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## THE CONDITIONALITY OF NEIGHBOURHOOD EFFECTS UPON SOCIAL NEIGHBOURHOOD EMBEDDEDNESS

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**Abstract** An immense body of literature has been published on the effects of the residential neighbourhood on individual socio-economic outcomes. Numerous studies have designated these neighbourhood effects to the socialisation and resources mechanisms. This study argues that social contacts and interactions in the neighbourhood are the minimal condition for these mechanisms to operate. Following this argument, this study examines whether these particular mechanisms will operate more strongly, and thus whether the magnitude of neighbourhood effects will be higher, for individuals who are socially more embedded in their neighbourhood. These conditional neighbourhood effects upon social embeddedness in the neighbourhood are examined for 3,272 individuals within 246 neighbourhoods in the Netherlands. Surprisingly, it is found that the association between neighbourhood's socio-economic conditions and resident's income is not different for individuals with a different degree of neighbourhood-specific social contacts and interactions. Consequently, this study challenges the core of the neighbourhood effects argument on socio-economic outcomes by questioning the often applied socialisation and resources mechanisms.

### INTRODUCTION

For the past few decades, many scholars in fields of geography, sociology and economics have published on the effect of the neighbourhood on the socio-economic outcomes of its residents (for comprehensive reviews of research on neighbourhood effects, see Dietz, 2002; Ellen and Turner, 1997; Friedrichs et al., 2003; Leventhal and Brooks-Gunn, 2000).

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A slightly different version of this chapter has been published as Miltenburg, E.M. (2015). The Conditionality of Neighbourhood Effects upon Social Neighbourhood Embeddedness: A Critical Examination of the Resources and Socialisation Mechanisms. *Housing Studies*, 30(2): 272-294. This chapter is furthermore partially inspired by first steps taken in a conference paper by Miltenburg and Lindo, 2011.

Since the 1990s, two important theoretical refinements have been made in the field of neighbourhood effects. First, scholars provide elaborate discussions on the potential causal mechanisms that connect neighbourhood characteristics to individual behaviour. Theoretically, most agree on the extensive range of possible neighbourhood mechanisms (Galster, 2012; Small and Feldman, 2012). Second, some have questioned the assumption of a homogenous effect of the neighbourhood environment across all residents. Disputing this dominant one-size-fits-all discourse in quantitative studies, they proposed the idea of conditional effects: the neighbourhood context affects the lives of some residents and in some types of neighbourhoods more than others (Buck, 2001; de Souza Briggs, 1997; Friedrichs and Blasius, 2003; Galster, 2008; Galster et al., 2010; Lupton, 2003; Pinkster, 2007; Small and Feldman, 2012; Tienda, 1990).

Complementary, the field has advanced methodologically using longitudinal data (Andersson et al., 2007; Galster et al., 1999; Musterd et al., 2003; van Ham and Manley, 2010), dealing with self-selection bias and estimating non-linear effects (for overviews of methodological challenges of research on neighbourhood effects, see Dietz, 2002; Lupton, 2003; Sampson et al., 2002). Yet, despite methodological innovations and theoretical refinements, quantitative studies on neighbourhood effects do not further the debate as empirical work on mechanisms and conditional effects lags behind. Recently, Sharkey and Faber (2014) made a convincing case in the *Annual Review of Sociology* that this enormous concern with selection bias and methodological demands on isolating the causal effects of neighbourhoods has overshadowed and actually "led to a dearth of research on the mechanisms through which neighborhood inequality is linked with the outcomes of individuals" (Sharkey and Faber, 2014, p.560). Although studies with more advanced methods and longitudinal designs are more successful in assessing causal inference, they do not unravel the causal mechanisms at work.

The theoretical refinements on neighbourhood mechanisms remain largely hypothetical (Leventhal and Brooks-Gunn, 2000; Manley and van Ham, 2012; Small and Feldman, 2012). Scholars seldom, if ever, specify or observe the neighbourhood mechanisms in their empirical models, and there is no consensus about which mechanisms have the most empirical support (Galster, 2012; Small and Feldman, 2012). Moreover, there is no clear answer to the question under what con-

ditions the neighbourhood is important for its residents. The state-of-the-art in the empirical research on neighbourhood effects field can be summarised as followed:

“an entire generation of researchers concerned themselves with answering either a yes-or-no question (do neighbourhoods matter?) or a question of degree (how much do they matter?)-rather than a conditional question (under what circumstances do they matter?)” (Small and Feldman, 2012, p. 60)

The neglect of accounting for conditional effects has resulted in an overestimation and underestimation of the neighbourhood effects for certain residents in the neighbourhood (Lupton, 2003; Small and Feldman, 2012). The few empirical studies that do pose the conditional question differ considerably in their scope, outcomes and operationalisations, leading to unclear conclusions. It is therefore essential that scholars accurately theorise the mechanisms and conditional effects and submit the indicated matters to strict empirical tests using adequate measurements.

The issue of how and for whom the neighbourhood matters also extends beyond academic research and has direct relevance for policymakers, so it is important that the different mechanisms that should improve the life chances of the residents are empirically unravelled, as different mechanisms require diverse and more targeted policy solutions in the neighbourhood. In addition, if residents really differ in the extent to which their socio-economic status is influenced by their neighbourhood, the question arises whether collective area-based interventions are the most effective way to tackle the problems of deprivation (Musterd and Pinkster, 2009).

In the theoretical frameworks of the neighbourhood effects on socio-economic outcomes debate, the social-interactive mechanisms are most often employed and, by and large, perceived as the “core of the neighbourhood effects argument” (van Ham and Manley, 2012, p. 6). In the social-interactive mechanism, the impact of the neighbourhood composition is transmitted through social interaction in the area. This mechanism includes, *inter alia*, processes such as social cohesion and control, competition, socialisation, relative deprivation and social networks (Galster, 2012). Although these presumed social-interactive

neighbourhood mechanisms remain a black box in the empirical models, in their theories scholars specifically propose socialisation and social networks as mechanisms to explain neighbourhood effects on socio-economic outcomes (Andersson, 2001; Friedrichs et al., 2003; Leventhal and Brooks-Gunn, 2000).

Socialisation and social networks mechanisms are two sides of the same coin, the social networks mechanism relates to the support, information and resources available from social contacts in the neighbourhood (and are often referred to as opportunity structures), while the socialisation mechanism derives from the fact that social contacts in the neighbourhood evolve along certain lines (social class, ethnicity, age, gender) with enclosed attitudes, values, behaviours that can either enhance or limit residents' socio-economic opportunities (Andersson, 2001; Friedrichs et al., 2003; Galster et al., 2010). Both mechanisms fall under the banner of endogenous neighbourhood effects: the behaviour of neighbours has an impact on the resident's behaviour (Andersson et al., 2007). This chapter, for reasons of clarity and comprehensibility, refers to the social network and socialisation mechanisms as *network resources* and *network socialisation*.<sup>1</sup>

Measuring these endogenous effects is challenging and this study refrains from claiming that either network resources or network socialisation patterns are the transmitters of neighbourhood effects. A way to lift the lid off of the black box and understand neighbourhood effects better, however, is to focus on the contacts and interactions of residents in the neighbourhoods, since both the network resources and network socialisation mechanisms build on these contacts and interactions. The neighbourhood-specific social contacts and interactions are the minimal condition for the network resources and socialisation mechanisms to operate. The mechanisms operate more strongly, and thus the magnitude of neighbourhood effects is higher, for individuals with more neighbourhood-specific social contacts and interactions. When residents' social contacts extend beyond the neighbourhood, they are likely to be less sensitive to the neighbourhood's characteristics (Buck, 2001; de Souza Briggs, 1997; Ellen and Turner, 1997; Friedrichs and Blasius, 2003; Galster, 2008; Galster et al., 2010; Lupton, 2003; Pinkster, 2007; Small and Feldman, 2012; Tienda, 1990).

The goal of this chapter is to estimate the conditionality of the neighbourhood effect through the neighbourhood-specific social contacts and interactions within the assumed mechanisms, not assessing

the specific mechanism that transmits the neighbourhood effect. The study thus critically assesses the presupposition of the presence of most-often cited causal pathways (the network resources and network socialisation mechanisms) that connect neighbourhood characteristics to an individual's socio-economic status. The following question is addressed in this chapter: *To what degree is the association between the neighbourhood's socio-economic conditions and resident's socio-economic status in Dutch neighbourhoods conditional upon the resident's degree of neighbourhood-specific social contacts and interactions?* This study answers this question using the first wave of the 2009 Netherlands Longitudinal Lifecourse Study (NELLS), a detailed cross-sectional data-set covering 3,272 individuals within 246 neighbourhood districts with different social and economic profiles in the Netherlands together with an adequate measurement of the social contacts and interactions in the neighbourhood.

#### THEORETICAL GROUNDS FOR NEIGHBOURHOOD EFFECTS

Researchers on both sides of the Atlantic have found significant evidence for the argument that the neighbourhood in which one lives has a substantial impact on one's chances in life. But critics have argued that, in reality, these are just correlations between neighbourhood attributes and individual outcomes (Cheshire, 2007; van Ham et al., 2014; van Ham and Manley, 2012). There are theoretical grounds, however, for arguing that the neighbourhood influences individual socio-economic outcomes over and above the effect of individual characteristics.

Theoretically, the argument can be traced back to influential studies on disadvantaged communities, notably the classical ones on the black inner-city ghettos in the USA (Lewis, 1997; Stack, 1975; Valentine, 1978; Wilson, 1987). The outcomes of socialisation, contagion and social networks in neighbourhoods are most famous due to the work written by Wilson 1987; 1996. *Social isolation*, one of the main concepts in the work of Wilson, is about the structurally disadvantaged situation of communities that have become disconnected from mainstream society because important institutions, including the middle-class and skilled working-class segment of the local population, have withdrawn from the area. Another central notion is *concentration ef-*

*fects*, meaning that those without prospects or opportunities to relocate and get employed remain in social isolation, excluded from institutions and resources that citizens from the 'mainstream' routinely have access to and enjoy. The local concentration of people with insufficient education and without employment, lacking the credentials necessary in the new economy, is attendant on, or leads to, an overrepresentation of other population characteristics that is cut off from job networks and role models of salaried workers, businessmen and two-parent families. Concentrated poverty is very much the convergence of the absence of requirements necessary for a good community and individual life whose presence elsewhere in society is considered to be completely self-evident (Wilson, 1987, 1996).

In short, the social isolation and concentration effects theories claim that residents of disadvantaged neighbourhoods are isolated from the relevant institutions, role models and resourceful social contacts that can give them access to the mainstream culture and job information.<sup>2</sup> The social isolation and concentration effects in neighbourhoods arise from network resources and network socialisation mechanisms coming from social contacts and interactions in the neighbourhood (which fall under the banner of social-interactive mechanisms).<sup>3</sup> Since social-interactive mechanisms are the most often cited mechanisms of the neighbourhood effects argument on socio-economic outcomes, throughout this chapter the network resources and network socialisation mechanisms are kept in mind as mechanisms through which neighbourhood effects are transmitted (Galster, 2012; van Ham and Manley, 2012).<sup>4</sup>

Many studies have confirmed empirically that the neighbourhood influences individual socio-economic outcomes and allocate the findings to the network resources and network socialisation mechanisms, both in the American (Cotter, 2002; de Souza Briggs, 1997; Galster et al., 1999; Weinberg et al., 2004) and the European context (Andersson et al., 2007; Musterd et al., 2003; van der Klaauw and van Ours, 2003; van Ham and Manley, 2010). The basic premise in this type of studies is that the neighbourhood "contributes to residents' aspirations and preferences with respect to work as well as their (perceived) employment opportunities, which in turn leads residents to make certain life choices that subsequently influence their social position" (Pinkster, 2009, p.8). This leads to the first hypothesis:

*Hypothesis 1:* The level of socio-economic deprivation in the neighbourhood is negatively associated with the resident's socio-economic status.

### *Conditional neighbourhood effects*

Theoretically, the neighbourhood affects the lives of some residents and in some neighbourhoods more than others. The fact that the conditional question is neglected in most empirical studies is a result of the strict interpretation of early literature on disadvantaged communities, where the concentration effects were seen as homogenous across residents and neighbourhoods (Small and Feldman, 2012; Wilson, 1987, 1996).<sup>5</sup> These scholars did not acknowledge that the neighbourhood conditions might affect residents in different ways under different conditions (Buck, 2001; de Souza Briggs, 1997; Ellen and Turner, 1997; Friedrichs and Blasius, 2003; Galster, 2008; Galster et al., 2010; Lupton, 2003; Pinkster, 2007; Small and Feldman, 2012; Tienda, 1990).

The network socialisation and network resources mechanisms are two distinct mechanisms, which both build on neighbourhood-specific social contacts and interactions. These mechanisms do not necessarily presume equal and negative effects of the neighbourhood on all residents, such as in the stigmatisation mechanism, but are also open for a more differentiated and positive impact (Andersson, 2001; Galster, 2008). The neighbourhoods' effects can be negative, positive or non-existing through the network socialisation and network resources mechanisms because the effects are contingent on the socio-economic population characteristics of the neighbourhood and on how residents are socially differently embedded in the neighbourhood.

With regard to socio-economic outcomes, network socialisation in the neighbourhood is a social learning process in which individuals conform to work ethics as disseminated by their role models and peers. Individuals' attitudes, actions and norms concerning work can, for better or worse, change due to interaction with these contacts (Brattbakk and Wessel, 2013; Galster, 2008). More affluent co-residents might create a "positive, work-oriented social climate" in the neighbourhood, which has a positive impact on the residents' economic well-being (de Souza Briggs, 1997, p. 218). However, in the case of so-



cial isolation, a relative absence of positive role models in the neighbourhood and the presence of deviant work ethics of residents (cultures of unemployment), the socio-economic opportunities of a resident are believed to decrease (Galster et al., 1999). Focusing on the neighbourhood as a socialising setting, network socialisation mainly operates through direct interaction with other residents in the neighbourhood (Andersson, 2001).<sup>6,7</sup>

The network resources mechanism refers to the idea that social networks can be seen as an opportunity structure in which different kinds of support, information and resources can be accessed to achieve instrumental goals, such as climbing the socio-economic ladder (Coleman, 1988; Granovetter, 1995; Lin, 1999; Lin et al., 2001). The neighbourhood can be conceptualised as an opportunity structure where relevant social resources may or may not be available. Consequently, "(...) residents may gain different amounts of information about skill-enhancing and employment opportunities, depending on the degree to which they rely on local social networks and the resources these networks can access" (Galster et al., 2010, p. 2919).

Network socialisation focuses on enclosed attitudes, values and behaviour in social contacts and interactions in the form of role models and peers in the neighbourhood, while the network resources refer to different kinds of support, information and resources available from social contacts in the very same neighbourhood (Andersson, 2001; Friedrichs et al., 2003; Galster et al., 2010). In both mechanisms, the social contacts and interactions in the neighbourhood are a key element in estimating neighbourhood effects. The neighbourhood-specific social contacts and interactions are the minimal condition for the network resources and network socialisation mechanisms to operate, and the magnitude of neighbourhood effects depends on the amount and degree to which the social contacts of an individual reside in the same neighbourhood.

The meaning of local contacts is also contingent on residents' contacts outside the neighbourhood. Residents who lack extended networks outside the neighbourhood are more dependent on the social contacts in the neighbourhood, and thus on the values and resources they offer (Ellen and Turner, 1997; Friedrichs and Blasius, 2003; Galster, 2008; Harding et al., 2011a; Pinkster, 2007). From this follows the second hypothesis:

*Hypothesis 2:* The negative association between the level of socio-economic deprivation in the neighbourhood and the resident's socio-economic status will be stronger for individuals who are more strongly embedded into the neighbourhood.

This idea that neighbourhood effects are contingent on the locality of the resident's social contacts and interactions is promising, but has only been tested a few times in empirical studies. These studies rarely focus, however, on socio-economic outcomes,<sup>8</sup> and are not conducted on a large scale in a diverse range of neighbourhoods, but instead, take the approach of ethnographic field work and modest quantitative studies in only a few neighbourhoods (Farwick, 2007; Friedrichs and Blasius, 2003; Oberwittler, 2004). In addition, the studies are limited by their data and their operationalisations of the social network in the neighbourhood range from a limited network typology with only four categories (Friedrichs and Blasius, 2003), a dichotomy between residents of which none up to a few, and residents of which many up to all friends are predominantly from their own neighbourhood (Oberwittler, 2004), the time spent in the neighbourhood each day (Farwick, 2007), to socio-economic and demographic indicators (age, number of children, number of working hours and income) as proxies for the locality of the social network (Galster et al., 2010).

The study most similar to the present one is conducted by Galster et al. (2010). The authors investigate variations in the magnitude of the neighbourhood effects on income in three large Swedish metropolitan areas for certain subsets of the population categorised by socio-economic and demographic characteristics. They find that regardless of gender, residents with children and who do not work full time experience larger neighbourhood effects. The authors propose that these subgroups are more sensitive for the neighbourhood environment because they have more social contacts in the neighbourhood. Whether the localness of the social contacts is the conditioning factor here remains inconclusive though, as the present study finds that the socio-economic and demographic characteristics are imperfect measures of an individual's social contacts in the neighbourhood.<sup>9</sup> This study, therefore, does not use proxies but directly models the social embeddedness into the neighbourhood to test the theoretic-

cal idea whether residents with more contacts in the neighbourhood are more subject to neighbourhood effects.

All other things held constant in the model, this study argues that the number of important contacts residing in the same neighbourhood indicate the strength of the socialising forces and resources in the neighbourhood. The more most important contacts reside within the same neighbourhood, the more an individual is embedded in the neighbourhood and the more sensitive for the network socialisation and resources mechanisms (Brattbakk and Wessel, 2013). From this follows the first subhypothesis:

*Hypothesis 2a:* The negative association between the level of socio-economic deprivation in the neighbourhood and the resident's socio-economic status will be stronger the higher *the absolute number* of most important contacts residing in the neighbourhood.

With regard to the conditionality argument, Galster (2008, p. 10) states that: "If socialization via role models were the predominant mechanism (...) the intensity of exposure to such an influence would depend on the degree to which the individual's social networks were contained within the neighbourhood". This degree can be estimated by the number of most important contacts of an individual that are constrained to their neighbourhood relative to the most important contacts outside the neighbourhood. The higher this degree of social embeddedness in the neighbourhood, the more sensitive these residents are for the neighbourhood context. From this follows the second subhypothesis:

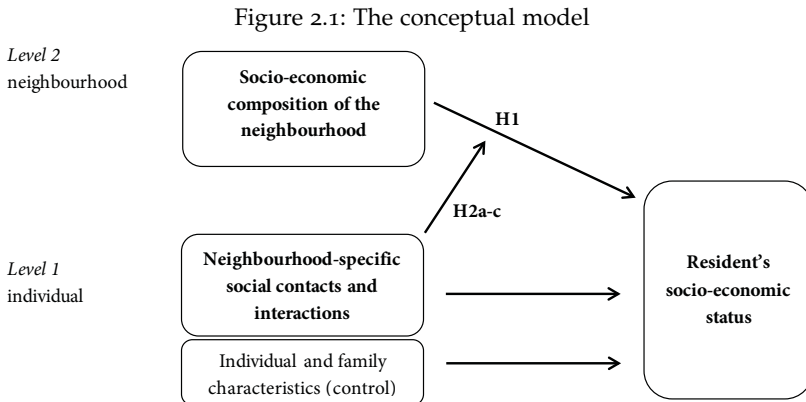
*Hypothesis 2b:* The negative association between the level of socio-economic deprivation in the neighbourhood and the resident's socio-economic status will be stronger the higher *the share* of most important contacts residing in the neighbourhood.

Not only the absolute number and share of members of a resident's core network that resides in the same neighbourhood but also the importance of more general, personal contact in the neighbourhood can alter the magnitude of neighbourhood effects. The idea is that the

more of these contacts and interactions residents in the neighbourhood have, the more access the resident has to resources within the neighbourhood and the more subject the resident is to socialisation. One can also expect, therefore, *ceteris paribus*, a conditioning effect of the frequency of general contact in the neighbourhood. The third subhypothesis is:

*Hypothesis 2c:* The negative association between the level of socio-economic deprivation in the neighbourhood and the resident's socio-economic status will be stronger the higher the frequency of general contact in the neighbourhood.

Figure 2.1 summarises the hypotheses in a conceptual model.



DATA AND METHODS

*Data*

The hypotheses are tested on the first wave from the NELS from 2009 (de Graaf et al., 2010a), which contains a rich palette of variables capturing social contacts in the neighbourhood, family information, socio-economic and social background information and personal and

neighbourhood characteristics (de Graaf et al., 2010b). The NELS data cover around 250 neighbourhood districts in the Netherlands. For the definition of the neighbourhood I follow the standard geographical delineation as defined by Statistics Netherlands: the neighbourhood district is between the municipality and the lowest spatial neighbourhood level and follows natural demarcation lines and homogenous architectural styles. Information about the characteristics of the neighbourhoods was derived from a national register database (*Key Figures Districts and Neighbourhoods*) provided by Statistics Netherlands.

For this data-set a two-stage stratified sampling was conducted. The first stage consisted of the quasi-random selection of 35 municipalities (of 431 in total) in the Netherlands based on the region and urbanisation. The selection of cities was quasi-random because the four largest cities Amsterdam, Rotterdam, Den Haag and Utrecht were included a priori. This ensured a substantive amount of Moroccans and Turks.<sup>10</sup> The second stage consisted of a random selection from the population registers within municipalities based on (1) age (age range 15-45), (2) country of birth of the respondent and (3) country of birth of the parents of the respondent.<sup>11</sup> There was an oversampling of respondents from Moroccan and Turkish origin (de Graaf et al., 2010b). The sample was confined to respondents of 18 years and older who have answered the survey questions of interest and for whom information on their neighbourhood of residence was available, leaving us with 3,272 respondents within 246 neighbourhood districts.<sup>12</sup>

### *Causality*

The data are cross-sectional so caution is needed with drawing conclusions on causal relationships. Self-selection into neighbourhoods cannot be ruled out with a cross-sectional design. The between-neighbourhood selection bias, however, should not be treated as a statistical nuisance but as a phenomenon that is itself of substantive interest: selection into neighbourhoods is embedded in socially spatial stratified settings (Sampson, 2012). Moreover, even in longitudinal designs, it is difficult to assess causality of endogenous neighbourhood effects because of the 'reflection problem' (as coined by Manski (2000): the socio-economic composition of the neighbourhood is itself deter-

mined by the socio-economic status of each resident, so does the composition actually have an impact on the individual socio-economic status or is it not more than the aggregation of individual behaviour?

It is thus challenging to disentangle the causal pathways behind neighbourhood effects. Yet, although correlation does not imply causation, causation does imply correlation. A robust negative association between neighbourhood deprivation and an individual's socio-economic status is a starting point for further assessing the potential causal pathways by means of a careful investigation of the prerequisites for the network socialisation and network resources mechanisms. To the extent that these mechanisms form important explanations, there should be an empirical association between variables assessing neighbourhood socialisation and network resources on the one hand, and the magnitude of neighbourhood effects on the other. Instead of purely isolating neighbourhood causal effects, the present chapter tests the validity of theoretical pathways that supposedly explain the association between neighbourhood characteristics and the individual's socio-economic status.

Another important identification problem that is often overlooked in the neighbourhood effects field is that individuals also determine to what extent they are exposed to their environment. This selection in exposure to the different neighbourhood features is what Harding et al. (2011a) have labelled "within-neighborhood selection bias". This differential exposure to the neighbourhood is driven by various degrees of neighbourhood-specific social contacts and interactions. Taking these into account is thus a necessity: different residents choose to spend their time with different neighbours, in different ways and places which might reveal neighbourhood effect heterogeneity (Harding et al., 2011b).

The limitations of the cross-sectional data are balanced by the major strengths of the NELS data: it contains different measures on social embeddesness in the neighbourhood in combination with neighbourhood and individual socio-economic characteristics, thereby making it feasible to estimate the conditionality of the association between the neighbourhood composition and individual socio-economic status through these neighbourhood-specific social contacts and thereby providing ample attention to the mechanisms behind neighbourhood effects.

*Operationalisation of independent and dependent variables*

In order to map out the neighbourhood-specific social contacts and interactions, this study employs two measures on the most important contacts and one measure on the more general, personal contact. The first two measures are based on a name generator: the respondent was asked to mention his or her five most important contacts and to list characteristics of these social contacts. From this I counted (1) the absolute number of contacts of the resident that are living in the same neighbourhood and (2) the share of most important people living in the same neighbourhood (calculated by the number of most important contacts living in the same neighbourhood divided by the total number of most important contacts). This results in a percentage score of the share of most important people living in the same neighbourhood.<sup>13</sup> (3) The frequency of general contact with neighbours, which is about personal contact with people in the neighbourhood in general (which goes beyond the core network) and refers to seeing each other (not calling or texting). Respondents can score the contact from a scale of never, approximately once per year, a few times per year, approximately once per month, a few times a month, once or more per week to (almost) everyday. Table 2.1 shows the descriptives of these three variables on neighbourhood-specific social contacts and interactions.

The dependent variable individual socio-economic status is measured by self-reported income of the household of an individual.<sup>14</sup> On a 16-point scale, respondents reported the net monthly income from the household (see Table 2.2, for the distribution). The theoretical framework is devoted to the association between the neighbourhood composition and income, but obviously income is the consequence of more factors and these individual effects could potentially suppress neighbourhood effects.<sup>15</sup> The most obvious control variables are being employed or not, educational level (of respondent and father), age (and age-squared to control for curvilinear effect), gender and ethnicity. Since differences in income can also be expected for different household composition and living conditions, I include a variable whether the respondent lives together, has children and the length of residence. Descriptive statistics of the individual-level (control) variables are summarised in Table 2.2.

Table 2.1: Descriptive statistics of neighbourhood-specific social contacts and interactions

	N	Percentage
<b>Core network in neighbourhood (absolute)</b>		
0	2,360	72.13
1	633	19.35
2	215	6.57
3	48	1.47
4	14	0.43
5	2	0.06
<b>N individuals</b>	3,272	100.00
<b>Mean</b>	0.389	
<b>SD</b>	0.722	
<b>Core network in neighbourhood (relative)</b>		
0 (0%)	2,360	72.13
0.2 (20%)	132	4.03
0.25 (25%)	80	2.44
0.33 (33%)	152	4.65
0.40 (40%)	51	1.56
0.50 (50%)	192	5.87
0.60 (60%)	20	0.61
0.67 (67%)	74	2.26
0.75 (75%)	16	0.49
0.80 (80%)	12	0.37
1 (100%)	183	5.59
<b>N individuals</b>	3,272	100.00
<b>Mean</b>	0.147 (14.7%)	
<b>SD</b>	0.278	
<b>General contact with neighbours (frequency)</b>		
(1)Never	305	9.32
(2)Approximately once a year	86	2.63
(3)A few times a year	361	11.03
(4)Approximately once a month	308	9.41
(5)A few times a month	714	21.82
(6)Once or more a week	1,064	32.52
(7)(Almost) every day	434	13.26
<b>N individuals</b>	3,272	100.00
<b>Median</b>	5	

Source: author's calculations using NELS (de Graaf et al., 2010a)



Table 2.2: Descriptive statistics of individual-level variables

Characteristics of individual	Mean/median	SD
Household income	7 (2,000-2,499 per month) <sup>†</sup>	2.925
Age (years)	32.652	8.122
Female	0.528	
<b>Ethnicity</b>		
Dutch	0.558	
Moroccan, 1st gen	0.122	
Moroccan, 2nd gen	0.058	
Turkish, 1st gen	0.131	
Turkish, 2nd gen	0.059	
Non West, 1st gen	0.022	
Non West, 2nd gen	0.012	
West, 1st gen	0.014	
West, 2nd gen	0.025	
Living together (ref: no partner or not living together with partner)	0.636	
Children (ref: no children)	0.555	
Length of residence	2 (6-10 years) <sup>‡</sup>	1.189
Employed (ref: unemployed)	0.810	

Source: author's calculations using NELS (de Graaf et al., 2010a)

<sup>†</sup> For the 16-point scale of income the median is considered more informative. The mean of household income is 6.716, standard deviation 2.925. The variable is treated as continuous. The skewness of the income distribution is 0.367 and the kurtosis 3.385, so the distribution is approximately symmetric. The household income categories are: (1) less than 150 euro per month; (2) 150 – 299 euro per month; (3) 300 – 499 euro per month; (4) 500 – 999 euro per month; (5) 1,000–1,499 euro per month; (6) 1,500 – 1,999 euro per month; (7) 2,000 – 2,499 euro per month; (8) 2,500 – 2,999 euro per month; (9) 3,000– 3,499 euro per month; (10) 3,500– 3,999 euro per month; (11) 4,000–4,499 euro per month; (12) 4,500– 4,999 euro per month; (13) 5,000–5,499 euro per month ; (14) 5,500–5,999 euro per month; (15) 6,000 – 6,999 euro per month; and (16) 7,000 euro or more per month.

<sup>‡</sup> The distribution of length of residence was rather skewed, so this was recoded into 5 categories: (1) <=5 years (2) 6-10 years (3) 11-15 years (4) 16-20 years and (5) >20 years. The mean of the length of residence 5-point scale is 1.982 and standard deviation 1.189. The variable is treated as continuous.

Table 2.2: Descriptive statistics of individual-level variables (continued)

Characteristics of individual	Mean
<b>Highest educational level attained</b>	
No education	0.032
Primary school	0.102
Basic preparatory vocational secondary education	0.096
Theoretical pathway vocational secondary education	0.073
Senior general secondary education	0.065
Pre-university education	0.051
Mixed learning pathway vocational secondary education (short track)	0.083
Mixed learning pathway vocational secondary education (long track)	0.227
Higher professional education	0.177
University (bachelor)	0.032
University (master)	0.060
PhD	0.004
<b>Highest education father</b>	
No education	0.161
Primary school	0.195
Basic preparatory vocational secondary education	0.164
Theoretical pathway vocational secondary education	0.078
Mixed learning pathway vocational secondary education	0.158
Senior general secondary education/ Pre-university education	0.041
Higher professional education	0.133
University	0.070
<b>N individuals</b>	3,272
<b>N neighbourhoods</b>	246

Source: author's calculations using NELS (de Graaf et al., 2010a)

The socio-economic composition of the neighbourhood is measured by a standardised index of neighbourhood deprivation based on nine socio-economic neighbourhood characteristics that represent various domains of opportunity structures, resources and stratification in the neighbourhood.<sup>16</sup> A PCF analysis for the nine items retained two factors with an eigenvalue above 1. The correlations between each item ranged from the lowest 0.31 till highest score 0.94. Only factor loadings values that are greater than 0.40 are considered significantly related to the factor (Acock, 2008). The primary factor accounted for 62 percent of the total variance (with an eigenvalue of 5.54), while the second factor accounted for only 15 percent with an eigenvalue of 1.38. The second factor had very low factor loadings (5 of 9 below 0.4). The primary factor had factor loadings ranging from -0.91 till -0.75 for indicators of neighbourhood socio-economic advantage, and from 0.57 till 0.89 for indicators of neighbourhood socio-economic deprivation, so all items are included in the model. The Kaiser-Meyer-Olkin postfactor measure of sampling adequacy was 0.74, which suggests an adequate factorability. Finally, the internal consistency for the index was examined using Cronbach's alpha for unstandardised items, which was moderate (0.69) (and is 0.92 for standardised items). I continued with the primary factor and standardised it to form the index of neighbourhood deprivation, which will be included in the model as a continuous independent variable.<sup>17</sup>

### *Analytical strategy*

This study applied a multilevel model to estimate the relation between the neighbourhood deprivation index and income. All multilevel models were estimated with Stata 13.0, using maximum likelihood estimates with random intercepts for neighbourhoods.<sup>18</sup>

The intercept-only model shows that most of the difference in income lies at the individual level. Nevertheless, still 6.6% of the total variance is attributable to the neighbourhood level.<sup>19</sup> The fact that there is a relatively large share of cross-neighbourhood variance requires a multilevel approach.<sup>20</sup>

In the first step of the analysis, individuals are nested within neighbourhoods, but only individual-level characteristics are included (model 1). Second, to assess whether the neighbourhood deprivation in-

dex is negatively associated with income over and above the effect of individual characteristics, the index of neighbourhood level of deprivation is added (model 2). Finally, to investigate whether the relationship between neighbourhood deprivation and income is stronger for individuals who are more strongly embedded in the neighbourhood, three final models are estimated (models 3-5) that include cross-level interaction terms of the impact of the neighbourhood deprivation and the absolute number, the share of members of a resident's core network residing in the same neighbourhood and the more general, personal contact in the neighbourhood. The basic form of this model can be represented as follows:

$$Y_{ij} = \beta_0 + \beta_1 X_{ij} + \beta_2 Z_j + \beta_3 X_{ij} Z_j + v_{0j} + \epsilon_{ij}$$

where

$Y_{ij}$  is the income of respondent  $i$  in neighbourhood  $j$

$\beta_0$  is a constant (intercept)

$\beta_1 X_{ij}$  is the effect of an individual-level characteristic of respondent  $i$ ;

$\beta_2 Z_j$  is the effect of a neighbourhood-level characteristic of neighbourhood  $j$ ;

$\beta_3 X_{ij} Z_j$  is the effect of a cross-level interaction term between a neighbourhood-level characteristic of neighbourhood  $j$  and an individual-level characteristic of respondent  $i$ ;

$v_{0j}$  represents the variation in the intercept across neighbourhoods;

$\epsilon_{ij}$  represents the remaining variation within individuals.

Following the main model, multiple robustness checks are performed to further substantiate the findings.

## RESULTS

Model 1 of Table 2.3 includes only individual-level variables and indicates a reduction of the between-neighbourhood variance, pointing to a compositional effect (Table A2.3 in the appendix shows the effects of the individual-level control variables). Model 2 includes the index of neighbourhood deprivation, further reducing the neighbourhood variance. This model indicates a small, but significant negative

relationship between the level of neighbourhood deprivation and income, supporting the first hypothesis. Models 3-5 show that there are no significant cross-level interaction effects for the absolute number and share of most important contacts residing in the neighbourhood, nor were significant differences observed in the association between the neighbourhood's level of deprivation and income and different degrees of general, personal contact in the neighbourhood. The second hypothesis cannot be accepted, since the association between the level of neighbourhood deprivation and the resident's socio-economic status is not stronger for individuals who are more strongly embedded into the neighbourhood. A model with only the level of neighbourhood deprivation and interaction terms without controlling for any individual and family characteristics was also estimated. This does also not produce any significant findings, the association between the level of neighbourhood deprivation and income is not stronger for individuals who have more neighbourhood-specific social contacts and interactions.<sup>21</sup>

The findings withstand a large number of robustness checks for outliers (on both the dependent variable income and independent variable neighbourhood deprivation),<sup>22</sup> on multiple measures of neighbourhood deprivation (thresholds for most and least deprived areas and each item from the index separately)<sup>23</sup> and for the interval mid-point strategy and interval regression of the outcome variable income.<sup>24</sup> All the robustness checks produced very similar results and for reasons of parsimony, these analyses are not included in this chapter.

#### DISCUSSION AND IMPLICATIONS

Many studies on the impact of the socio-economic composition of the neighbourhood on individuals' socio-economic outcomes have contextualised their findings with the role modelling and network effects in the neighbourhood (Andersson et al., 2007; Cotter, 2002; de Souza Briggs, 1997; Galster et al., 1999, 2008; Musterd et al., 2003; van der Klaauw and van Ours, 2003; van Ham and Manley, 2010; Weinberg et al., 2004). Their empirical evidence is not decisive on the causal pathways; however, these scholars allocated their findings to the mechanisms solely based on the direction of the coefficients

Table 2.3: Impact of neighbourhood deprivation index on income conditional upon social embeddedness in the neighbourhood

	model 1		model 2		model 3		model 4		model 5	
	B	(SE)	B	(SE)	B	(SE)	B	(SE)	B	(SE)
<b>Social embeddedness in neighbourhood (level 1)</b>										
Core network (absolute)	-0.030	(0.081)	-0.020	(0.081)	-0.032	(0.082)	-0.017	(0.081)	-0.020	(0.081)
Core network (relative)	0.117	(0.212)	0.110	(0.212)	0.110	(0.212)	0.084	(0.217)	0.110	(0.212)
Contact with neighbours (frequency)	-0.002	(0.020)	-0.004	(0.020)	-0.004	(0.020)	-0.004	(0.020)	-0.003	(0.020)
<b>Characteristics neighbourhood (level 2)</b>										
Standardised index of neighbourhood deprivation			-0.157***	(0.043)	-0.175***	(0.047)	-0.167***	(0.047)	-0.145	(0.108)
<b>Cross-level interaction effects (level 1 x level 2)</b>										
<i>Interaction:</i> core network neighbours (absolute) x index of neighbourhood deprivation					0.044	(0.046)				
<i>Interaction:</i> core network neighbours (relative) x index of neighbourhood deprivation							0.064	(0.122)		
<i>Interaction:</i> contact with neighbours (frequency) x index of neighbourhood deprivation									-0.002	(0.020)
<b>Intercept</b>										
Log likelihood	-5.793***	(0.682)	-5.769***	(0.682)	-5.770***	(0.682)	-5.764***	(0.682)	-5.772***	(0.683)
	-6.666		-6.659		-6.659		-6.659		-6.659	
<b>N individuals</b>										
N neighbourhoods	3,272		3,272		3,272		3,272		3,272	
	246		246		246		246		246	
<b>Variance components</b>										
Neighbourhood-level variance	0.091		0.062		0.062		0.062		0.062	
Individual-level variance	3.373		3.379		3.378		3.379		3.379	

Two-tailed test: † p < 0.10, \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001. Source: author's calculations using NELS (de Graaf et al., 2010a)  
 Note: all models include individual-level control variables: age, age-squared, gender, ethnicity, living together, having children, length of residence, employment status, highest educational level attained, highest education father

and thresholds found, not on the actual contacts and interactions between neighbours. Contrary to what the network resources and network socialisation mechanisms suggest, the present study finds that the magnitude of neighbourhood effects is not higher for individuals with more neighbourhood-specific social contacts and interactions. This does not imply that neighbourhood effects do not exist, but it does challenge the often applied socialisation and resources mechanisms. The following question remains: for whom actually does the neighbourhood matter? (Sharkey and Faber, 2014; Small and Feldman, 2012).

The issue of how and for whom the neighbourhood matters reaches beyond the field academic research and has direct relevance for policymakers. Most policies assume that individuals are susceptible to the neighbourhood in the same way. The neighbourhood's influence is believed to be beyond the resident's control and may either enhance or limit their socio-economic opportunities. It is this imposed environment that policymakers try to alter, either by changing the socio-economic mix of the neighbourhood or by promoting residential mobility for disadvantaged residents (such as the Moving to Opportunity programmes in the USA). Policymakers should, however, take into account that the institutional and socio-economic composition of neighbourhoods do not fully determine the way a respondent is affected by the neighbourhood; residents shape, select and are affected by the neighbourhood in different ways (Harding et al., 2011b). Policymakers should take this selected environment into account and therefore not aim at a one-size-fits-all approach. Rather, they should acknowledge that changes in the socio-economic composition of the neighbourhood do not automatically lead to more socio-economic opportunities for each resident. It goes beyond the scope of the present study, but the ability of individuals to actually capitalise the resources available in the neighbourhood should be further investigated. For individuals who have a low capacity to capitalise the resources in the neighbourhood, an area-targeted policy intervention would not be very helpful. In order to increase effectiveness of the policy, social services should actively reach out and extend their support for this vulnerable group that does not know how to request assistance. On a more positive note, an increasing socio-economic mix in the neighbourhood might still have beneficial side-effects such as a better reputation of the neighbourhood and an increase of higher-quality

institutions, facilities and organisations in the neighbourhood which might advance the individual opportunities (Galster, 2012).

Although only cross-sectional data were available, this study is a contribution to the field as it engages in the vigorous debate on the mechanisms behind neighbourhood effects. This study took an important first step in providing insight into the network resources and network socialisation mechanisms and offers a new, fruitful direction for future research on neighbourhood effects. Future work should concentrate on the remaining set of potential causal mechanisms. Since the variables in neighbourhood effects studies cannot be manipulated and individuals cannot be randomised to neighbourhoods, i.e. since no controlled experiment is possible, isolating the causal mechanisms at work in these studies is daunting. Like the present study, however, scholars should specify and observe the neighbourhood mechanisms in their empirical models. They should further investigate under which conditions these mechanisms operate and critically assess these central premises behind the causal pathways that connect neighbourhood characteristics to individual outcomes. Each mechanism operates in a different way dependent upon the geographical scale, the measurement of neighbourhood characteristics, the exposure of residents and the timing and duration of the effects (Galster, 2008).

Many scholars argue that neighbourhood effects are basically self-selection effects of individuals into neighbourhood. Sampson (2012) points out that this individual selection into neighbourhoods is embedded in certain social contexts and that that phenomenon is itself a neighbourhood effect. The underlying basis of neighbourhood effects is the existence of social and urban inequalities structures. Being embedded in those unequal structures, individuals derive certain aspirations and preferences with respect to employment opportunities, which leads them to be in structural (dis)advantage and make differential decisions when it comes to their socio-economic position.

In addition, this study and many scholars in the field of neighbourhood effects focus only on the current neighbourhood of residence, while continuing exposure to the former neighbourhoods of residence should not be neglected. When residents move to another neighbourhood, they can still be exposed to the previous neighbourhood of residence through continuing contacts with their old neighbours (Hedman, 2011; Sampson, 2012). Consequently, residents who



move can be exposed to different neighbourhoods at the same time, making it a challenge to allocate the neighbourhood effects to the accurate neighbourhood (Hedman, 2011). This broader idea of neighbourhood effects, leaving behind the idea of effects through the narrow mechanism of socialisation and resources in only one neighbourhood, should serve as a basis for future studies on social inequalities in the urban area.

Table A2.1: Testing the relationship between proxies and neighbourhood-specific contacts and interactions

Expectations (Galster et al., 2010)	Gender (female)	Age (years)	Family (children)	Employment (number of hours)	Income (money unit)
Socialisation Networks	?	-	+	-	-
	?	-	+	-	-
<b>Netherlands Longitudinal Lifecourse Study (NELLS)</b>					
<b>Number of most important people in living same neighbourhood</b>	+	-	n.s.	-	-
<i>bivariate regression</i>					
<i>B</i>	+	n.s.	n.s.	n.s.	-
(SE)	0.103 (0.027)	-0.003 (0.002)	0.051 (0.032)	-0.000 (0.001)	-0.011 (0.006)
<b>Share most important people in living same neighbourhood</b>	+	n.s.	n.s.	-	-
<i>bivariate regression</i>					
<i>B</i>	+	n.s.	+	n.s.	-
(SE)	0.031 (0.010)	-0.001 (0.001)	0.036 (0.012)	-0.001 (0.000)	-0.007 (0.002)
<b>Frequency of general contact of people in neighbourhood</b>	n.s.	+	+	-	-
<i>bivariate regression</i>					
<i>B</i>	n.s.	n.s.	+	-	-
(SE)	-0.101 (0.064)	-0.003 (0.005)	0.902 (0.077)	-0.008 (0.002)	-0.041 (0.013)

Source: author's calculations using NELLS (de Graaf et al., 2010a)

Table A2.2: Factor loadings for index of neighbourhood deprivation

Index of neighbourhood deprivation	Factor 1	Uniqueness
(1) percentage of (self-)employed people in 15-64 age group	-0.7825	0.3877
(2) the average income (wages, transfers, other) after tax (per income recipient)	-0.8607	0.2593
(3) the average income (wages, transfers, other) after tax (per person)	-0.7521	0.4344
(4) percentage of income recipients with income less than or equal to the 40th percentile of the national income distribution	0.7852	0.3835
(5) percentage of income recipients with income equal to or greater than the 80th percentile of the national income distribution	-0.9103	0.1713
(6) percentage of transfer recipients (employment disability insurance, unemployment benefits, welfare) in 15-64 age group	0.8893	0.2091
(7) welfare benefits per 1,000 households	0.7737	0.4013
(8) employment disability recipients per 1,000 individuals aged 15-64	0.5685	0.6768
(9) unemployment benefit recipients per 1,000 individuals aged 15-64.	0.6817	0.5352

Source: author's calculations using NELLS (de Graaf et al., 2010a)/Key Figures Districts and Neighbourhoods

Table A2.3: Continued from Table 2.3: individual-level control variables

	model 1		model 2		model 3		model 4		model 5	
	B	(SE)	B	(SE)	B	(SE)	B	(SE)	B	(SE)
Age (years)	0.530***	(0.041)	0.532***	(0.041)	0.532***	(0.041)	0.532***	(0.041)	0.532***	(0.041)
Age <sup>2</sup>	-0.007***	(0.001)	-0.007***	(0.001)	-0.007***	(0.001)	-0.007***	(0.001)	-0.007***	(0.001)
Female	0.035	(0.067)	0.032	(0.067)	0.032	(0.067)	0.032	(0.067)	0.033	(0.067)
Ethnicity (ref: Dutch)										
Moroccan, 1st gen	-0.833***	(0.138)	-0.767***	(0.138)	-0.766***	(0.138)	-0.767***	(0.138)	-0.767***	(0.138)
Moroccan, 2nd gen	-0.028	(0.159)	0.017	(0.158)	0.017	(0.158)	0.017	(0.158)	0.017	(0.158)
Turkish, 1st gen	-0.570***	(0.124)	-0.499***	(0.125)	-0.499***	(0.125)	-0.499***	(0.125)	-0.498***	(0.125)
Turkish, 2nd gen	-0.173	(0.153)	-0.088	(0.154)	-0.088	(0.154)	-0.089	(0.154)	-0.087	(0.154)
Non West, 1st gen	-0.439†	(0.228)	-0.396†	(0.228)	-0.396†	(0.228)	-0.396†	(0.228)	-0.396†	(0.228)
Non West, 2nd gen	-0.136	(0.302)	-0.117	(0.302)	-0.120	(0.302)	-0.120	(0.302)	-0.117	(0.302)
West, 1st gen	-0.272	(0.285)	-0.232	(0.285)	-0.229	(0.285)	-0.229	(0.285)	-0.232	(0.285)
West, 2nd gen	0.234	(0.211)	0.240	(0.211)	0.241	(0.211)	0.241	(0.211)	0.241	(0.211)
Living together (ref: no partner or not living together with partner)	2.558***	(0.088)	2.543***	(0.088)	2.543***	(0.088)	2.544***	(0.088)	2.545***	(0.088)
Children (ref: no children)	-0.351***	(0.095)	-0.353***	(0.095)	-0.353***	(0.095)	-0.352***	(0.095)	-0.353***	(0.095)
Length of residence	-0.096**	(0.030)	-0.090***	(0.030)	-0.090***	(0.030)	-0.089***	(0.030)	-0.090***	(0.030)
Employed (ref: unemployed)	1.113***	(0.091)	1.099***	(0.091)	1.103***	(0.091)	1.102***	(0.091)	1.099***	(0.091)
Highest educational level attained (ref: no education)										
Primary school	0.019	(0.210)	0.020	(0.210)	0.016	(0.210)	0.017	(0.210)	0.019	(0.210)
Basic preparatory vocational secondary education	0.121	(0.215)	0.131	(0.214)	0.126	(0.214)	0.127	(0.214)	0.130	(0.214)
Theoretical pathway vocational secondary education	0.437†	(0.224)	0.421†	(0.224)	0.417†	(0.224)	0.417†	(0.224)	0.420†	(0.224)
Senior general secondary education	0.538*	(0.231)	0.534*	(0.230)	0.529*	(0.230)	0.531*	(0.230)	0.534*	(0.230)
Pre-university education	0.205	(0.242)	0.205	(0.242)	0.281	(0.242)	0.283	(0.242)	0.283	(0.242)
Mixed learning pathway vocational secondary education (short track)	0.655**	(0.221)	0.652**	(0.220)	0.650**	(0.220)	0.652**	(0.220)	0.655**	(0.220)
Mixed learning pathway vocational secondary education (long track)	0.916***	(0.203)	0.903***	(0.203)	0.900***	(0.203)	0.900***	(0.203)	0.902***	(0.203)
Higher professional education	1.497***	(0.209)	1.485***	(0.208)	1.478***	(0.208)	1.480***	(0.209)	1.484***	(0.208)
University (bachelor)	0.881***	(0.266)	0.887***	(0.265)	0.883***	(0.265)	0.884***	(0.265)	0.885***	(0.266)
University (master)	2.828***	(0.238)	2.808***	(0.238)	2.802***	(0.238)	2.805***	(0.238)	2.808***	(0.238)
PhD	2.668***	(0.271)	2.657***	(0.271)	2.651***	(0.270)	2.657***	(0.270)	2.653***	(0.271)
Highest education father (ref: no education)										
Primary school	-0.025	(0.122)	-0.034	(0.122)	-0.033	(0.122)	-0.032	(0.122)	-0.034	(0.122)
Basic preparatory vocational secondary education	0.042	(0.141)	0.025	(0.141)	0.025	(0.141)	0.026	(0.141)	0.025	(0.141)
Theoretical pathway vocational secondary education	0.105	(0.164)	0.087	(0.164)	0.089	(0.164)	0.088	(0.164)	0.087	(0.164)
Mixed learning pathway vocational secondary education	-0.012	(0.143)	-0.029	(0.142)	-0.027	(0.142)	-0.028	(0.142)	-0.029	(0.142)
Senior general secondary education/ Pre-university education	0.142	(0.198)	0.125	(0.198)	0.130	(0.198)	0.128	(0.198)	0.125	(0.198)
Higher professional education	0.093	(0.152)	0.074	(0.152)	0.076	(0.152)	0.075	(0.152)	0.074	(0.152)
University	0.227	(0.174)	0.196	(0.174)	0.196	(0.174)	0.197	(0.174)	0.196	(0.174)

Two-tailed test: † p < 0.10, \* p < 0.05, \*\* p < 0.01, \*\*\* p < 0.001. Source: author's calculations using NELLS (de Graaf et al., 2010a)

## ENDNOTES

<sup>1</sup> Based on the theoretical substantiation of the social network and socialisation mechanisms by Galster (2012), I prefer to refer to these mechanisms from now on as network resources. The socialisation mechanism is also renamed network socialisation, to emphasise the fact that also this mechanism essentially transmits through the social contacts in the network.

<sup>2</sup> The neighbourhood effects literature sets out from Wilson's perspective on social isolation and concentration effects on social and occupational mobility, while taking a broader scope on conditions and outcomes. Neighbourhood effects have been identified on educational achievement, sexual activity and teenage pregnancy, deviant behaviour, school dropout rates, crime rates and health outcomes (for an overview see Ellen and Turner, 1997).

<sup>3</sup> Besides these mechanisms, environmental, geographical and institutional mechanisms are also considered in the theoretical review literature (Galster, 2012). The latter mechanisms are, however, less considered in empirical studies on neighbourhood effects on socio-economic outcomes such as employment and income.

<sup>4</sup> These social-interactive mechanisms are endogenous (Manski, 2000): the resident's socio-economic status is affected by the aggregation of the socio-economic statuses of the residents in the neighbourhood. It is challenging to assess endogenous effects from data, due to the so-called 'reflection problem'. I elaborate on this in the Methods section.

<sup>5</sup> The body of academic work on neighbourhood effects on socio-economic outcomes are very restricted to residents in poor, disadvantaged neighbourhoods. This provides only a one-sided view of the neighbourhood effects argument, as residents in this specific type of neighbourhood are known for being generally more locally oriented in their contacts and therefore more 'exposed' to the neighbourhood (Campbell and Lee, 1990; Ellen and Turner, 1997; Small and Feldman, 2012; Young, 2003).

<sup>6</sup> Pinkster notes that socialisation in the neighbourhood can also operate through indirect interaction, where just residing in the same space makes residents susceptible to the behaviour of their co-residents (Pinkster, 2007). This study focuses, however, on direct interaction through local contacts of the resident and consider indirect socialisation as an subordinate effect that is already covered by the main effect of the neighbourhood.

<sup>7</sup> This network socialisation process in the neighbourhood is also often referred to as the 'contagion model' or 'epidemic theory' which implies that (non-)normative behaviour is 'contagious': residents are influenced by the behaviour and beliefs of their co-residents through contact with them (Crane, 1991; Friedrichs and Blasius, 2003; Pinkster, 2007).

<sup>8</sup> Examples of studies that account for social neighbourhood embeddedness focus their research on outcomes such as the acceptance of deviant norms (Friedrichs and Blasius, 2003), juvenile delinquency (Oberwittler, 2004) and immigrants having German friends (Farwick, 2007).

<sup>9</sup> Galster et al. (2010) hypothesised that neighbourhood effects are less strong for older residents, residents who work more hours and have a higher income, and more strong for residents with children. The authors could not confirm all hypotheses with their analyses: they find that regardless of gender, only residents with children and who do not work full time experience larger neighbourhood effects. It is, however, empirically unclear whether social embeddedness in the neighbourhood is the con-

ditioning factor here. Appendix A2.1 shows in the upper two rows the expectations that Galster et al. (2010) postulated on the associations between magnitude of neighbourhood effect and individual characteristics for the socialisation and network neighbourhood effects mechanisms (see Galster et al., 2010, p. 2921). The six rows below test whether neighbourhood embeddedness is indeed lower for older residents, residents who work more hours and have a higher income, and higher for residents with children (no clear hypothesis was posed for females). My analysis shows that these proxies are not sound: both bivariate correlations and multilevel regression analyses (individual neighbourhood embeddedness nested within neighbourhoods) show that proxies do not always predict the contact with neighbours (measured by (1) the absolute number, (2) the share of members of a resident's core network residing in the same neighbourhood and (3) more general, personal contact in the neighbourhood) in the right direction. Furthermore, the explanatory power of all these proxies together is low: the individual-level variance of our three neighbourhood embeddedness measures is hardly reduced by including the proxies.

<sup>10</sup> Because the number of Moroccans and Turks living in more rural areas is very small, including Moroccans and Turks in these areas would lead to clustering effects, as interviewers would have to interview basically all Moroccans and Turks in those areas to obtain a sufficient number. It could also possibly hamper the sampling process; in order to reach out and interview Moroccans and Turks in these rural municipalities, the number of sampled municipalities should increase (de Graaf et al., 2010b). For this reason, the oversampling of Moroccans and Turks was restricted to municipalities with the highest urbanisation degrees, ranging for very strong urbanisation (more than 2500 addresses per km<sup>2</sup>) to moderate urbanisation (1,000-1,500 addresses per km<sup>2</sup>).

<sup>11</sup> Local authorities have drawn random samples from the population registry based on age and country of birth of the respondent and the parents. The local authority then provided the name, date of birth, sex, ethnicity and address of the individual. The overall response rate of the survey was 52 percent.

<sup>12</sup> The minimum number individuals per neighbourhood is 1, the maximum 92. On average, 13.3 individuals per neighbourhood are included.

<sup>13</sup> It could also be the case that residents have no important contacts at all. This type of resident would then automatically receive a score of 0 on both measures, while a resident who has at least one important contact but has none of those contacts living in the same neighbourhood also scores 0. Because these two situations are conceptually very different, only residents with at least one important contact are included in the analysis and can score a 0 on these measures (thereby excluding 3.7 percent of individuals in our sample that report no important contacts). Additional analyses with a slightly larger sample also, including respondents without any contacts (with a dummy indicating having no important contacts), showed very similar outcomes. Furthermore, it could be the case that the most important contacts residing in the same neighbourhood are family members of the resident. An additional model with a smaller sample which excludes those individuals of which all of their core contacts are both reported as family members and neighbours (excluding 14.2 percent of the individuals in our sample) led to very similar results.

<sup>14</sup> Question 'What is the net monthly income of you and your partner (if applicable) together? (partner with whom you live together or are married)'. Unfortunately, I could not estimate the individual income as almost half of the respondents did not answer the follow-up question on the individual contribution of respondent to the household income.

<sup>15</sup> This is most effectively shown in studies by Buck (2001) and Bolster et al. (2007), who present evidence that including a range of individual and household characteristics attenuate the neighbourhood effects, showing the importance of including these control variables.

<sup>16</sup> Table A2.2 in the appendix shows the factor loadings and uniqueness of this factor. Source of neighbourhood characteristics in NELS is *Key Figures Districts and Neighbourhoods*. The principal component factor (PCF) analysis was based on the total of 258 neighbourhood districts in the sample. The factorability of the following nine items was examined: (1) percentage of (self-)employed people in the 15-64 age group; (2) the average income (wages, transfers, other) after tax (per income recipient); (3) the average income (wages, transfers, other) after tax (per person); (4) percentage of income recipients with income less than or equal to the 40th percentile of the national income distribution; (5) percentage of income recipients with income equal to or greater than the 80th percentile of the national income distribution; (6) percentage of transfer recipients (employment disability insurance, unemployment benefits, welfare) in 15-64 age group; (7) welfare benefits per 1,000 households; (8) employment disability recipients per 1,000 individuals aged 15-64; and (9) unemployment benefit recipients per 1,000 individuals aged 15-64.

<sup>17</sup> The index is based on all 258 neighbourhoods in the data-set, but the final sample was confined to 246 neighbourhoods. From the standardisation, it logically follows that the standardised deprivation index in the final sample has a mean close to 0 (0.027) and standard deviation close to 1 (0.976) on the neighbourhood-level. The skewness of the neighbourhood deprivation index for the 246 neighbourhoods is 0.564 and the kurtosis is 3.117, so the distribution is approximately symmetric. On the individual level ( $N=3,272$ ), the mean is 0.212, the SD 0.940, minimum -2.110 and maximum 3.219.

<sup>18</sup> Random slopes on the measures on the most important contacts and the more general, personal contacts were not included because no significant random slope variance was found. As argued by Snijders and Bosker (1999), however, despite the fact that there is no significant random slope, a specific cross-level interaction can still be tested.

<sup>19</sup> Neighbourhood-level variance 0.564 and individual-level variance 7.991.

<sup>20</sup> The main models only show residents nested in neighbourhoods, but respondents are also nested within 35 municipalities. A three-level intercept-only model shows an intraclass correlation on the municipality level of 2.4%, and of 4.4% on the neighbourhood level. I conducted robustness checks for the main models where the clustering at the municipality level is included. These three-level models produced very similar results.

<sup>21</sup> Model not shown due to space limitations.

<sup>22</sup> I calculated a modified z-score both for the dependent variable income and the independent variable level neighbourhood deprivation. This modified z-score is determined based on the outlier resistant median of absolute deviation about the median. An individual case is an outlier when this modified z-score is greater than 3.5 (Iglewicz and Hoaglin, 1993). I conducted a stricter test with a modified z-score of 2. The findings withstand these strict checks for outliers on both the dependent and independent variable.

<sup>23</sup> Including each item from the index of neighbourhood deprivation separately leads to very similar results, only the percentage of welfare benefits and employment disability recipients on the neighbourhood level had no independent significant association with income. I also created threshold dummies for residents living in neighbour-

hoods scoring below the 20th percentile of deprivation (the least deprived areas) and a dummy for living in neighbourhoods scoring above the 80th percentile of the index of deprivation (the most deprived areas) because the mechanisms of socialisation and resources could also be non-linear, threshold-like (Galster, 2008). The neighbourhood effects might only occur after a minimum threshold of respective role models and resources has been reached before it can either enhance or limit residents' socio-economic opportunities (Andersson et al., 2007; Galster, 2008). Additional analyses which included the threshold dummies showed comparable outcomes. For reasons of parsimony, these analyses are not included in this study.

<sup>24</sup> The dependent variable income is grouped in income categories. The outcomes thus have interval censoring, as the exact income of each individual is not known. I converted the outcome variable to an interval variable using two approaches: the mid-point strategy and interval regression. For the mid-point strategy the assumption is made that individuals within one category are evenly spread across the category and the mid-point of each category is taken as the new value of the income variable. For the interval regression the assumption is made that the ordinal variable is derived from a continuous unobserved variable; for this approach I created two variables, indicating the lower and upper bound from the categories. As the outcome variables are now measured in euros and not on the 1-16 scale, the coefficients are rather different, but still show the same results: there is a small, but significant negative relationship between the level of neighbourhood deprivation and income.