011). However, the inclusion of the local area averages for the two social capital variables does not yield different conclusions regarding our individual-level social capital estimates (see Model II, Table 2). Moreover, we find that the average perceived social cohesion at the local area-level variable is statistically significant when we exclude the individual-level neighborhood-based social capital variables. This result indicates that the local area-level social cohesion variable is mediated by individual-level neighborhood-based social capital. In other words, social cohesion at the local area-level increases the perceived social cohesion at the individual level, which in turn has a positive association with life satisfaction (see also Oshio, 2016).¹⁴ In a final robustness check, we used an alternative dependent variable that measures subjective well-being based on the extent to which a respondent considers him/herself a happy person, i.e. not happy at all, not so happy, rather happy or very happy. By using an ordered probit estimation, we also find that when we use happiness as an alternative dependent variable, both perceived social cohesion and social contacts in the neighborhood are positively associated with subjective well-being (Model III, Table 2).

4.3. Heterogeneity

The average association between social contacts, social cohesion and individual life satisfaction may obscure substantial differences across different groups of residents. As discussed above, the relationship between social contacts and social cohesion on one hand and life satisfaction on the other hand can be considered heterogeneous since neighborhood-based social capital may be relevant only to specific groups of residents. Accordingly, we examine this heterogeneity by focusing on the objective characteristics of individuals and analyze differences in employment status, marital status, age, education level and health.¹⁵ In Table 3, the average marginal effects for the different groups of respondents are presented. The significant differences between

Table 3. Average marginal effects.

Employment status	Full-time	Part-time	Living on welfare	Retired	
Social contacts	0.025 (0.041)	-0.036 (0.051)	0.385*** (0.102)	0.166** (0.058)	
Social cohesion	0.066** (0.028)	-0.003 (0.034)	0.284*** (0.073)	0.135*** (0.034)	
Marital status	Married	Cohabiting	Single	Divorced/widowed	
Social contacts	0.086** (0.042)	-0.055 (0.065)	0.064 (0.041)	0.265*** (0.065)	
Social cohesion	0.121*** (0.023)	0.047 (0.042)	0.093** (0.032)	0.174*** (0.044)	
Age category	< 35 years	35–65 years	> 65 years		
Social contacts	0.080** (0.034)	0.063** (0.029)	0.160*** (0.037)		
Social cohesion	0.110*** (0.022)	0.085*** (0.021)	0.147*** (0.023)		
Education level	Lowest	Low	Middle	Highest	
Social contacts	0.325*** (0.086)	0.159** (0.062)	0.060 (0.039)	-0.018 (0.037)	
Social cohesion	0.195** (0.081)	0.146*** (0.034)	0.118*** (0.029)	0.030 (0.033)	
Health: number of chronic diseases	0	1	2	3	>4
Social contacts	-0.001 (0.036)	0.100** (0.037)	0.002 (0.073)	0.197* (0.101)	0.433*** (0.092)
Social cohesion	0.073** (0.025)	0.095** (0.029)	0.141** (0.043)	0.078 (0.070)	0.264** (0.080)

For all estimations, the number of observations is 9,776, and all average marginal effects have been estimated by controlling for other individual level variables and local area dummies.

a. Dependent variable: Self-reported life satisfaction, b. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.001$

groups are formally tested by using interaction effects and are reported in the text and [Appendix B](#).

Employment status

Compared to the results for working people, neighborhood-based social capital has a significantly stronger association with life satisfaction for people living on welfare and retired people; we find strong positive and significant relationships for both social contacts and social cohesion on life satisfaction for these groups. This finding can be explained by the tendency of people who are retired or live on welfare to spend more time in the neighborhood and to depend more on their neighbors and neighborhood facilities.

Marital status

When we examine the differences between marital status groups, we find that neighborhood-based social capital is significantly more important for divorced or widowed people. A possible explanation is that they depend more on local contacts because they no longer have a partner. Although we find significant differences only between the group of people who are widowed or divorced and the other groups, perceived social cohesion is still positively associated with life satisfaction for both married and single people. Moreover, social contacts in the neighborhood is positively associated with life satisfaction for married people.

Age

Neighborhood-based social capital is important mainly for elderly people (older than 65 years), and we find rather strong effects for this age group. This result is consistent with the observation that the association between neighborhood-based social capital and life satisfaction is stronger for retired people and is consistent with previous research that emphasizes the importance of neighborhood-based social capital for elderly people. The effect of neighborhood-based social capital is significantly greater for the age group older than 65 years than for the other age groups.

Education level

In terms of education level, we find significant heterogeneity regarding the relationship between neighborhood-based social capital and life satisfaction, particularly the differences between the groups with the lowest education and the highest education. When people are more educated, they find social contacts and social cohesion in the neighborhood less important. One possible explanation for these results is that the social networks of better-educated people increasingly extend beyond the boundaries of the neighborhood. These individuals often work farther away and have friends, colleagues and relatives in different cities (or even countries). Moreover, better-educated people often have a high(er) salary, which supports their mobility and makes them less restricted in spending time in their neighborhood compared with less-educated people, who are more likely to be neighborhood dependent. We find the strongest association for the interaction between social contacts and the people with the lowest education level.

Health

Concerning health, we find significantly different effect sizes (for 95% confidence intervals) between the group of people with no chronic diseases and the group with four (or more) chronic diseases. Neighborhood-based social capital is significantly more important for people with poor health. For people with relatively good health, neighborhood-based social capital seems to be less important for reported life satisfaction.

5. Conclusion and discussion

This research has examined the extent to which neighborhood-based social capital is important for residents' life satisfaction. We found support for the view that both social contacts and social cohesion in the neighborhood are positively and significantly associated with residents' life satisfaction. The findings are robust for using a different estimator and when including additional control variables as having friends in the same neighborhood and other variables that may confound the relationship between neighborhood-based social capital and life satisfaction.

The social context of a neighborhood (still) appears to be conducive to people's self-reported life satisfaction. Consistent with previous mainly qualitative studies (e.g. Howley et al., 2015; Meegan & Mitchell, 2001), we found a heterogeneous relationship between neighborhood-based social capital and life satisfaction. The association is much stronger for residents who are living on welfare, less-educated people, divorced or widowed people, elderly and/or retired people and people in poor health. Interestingly, perceived social cohesion is significantly more important than social contacts for married people and people younger than 35 years. They seem to value aspects as trust and connectedness in the neighborhood. Broadly, our results suggest that especially in neighborhoods with a high percentage of vulnerable people, enhancing neighborhood-based social capital can have a positive influence on residents' life satisfaction. Neighborhoods are likely to play an important role in our modern aging society because this study confirms that especially elderly retired people derive a substantial part of their life satisfaction from neighborhood-based social capital. Social problems, including loneliness, social isolation and segregation, are high on the political agenda of larger urban areas such as Rotterdam.

Based on this research, it is worthwhile for policy makers to develop customized policies to enhance neighborhood-based social capital; for example, such policies could involve organizing neighborhood activities or facilitating meeting opportunities (e.g. in a community center). In this regard, policies to foster neighborhood-based social capital must be driven by the understanding that neighborhood-based social capital may be quite different for different groups of residents. Policy makers should be aware that residents within localities differ in how they value neighborhood-based social capital and that not all dimensions of neighborhood-based social capital are equally important to everyone. Savage, Bagnall, and Longhurst (2005) have introduced the concept of "elective belonging", explaining how the middle classes seek out places where they can cluster together with people like themselves. As a consequence, urban processes such as segregation, gentrification and suburbanization have generated new forms of exclusionary social capital that fail to significantly resolve the problems of poor residents, whereas they strengthen the

position of the advantaged (Blokland & Savage, 2008). The extent to which public attempts to encourage social networking and to foster social capital are effective for the groups who mainly depend on their neighborhood is questionable. Although it is beyond the scope of this paper to discuss the effectiveness of urban policies that encourage social contacts and cohesion to solve problems, it is good to be aware of the limitations of these policies to target specific groups.

This research is based on cross-sectional data, which limit us in drawing conclusions regarding changes in the importance of the independent variables. In this regard, it would be interesting to analyze the differences over time to determine whether changes in neighborhood-based social capital affect the well-being of residents and whether the relative importance for residents' life satisfaction of neighborhood-based social capital increases or decreases over time. However, longitudinal research or panel data are required to study these types of dynamics. Another limitation of this research is that it is based on neighborhoods within only one particular city. This approach limits us in being able to generalize the outcomes to other cities, particularly cities outside The Netherlands. It would be interesting to analyze this importance of neighborhood-based social capital in different cities across different countries to investigate the cross-cultural differences in the importance of neighborhood-based social capital. In this regard, a cross-city and -country study could strengthen the external validity of this research. Moreover, due to the cross-sectional nature of the data, we could not fully account for problems of endogeneity, as it is reasonable to assume that people who are highly satisfied with their life are more sociable and consequently have more social contacts with neighbors (Howley et al., 2015) and a more positive perception of social cohesion. Therefore, our results should be interpreted as conditional associations, rather than causal relationships.

A final limitation of this research is that it does not elaborate on the mechanisms that explain *why* social contacts and social cohesion are more important for some subgroups in society than for others. As noted previously, we hypothesize that the importance of neighborhood-based social capital is related to neighborhood dependency and to whether people are more or less forced to invest in local contacts. Future research should therefore focus on the actual time that people spend in their neighborhood, with whom they spend their time, and how they value their spent time. Such research could be conducted through time diary research (Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004) or experience sampling (Csikszentmihalyi & Hunter, 2003). Finally, it would be interesting to analyze how advances in technology and online communication are related to neighborhood-based social capital. For example, to what extent neighbors make use of online communication tools, such as e-mail, WhatsApp, Facebook, and how this influences the neighborhood-based social capital related to people's individual life satisfaction, is of interest. These questions should be addressed in future research.

Notes

1. However, earlier studies of the Netherlands conclude that neighborhoods have lost importance as a source of social relations (Pinkster, 2007).
2. This paper builds on the classic work of Jane Jacobs (1961) and Rex and Moore (1967) regarding the importance of social relations within the neighborhood and how this differs

- for different groups. However, they did not discuss people's perception of neighborhood-based social capital and how this is related to people's life satisfaction.
3. Moreover, there are interpersonal differences in how people value social interaction (Helliwell, 2006). For example, extraverts tend to have a more positive view of social interaction and are also more likely to derive pleasure from it.
 4. However, Völker and Flap (2007) did not find evidence for their hypothesis that people with few resources establish more contacts with their neighbors (and vice versa) in their study of neighborhood relations in The Netherlands, whereas American studies have even found a negative relationship between social poverty and social network size (Small, 2007; Tigges, Brown, & Green, 1998).
 5. The weights are constructed to adjust for difference between the sample and the inhabitants of the city of Rotterdam.
 6. The relatively high percentage of missing values is caused by the objective health question as many people did not complete the "chronic disease" module of the survey. Despite these missing data, we decided to include this variable as we consider health as an important determinant of individual life satisfaction. If we use subjective health, instead of objective health, the sample size is higher ($N = 11,696$) but the association between the independent and development variable remains more or less the same.
 7. Unfortunately, we could not use another measurement method for life satisfaction, such as the "satisfaction with life scale", which consists of five statements that measure the global cognitive judgments of satisfaction with one's life (Diener, Emmons, Larsen, & Griffin, 1985).
 8. We estimate the distribution with and without weights to control for potentially biased results, because highly satisfied people are more likely than less satisfied people to respond to questionnaires. The distribution is somewhat identical, although there is a small difference in the group of individuals who rate their life satisfaction as 10.
 9. In a meta-analysis on Cronbach's coefficient alpha, Peterson (1994) found an average reported alpha coefficient of 0.70 for values and beliefs. The mean Cronbach's alpha for the variables with four scale categories is 0.76 (similar to the social contacts index); the minimum of the 95% confidence interval is set to 0.69. For the variables that are constructed out of four items, the mean Cronbach's alpha is 0.76, and the minimum of the 95% confidence interval is set to 0.68. The meta-analysis indicates that the Cronbach's alpha of 0.69 for the social contacts index is lower than average but still meets the minimum threshold of an index that is constructed from four questions on a four-point scale.
 10. Both indices are constructed by adding the four questions and by dividing the sum by four. As a robustness check, we constructed the same indices by using factor analysis (a principal component estimation). In both indices, we find one factor with an eigenvalue that is greater than one. Including these "factor" indices in the baseline regression model gives similar results. Thus, the way in which the indices are constructed seems to be rather robust.
 11. In our research, Rotterdam is divided into 59 local areas, which we use to construct the local area dummies. On average a local area in Rotterdam counts about 10,500 inhabitants. The range is quite broad with a maximum of 27,501 and minimum of 4,103 inhabitants. A taxonomy of this classification is available upon request.
 12. In addition, we examined whether our results were sensitive to not controlling for personality traits, such as optimism and extraversion, which affect the extent to which people participate in social life and their reported life satisfaction. To address this endogeneity problem, we controlled for feelings of depression based on the survey question how often people feel sad or depressed in the last four weeks. People who feel depressed are more likely to withdraw from social life, have less social contacts and value social cohesion lower. Adding a dummy for feelings of depression as a control variable did not alter our conclusions, although the association between social contacts and life satisfaction became smaller. So even when we try to account for the problem of

endogeneity by controlling for additional personality traits, our findings for the importance of neighborhood-based social capital turn out to be rather robust.

13. These items were measured on a scale from 1 to 10 and because of multicollinearity issues, were transformed into a dummy. The respondents are considered to be satisfied with a specific dimension if their score is 7 or higher on this dimension.
14. These results are available upon request.
15. In this paper, we discuss only the individual characteristics for which we found significant results; for this reason, gender, ethnicity, annual household income and household composition are not listed in [Table 3](#).

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No potential conflict of interest was reported by the authors.

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Appendix A1**Descriptive Statistics of Variables Included in the Analysis (N = 9,776)**

	Mean	SD	Min	Max
Life satisfaction	7.73	1.55	1	10
Social contacts	2.68	0.67	1	4
Social cohesion	3.52	0.92	1	5
<i>Individual control variables</i>				
Age	48.46	20.77	19	98
<i>Gender</i>				
Female	0.53	0.50	0	1
<i>Ethnicity</i>				
Dutch native	0.71	0.45	0	1
Non-Western immigrants	0.19	0.39	0	1
Western immigrants	0.10	0.29	0	1
<i>Marital Status</i>				
Married/registered partners	0.43	0.49	0	1
Single	0.30	0.46	0	1
Cohabiting	0.12	0.32	0	1
Divorced/widowed	0.16	0.36	0	1
<i>Household composition</i>				
Without child(ren)	0.79	0.41	0	1
With child(ren)	0.21	0.41	0	1
<i>Education level</i>				
Lowest level	0.10	0.30	0	1
Low level	0.28	0.45	0	1
Middle level	0.31	0.46	0	1
High level	0.30	0.46	0	1
<i>Employment status</i>				
Full-time	0.33	0.47	0	1
Part-time	0.19	0.39	0	1
Retired	0.25	0.43	0	1
Living on welfare	0.09	0.28	0	1
Housewife/man	0.08	0.27	0	1
Student	0.07	0.25	0	1
<i>Household income</i>				
< 20% (max. €15,200)	0.18	0.39	0	1
20–40% (max. €19,400)	0.18	0.38	0	1
40–60% (max. €24,200)	0.20	0.40	0	1
60–80% (max. €31,000)	0.21	0.41	0	1
> 80% (> €31,000)	0.23	0.42	0	1
<i>Health (number of chronic diseases)</i>				
0	0.39	0.49	0	1
1	0.28	0.45	0	1
2	0.14	0.35	0	1
3	0.08	0.28	0	1
> 4	0.10	0.31	0	1
<i>Social capital (friends)</i>				
No circle of friends	0.11	0.32	0	1
Small circle of friends	0.19	0.39	0	1
Large circle of friends	0.69	0.46	0	1
<i>Residential duration</i>				
	15.74	14.73	0	98
<i>Friends in same neighborhood</i>				
None	0.31	0.46	0	1
A few	0.49	0.50	0	1
Many or most of the friends	0.20	0.40	0	1
<i>Satisfaction with living environment</i>				
	7.51	1.80	1	10
<i>Satisfaction with green space</i>				
	6.95	1.87	1	10

Appendix A2: Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1 Life satisfaction	–																
2 Social contacts	0.145	–															
3 Social cohesion	0.183	0.533	–														
4 Age	-0.031	0.230	0.166	–													
5 Gender	-0.041	-0.012	0.003	-0.029	–												
6 Ethnicity	-0.116	-0.147	-0.123	-0.177	0.025	–											
7 Marital status	-0.147	-0.289	-0.157	-0.376	0.083	0.058	–										
8 Household composition	0.001	0.146	0.055	-0.148	0.061	0.147	-0.198	–									
9 Education level	0.110	-0.065	0.020	-0.436	-0.065	-0.010	0.174	0.039	–								
10 Employment status	-0.119	0.028	0.016	0.504	0.042	-0.016	-0.106	-0.225	-0.345	–							
11 Annual household income	0.186	0.187	0.175	0.059	-0.065	-0.209	-0.178	0.036	0.215	-0.226	–						
12 Health	-0.224	0.056	-0.026	0.370	0.119	0.004	-0.098	-0.055	-0.256	0.271	-0.097	–					
13 Social capital (friends)	-0.308	-0.141	-0.168	0.036	0.011	0.096	0.070	-0.046	-0.084	0.083	-0.115	0.108	–				
14 Residential duration	0.005	0.237	0.073	0.408	-0.013	-0.082	-0.184	0.054	-0.240	0.246	0.076	0.160	-0.023	–			
15 Friends in same neighborhood	0.096	0.219	0.199	-0.058	0.032	-0.003	0.002	-0.038	0.001	0.005	-0.002	-0.038	-0.171	0.043	–		
16 Satisfaction living environment	0.223	0.211	0.357	0.187	-0.110	0.022	-0.103	0.038	-0.041	0.092	0.116	0.001	-0.129	0.062	0.117	–	
17 Satisfaction green space	0.118	0.166	0.210	0.188	-0.093	-0.002	-0.120	0.013	-0.056	0.078	0.095	0.011	-0.038	0.069	0.031	0.295	–

In this correlation matrix dummy variables are used for the categorical variables; Gender: 0 = male, 1 = female; Ethnicity: 0 = Dutch, 1 = non-Dutch; Marital status: 0 = married, 1 = not married; Household composition: 0 = without children, 1 = with children; Education level: 0 = low(er) educated, 1 = high(er) educated; Employment status: 0 = employed, 1 = unemployed; Health: 0 = good health, 1 = poor health; Social capital: 0 = many friends, 1 = few friends; Residential duration: 0 = less than 10 years, 1 = more than 10 years; Friends in same neighborhood: 0 = none or only a few friends, 1 = many or most of the friends; Satisfaction with living environment: 0 = less than 7, 1 = 7 or more; Satisfaction with green space: 0 = less than 7, 1 = 7 or more.

Appendix B: Significant Differences between Groups based on Interaction Terms

Employment status x social contacts					Employment status x social cohesion						
	1	2	3	4		1	2	3	4		
1. Full-time	x		***	*	1. Full-time	x		**			
2. Part-time		x	***	**	2. Part-time		x	**	**		
3. Living on welfare	***	***	x	*	3. Living on welfare	**	**	x	*		
4. Retired	*	**	*	x	4. Retired		**	*	x		
Marital status x social contacts					Marital status x social cohesion						
	1	2	3	4		1	2	3	4		
1. Married	x	**		**	1. Married	x					
2. Cohabiting	**	x	*	**	2. Cohabiting		x		**		
3. Single		*	x	**	3. Single			x			
4. Divorced/widowed	**	**	**	x	4. Divorced/widowed		**		x		
Age category x social contacts					Age category x social cohesion						
	1	2	3			1	2	3			
1. < 35 years	x		**	1. < 35 years	x	**					
2. 35–65 years		x	***	2. 35–65 years	**	x	***				
3. > 65 years	**	***	x	3. > 65 years		***	x				
Education level x social contacts					Education level x social cohesion						
	1	2	3	4		1	2	3	4		
1. Lowest	x			*	1. Lowest	x			*		
2. Low		x		**	2. Low		x		**		
3. Middle	**		x	**	3. Middle			x	**		
4. High	**	**	*	x	4. High	*	**	**	x		
Health x social contacts					Health x social cohesion						
	1	2	3	4	5		1	2	3	4	5
1. No disease	x	**		*	***	1. No disease	x				**
2. One disease	**	x			**	2. One disease		x			**
3. Two diseases			x	*	**	3. Two diseases			x		
4. Three diseases	*		*	x		4. Three diseases				x	
5. Four or more diseases	***	**	**		x	5. Four or more diseases	**	**			x

a $p < 0.10$, ** $p < 0.05$, *** $p < 0.001$