Fear of Crime and Neighbourhood Cohesion in Context

On the role of place, time and ethnic diversity

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On the role of place, time and ethnic diversity

Onveiligheidsgevoelens en buurtcohesie in context

Over de rol van plaats, tijd en etnische diversiteit

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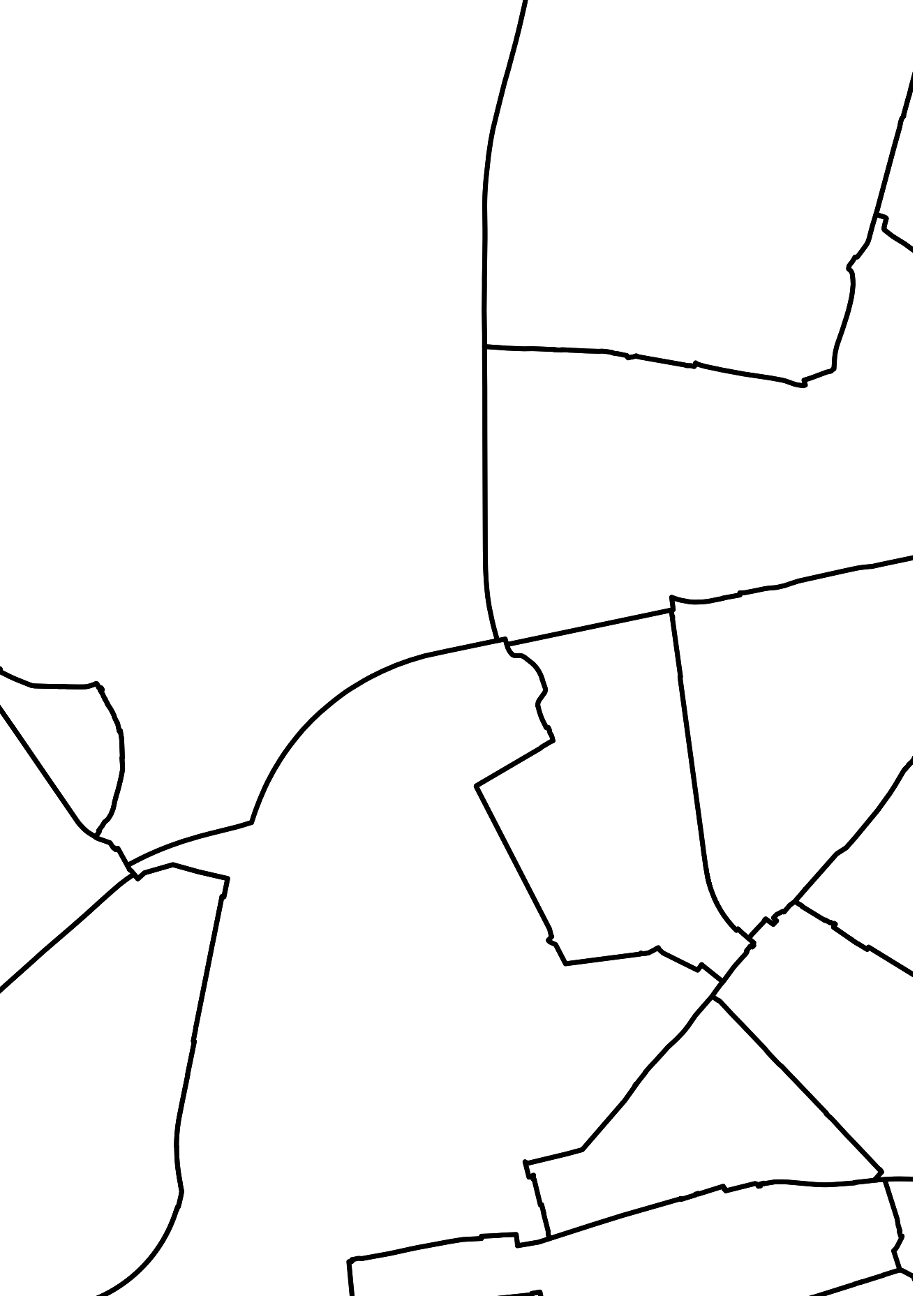


Chapter 1

Synthesis:
Fear of crime and neighbourhood cohesion in context

1.1 Introduction

Processes related to globalization, individualization and the rise of new communication technologies have sparked an academic debate about the significance (or insignificance) of the neighbourhood. The question is to what extent the neighbourhood still provides a relevant context for studying a person's life and behaviours, now that we are living in an increasingly 'placeless' world where – according to some – distance has died (Clark, 2009; Sampson, 2012). Scholars have argued that, despite these new realities, neighbourhoods remain important when researching social processes. In the first place, because a wide variety of phenomena, such as crime and joblessness, are spatially ordered and clustered in neighbourhoods. This spatial dimension is crucial to understanding how social organization (or disorganization) and inequality operate in the modern city (Sampson, 2012; Sharkey, 2013). Other researchers have shown that the neighbourhood continues to be an important setting for the formation of social ties and contacts for its residents (Clark, 2009; Forrest and Kearns, 2001). In a study on neighbour relations in the Netherlands, Mollenhorst and colleagues (2009) concluded that 'the locale has not lost relevance to its residents' (p.555). At the same time, however, we should acknowledge that the extent to which the neighbourhood functions as a social setting may be different for different types of residents (Miltenburg, 2017).

One of the main themes of this dissertation is how the neighbourhood shapes social life, and more specifically, individual perceptions of fear of crime and neighbourhood cohesion. Before discussing the themes and contributions in more depth, I will first briefly elaborate on the neighbourhood's position in theoretical debates and policy. In academia, the significance of the neighbourhood is frequently studied in relation to 'neighbourhood effects'. Most current research within this literature departs from the idea that living in an economically disadvantaged neighbourhood has negative effects on a wide range of individual outcomes related to health, educational achievement and socio-economic position (Manley et al., 2013). It is assumed that social interaction between neighbours is one of the main mechanisms through which the negative impact of a neighbourhood is transmitted (Miltenburg, 2017; Van Ham and Manley, 2012). A different and older tradition of neighbourhood effects research focuses on how certain structural neighbourhood characteristics affect the social organization of neighbourhoods. Scholars have theorized and shown that low-income neighbourhoods with high levels of ethnic heterogeneity and residential mobility are more socially disorganized and, as a consequence, more conducive to crime and other problems. Here, the focus is not on individual outcomes but rather on social phenomena observed at the neighbourhood level (Sampson, 2008; Sampson, 2012). The common theme in both types of neighbourhood effects research is how the

neighbourhood affects a wide range of social phenomena, at either the individual or ecological level.

In policy, the neighbourhood is considered a relevant site for government intervention (Manley et al., 2013). Such strategies, also known as territorial governance (De Wilde, 2015) or area-based policies (Andersson and Musterd, 2005), are aimed at reducing social problems related to social exclusion, deprivation, unsafety and liveability (Van Gent, Musterd and Ostendorf, 2009). To tackle such issues, measures are taken to engage residents in their neighbourhood and to stimulate social contact (De Wilde and Duyvendak, 2016; Hoekstra and Dahlvik, 2018). One such example is the implementation of neighbourhood watch schemes; a strategy designed to directly involve inhabitants in crime-reducing efforts by strengthening local social ties in order to reduce neighbourhood crime and levels of fear (Brunton-Smith, Sutherland and Jackson, 2013; Sharkey, 2018). Increasing a neighbourhood's socio-economic mix is another well-known strategy to overcome its problems. The aim is to attract middle and high income groups, as their presence is expected to positively influence the economic position of the less advantaged residents (Manley et al., 2012; Miltenburg, 2017). The various neighbourhood-based policies are based on the assumption that the neighbourhood provides a relevant context in which certain social problems can be solved. Obviously, not all problems within a neighbourhood can be adequately solved at this level. Scholars have warned against overlooking the importance of the wider context (Engbersen and Engbersen, 2008; Musterd and Andersson, 2005).

This dissertation examines how the neighbourhood impacts individuals' levels of fear of crime and neighbourhood cohesion and builds on the notions set out above. However, in contrast to most previous research, it takes a critical look at whether the (administratively defined) neighbourhood is the most appropriate spatial scale for studying these relationships (cf. Sharkey and Faber, 2014). I will return to this point when discussing the contributions of this dissertation. The two main concepts of this research – fear of crime and neighbourhood cohesion – are defined as follows. Fear of crime refers to 'a range of feelings, thoughts and behaviours people have regarding the subjective risk of criminal victimization' (Jackson and Gouseti, 2014). This definition suggests that fear is not necessarily geographically bound to the neighbourhood. In practice, however, most fear-of-crime research is based on individuals' fear levels in their immediate neighbourhood surroundings. This study is no exception. Neighbourhood cohesion is defined as how well residents in a neighbourhood 'stick' to each other and how well they are able to live together (Chan, To and Chan, 2006). A cohesive neighbourhood is characterized by feelings of mutual trust and solidarity, a shared sense of belonging (or place attachment), a high degree of social interaction, and absence of conflict (Forrest and Kearns, 2001). How residents experience and perceive

safety (or the lack thereof) and cohesion in their neighbourhood are both relevant studies in their own right, also because of their assumed consequences. A higher level of fear or a lower level of cohesion may negatively affect the wellbeing of individuals and their quality of life. Consequences include psychological distress and self-isolation (Hale, 1996; Henson and Reyns, 2015). In addition, at the contextual level, fear and a lack of cohesion are linked to neighbourhood decline in the form of increased levels of crime and disorder (Markowitz et al., 2001; Skogan, 1986). The overall aim of this dissertation is to contribute to the literature on fear and cohesion. I do so in three ways:

1. by considering and analyzing the role of various contextual determinants in relation to fear of crime and neighbourhood cohesion in a more innovative way, if possible;
2. by employing different spatial units of analysis (not only the administratively defined neighbourhood);
3. by exploring the time dimension in relation to feelings of unsafety.

The first contribution relates to the examined contextual determinants of fear and cohesion. Both existing and new pathways were tested in order to better explain differences in fear and cohesion levels across residential contexts. In this dissertation, and especially in the first two studies, special attention is paid to the role of ethnic diversity. The impact of ethnic diversity on cohesion and fear is a relevant topic to consider as Western societies are becoming increasingly diverse (Crul, 2016; Meissner and Vertovec, 2015; Vertovec, 2007). There is also widespread academic debate on the social implications of living with ethnic diversity, in particular since the introduction of Putnam's (2007) constrict hypothesis. Despite the academic progress that has been made on this topic, there are still some unsettled issues. One of the main issues is related to the conceptualization and measurement of ethnic diversity. I have introduced a more innovative way of measuring diversity in order to isolate diversity effects from out-group effects. Most studies are unable to do so because existing measures of diversity and out-group size tend to highly correlate with each other (Gijsberts, Van der Meer and Dagevos, 2012). The dissertation also considers how to settle questions regarding the conditionality and timing of diversity effects. It does so by analyzing whether the effects of diversity on fear and cohesion are conditional on a person's ethnic background. In addition, I explore whether diversity effects are stronger in contexts where the level of ethnic heterogeneity has suddenly increased. When looking at fear, I have also analyzed the role of crime, disorder, neighbourhood cohesion and facilities. Crime is perhaps the most obvious underlying cause of feeling unsafe. The empirical link between crime and fear is, however, rather weak and inconsistent (Rountree, 1998). I therefore explored whether we can improve our understanding by differentiating between different sorts of crime and by employing different ways of measuring crime. The amount of disorder in a residential

area is also considered a relevant predictor of fear (Brunton-Smith and Sturgis, 2011; Hale, 1996). In this dissertation, the role of disorder is analyzed using two different measures in order to gain more insight into the relationship between disorder and fear. The disorder measures are based on both respondents' perceptions and on objective figures. Lastly, it is examined how feelings of *safety* can be facilitated. First, the role of neighbourhood cohesion is addressed at both the individual level and the contextual level. Second, inspired by the work of urban sociologist Blokland (2008; 2017), it is hypothesized and tested whether having facilities in a residential area is associated with increased levels of safety.

Regarding the second contribution, I critically examine whether the neighbourhood is the most relevant spatial unit for studying the influence of the residential environment on fear and cohesion. The vast majority of studies examining the role of context do so on the basis of administratively defined neighbourhoods (Brunton-Smith and Sturgis, 2011; Gijsberts et al., 2012; Scarborough et al., 2010). Besides, in almost all discussions on the impact of the residential context (of, for instance, living in a deprived area) 'context' is equated with 'neighbourhood'. I agree, however, with previous observations that studies are in need of a more flexible approach (Sharkey and Faber, 2014) and that we must 'break away from the tyranny of neighbourhood' (Petrović, Manley and Van Ham, 2019). This dissertation illustrates what can be gained from more flexibility. First, by assessing the impact of ethnic diversity at different spatial levels, including the street segment, neighbourhood and district (in Dutch: *wijk*). Second, by applying so-called egohoods to research on the fear of crime. Egohoods are individualized measures of context based on a person's residential location. The boundaries of these units are drawn as concentric circles surrounding an individual (Hipp and Boessen, 2013).

For the third and last contribution, a dynamic approach has been applied to the study on feelings of unsafety. There is little research on how perceptions of neighbourhood unsafety develop over time, and even fewer studies on how potential changes can be explained (for an exception, see Skogan, 2011). Instead, most existing fear-of-crime research is based on data collected at a single point in time (Brunton-Smith and Sturgis, 2011; Collins and Guidry, 2018; Hooghe and De Vroome, 2016. The absence of longitudinal analyses is an important limitation in this field. A more dynamic approach can improve our understanding of how fear levels develop over time and therefore make us better equipped to inform policies aimed at reducing fear levels. For these purposes, I examine and explain trends in perceived neighbourhood unsafety over a 15-year period, based on data collected in the years 2003-2017. This dissertation analyzes patterns of fear and cohesion within the context of the Netherlands (**Chapter 2** and **Chapter 3**) and zooms in on the city of Rotterdam in the last two chapters (**Chapter 4** and **Chapter 5**).

The reason for focusing on the Netherlands and Rotterdam is threefold. First, the population of the Netherlands, and of Rotterdam in particular, is relatively ethnically diverse. In 2019, 23% of the Dutch population had either been born abroad or was a child of a foreign-born parent. In Rotterdam, one of the most diverse municipalities in the Netherlands, there are now more inhabitants with a migration background than with a Dutch background. These levels of diversity are likely to continue to grow as migrants originate from an increasingly diverse array of countries (Jennissen et al., 2018). It follows that the Netherlands and Rotterdam provide a relevant context in which to study diversity effects. Second, by examining feelings of unsafety among inhabitants of the Netherlands, this dissertation broadens the scope of fear-of-crime research as most existing studies have been conducted in the United States or the United Kingdom. The determinants of fear in other countries have been less frequently researched (for exceptions, see Hanslmaier, 2013; Hooghe and De Vroome, 2016).

Thirdly, the availability of detailed (geocoded) administrative register data offers unique research opportunities. In the current research, this means studying the role of residential context in more innovative ways. The data on the residential context is drawn from the System of Social Statistical Datasets (Bakker, Van Rooijen and Van Toor, 2014) and Rotterdam's Municipal Personal Records Database (in Dutch: *Basisregistratie Personen*). This dissertation is based on four empirical studies, which can be found in Chapters 2 to 5. The four chapters are structured as journal articles and can be read independently of each other. In the remainder of this first chapter, I will elaborate further on the three main research contributions and how these contributions theoretically and empirically relate to the existing literature (section 1.2). In section 1.3, the research design is discussed. The remaining sections deal with a more detailed overview of the four studies (section 1.4) and the conclusions and discussion (section 1.5).

1.2 Contributions: the role of contextual determinants, place and time

Contextual determinants of fear of crime and neighbourhood cohesion

Determinants of fear and cohesion can be found at both the individual level and the contextual level. The current research mainly focuses on contextual determinants. This does not mean that individual-level factors, such as gender, age or economic status, are less important in explaining differences in fear and cohesion. Previous studies have repeatedly demonstrated that these individual characteristics also matter. The wider residential context in which a person lives, however, is also considered to be of great importance. Given the

relevance of the wider context, numerous scholars have examined which contextual characteristics increase or decrease levels of fear and cohesion. Research on this topic has predominantly focused on socio-demographic characteristics and when examining fear, it has also addressed the role of crime (Brunton-Smith et al., 2013; Wickes et al., 2019). Based on the literature, it is possible to propose a variety of mechanisms that link certain contextual characteristics to fear and cohesion at the individual level. This section discusses the relevant mechanisms and elaborates on what the current dissertation adds to existing research. An overview of the studied contextual characteristics, mechanisms and outcomes is presented in Table 1.1. The role of ethnic diversity, crime, disorder and facilities were examined at different spatial scales. This will be further discussed in section 1.3. Although I do not explicitly address the role of residential mobility and economic disadvantage in this overview, these factors will be taken into account in the empirical analyses.

Table 1.1. Overview of contextual characteristics, mechanisms and outcomes.

Contextual characteristic	Mechanism	Studied outcome	Chapter
1. Ethnic diversity	Anomie	Cohesion and fear	Chapters 2 and 3*
2. Out-group size	Threat	Cohesion and fear	Chapter 3
3. Crime	Objective risk	Fear	All chapters
4. Disorder	Signalling community erosion	Fear	Chapters 4 and 5
5. Cohesion	Informal control	Fear	Chapter 3
6. Facilities	Public familiarity	Fear	Chapter 4

* The role of diversity is also analyzed in Chapters 4 and 5, but in these chapters it is only analyzed in relation to fear.

Following Van der Meer and Tolsma (2014), the anomie mechanism and threat mechanism are identified to explain why and how the ethnic composition of a context is related to inhabitants' level of fear and cohesion. The first mechanism considers how diversity causes feelings of anomie, which ultimately result in social isolation and fear. Anomie can be described as feelings of anxiety a person experiences as a result of a real or perceived lack of shared social norms and language in the living environment (Laméris, 2017). These feelings of anxiety and uncertainty about how to behave 'properly' cause residents to avoid social interaction and isolate themselves. In a diverse setting, it is also more difficult to interpret each other's behaviours and manners, and this may increase fear (Covington and Taylor, 1991). The second mechanism is informed by conflict theory, and specifies that a large out-group induces feelings of threat which negatively affect cohesion and perceived safety. In most existing studies, no clear distinction is made between the effect of living in diversity and of living in a context with a large out-group (for an exception, see Koopmans

and Schaeffer, 2015). This is probably because the measures of diversity and out-group size tend to overlap in practice. As a result, scholars are often unable to determine whether levels of cohesion or fear are better explained by the population's diversity level, the relative size of the out-group, or a combination of both. This has implications for studies that have empirically linked diversity to lower levels of neighbourhood cohesion (e.g. Bécares et al., 2011; Gijsberts et al., 2012; Laurence and Bentley, 2016) or more fear of crime (e.g. Covington and Taylor, 1991; Hooghe and De Vroome, 2016).[1] In **Chapter 3**, a solution is proposed to better distinguish between diversity and out-group size. It involves calculating a group-specific measure of diversity that assesses the level of diversity among members of the out-group. The overall aim is to contribute to a more precise understanding of how ethnic composition may affect social relations in the living environment. With regard to the debate on diversity effects, two additional contributions will be set out in **Chapter 2**. They relate to the questions of conditionality and timing. First, it is explored to what extent the hypothesized diversity effects on fear and cohesion are similar for both natives and non-natives. This has not been settled yet, but it can be theorized that it is likely that negative diversity effects will be less prevalent among ethnic minorities than among members of the native majority (Schaeffer, 2014). Second, it is analyzed whether diversity effects are stronger when a context has experienced a sudden increase in diversity. This issue has also been left largely unexplored as most studies assess the role of diversity based on current levels of diversity rather than changes in diversity over time (for exceptions, see Dinesen and Sønderskov, 2012; Pickett et al., 2012).

When looking at fear, four additional contextual characteristics and mechanisms are examined. The first mechanism is related to the objective crime risk and follows the logic that inhabitants feel less safe when living in an environment where crime occurs more frequently. Because these inhabitants are objectively more likely to become victimized, fear is considered a rational response in this case (Brunton-Smith and Sturgis, 2011). Various scholars have noted that empirical support for a direct link between crime and individual fear levels is rather inconsistent (Rountree, 1998; Taylor, 2001). However, the most recent studies show that residents living in a context with higher crime rates feel less safe (Breetzke and Pearson, 2014; Brunton-Smith and Sturgis, 2011; Zhao, Lawton and Longmire, 2015). To gain more insight into this relationship, I distinguish between different types of crime and use crime-related data from different sources. Different types of crimes are examined because researchers have previously argued that certain types of crime may have a stronger impact on residents' fear levels (Ferraro and LaGrange, 1987; Hooghe and De Vroome, 2016). Therefore, a distinction is made in **Chapter 3** and **Chapter 4** between the number of burglaries and of violent crimes. Besides, the majority of studies examining the

[1] This also the case in Chapter 2.

crime-fear link measure the level of crime based on police-recorded data. This is also the case in the current dissertation, except for the last chapter. In **Chapter 5**, police-recorded crime figures are used in combination with victimization rates based on survey data. Taken together, these measures provide a more accurate picture of the crime situation (Brunton-Smith and Allen, 2010).

The next mechanism links the make-up of the physical and social environment to levels of unsafety. It considers how disorder, defined as 'low-level breaches of community standards', negatively impacts safety levels (LaGrange, Ferraro and Supancic, 1992: p.312). Signs of disorder can be physical or social. The former refers to disorderly physical surroundings, and more specifically to the presence of litter, graffiti and vandalism. The latter refers to social behaviours that are considered disruptive, such as public drinking, drug use and fighting (Covington and Taylor, 1991; Ferraro, 1995). Although manifestations of disorder are not necessarily fear-triggering in themselves, they emit a signal to inhabitants that conventionally accepted norms and values are eroding and that social control is lacking. As a result, residents living in disorderly environments will feel more vulnerable to crime and hence less safe (Taylor, 2001). There is considerable empirical evidence supporting the link between disorder in the living environment and individual-level fear (e.g. Markowitz et al., 2001; Rountree and Land, 1996; Scarborough et al., 2010). Researchers employ different methods to measure disorder. Most measures are based on respondents' perceptions of disorder which are then aggregated at the contextual level. Not all scholars agree that this is the most suitable approach. The problem with this measure is that a detected effect of disorder on fear can be endogenous, meaning that fear generates perceptions of disorder rather than (or in addition to) the other way round (Brunton-Smith and Sturgis, 2011; Sampson and Raudenbush, 1999). An alternative is using independently collected observations, either through systematic social observation of public spaces (Sampson and Raudenbush, 1999) or interviewer assessments of disorder (Brunton-Smith and Sturgis, 2011). Despite the shortcomings of using respondents' assessments of disorder, some scholars consider it 'a useful and adequate measure of disorder' (Van Noord, De Koster and Van der Waal, 2018: p.76). First, because the alternative is not always feasible as it is rather costly and time-consuming. Second, studies have shown a considerable degree of correlation between this way of measuring disorder and assessments made by independent observers (Hipp, 2007; Van Noord et al., 2018). In this dissertation, both types of measures are used. In **Chapter 4**, the role of disorder is examined based on perceptions of respondents and in **Chapter 5**, I rely on independently collected observations to measure disorder.

All mechanisms considered so far have explicated how certain contextual characteristics result in increased levels of unsafety at the individual level. Largely overlooked in most studies are factors that may facilitate feelings of safety. The current research considers two types of such facilitating factors. More specifically, I explore the role of cohesion (in **Chapter 3**) and of facilities (in **Chapter 4**) in relation to fear of crime. In this way, I aim to expand knowledge on how to positively affect feelings of safety. The impact of cohesion is assessed both at the contextual level (in this chapter, the neighbourhood) and at the individual level. Drawing on the literature on collective efficacy, it is expected that inhabitants living in cohesive neighbourhoods will experience more safety. Greater cohesion enables inhabitants to take more control of what is happening in their neighbourhood, and to reduce problems related to crime and disorder (Morenoff, Sampson and Raudenbush, 2001; Sampson, Raudenbush and Earls, 1997). This leads to more people feeling safer in their neighbourhood. Only a few studies have empirically examined the link between cohesion at the contextual level and levels of fear, and their evidence is rather inconclusive (Rountree and Land, 1996; Yuan and McNeeley, 2017). The relationship between cohesion and fear at the individual level will also be addressed. At this level, cohesion is expected to either contribute to more safety or to harm feelings of safety.

The final mechanism considers how having facilities in the local environment may reduce residents' fear. It is hypothesized that local facilities promote public familiarity and therefore contribute to feelings of safety. The central idea is that facilities offer inhabitants the opportunity to meet and become familiar with each other, which may decrease fear as this makes the social environment more predictable and gives people a better idea of who they can trust (or distrust) (Blokland 2008, 2017). The societal benefits of local facilities are empirically underexplored in fear-of-crime research; only one study has examined the association between the use of facilities and fear of crime. It revealed that there was no significant relationship (Riger, LeBailly and Gordon, 1981). Several scholars have analyzed the extent to which facilities are related to other positive societal outcomes, such as reduced crime levels (e.g. Beyerlein and Hipp, 2005; Peterson, Krivo and Harris, 2000; Wo, 2016) and increased levels of social capital and cohesion (e.g. Van Bergeijk, Bolt and Van Kempen, 2008; Völker, Flap and Lindenberg, 2007; Curley, 2010; Corcoran et al., 2018). These studies confirm the hypothesis that facilities play a positive role in reducing problems.

Place and time

Most scholars researching how individual-level outcomes are shaped by the local living environment use the administrative neighbourhood as a measure of context. These studies often rely on data collected at a single point in time. Both practices limit our understanding

of how the mechanisms outlined in section 1.2.1 may operate. I aim to overcome these limitations in the following ways. First, by using different spatial units of analysis in addition to the administrative neighbourhood when researching the impact of the living environment on individuals' levels of safety and cohesion. Next, I explore what can be gained from adopting a more dynamic approach (to the study on feelings of unsafety). Scholars have become increasingly critical of using the administrative neighbourhood as the main spatial unit to study effects of the residential environment (Hipp and Boessen, 2013; Lupton and Kneale, 2012; Petrović et al., 2019). The choice to adopt administrative neighbourhoods is often without theoretical justification and is instead driven by data availability. As a result, these units can be rather meaningless if the mechanisms under study are not tested at the appropriate spatial scale. Overreliance on the administrative neighbourhood is considered problematic because of the unrealistic assumption that this single spatial unit captures all the relevant ways in which context may impact a person's life (Petrović et al., 2019). Furthermore, it is a simple measure of context that generally lacks meaningful boundaries. This is especially the case for inhabitants, especially for those living nearby an administrative neighbourhood boundary and who are therefore likely to be influenced by adjacent contexts. To study the impact of context more realistically, Sharkey and Faber (2014) propose a flexible approach in which the appropriate scale is defined on the basis of theory and evidence specific to the phenomenon being researched. **Chapter 2** and **Chapter 4** of this dissertation illustrate the advantages of bringing more flexibility into the study of cohesion and fear. Each chapter adopts its own strategy.

In **Chapter 2**, the contextual influence on neighbourhood cohesion and fear of crime is researched using different-sized administrative units, including street segments, neighbourhoods and districts. This study pays special attention to the role of ethnic diversity, and considers at which scale(s) diversity has the strongest effect on cohesion and fear. For both theoretical and methodological reasons, the expectation was that diversity effects would be stronger at a smaller scale (i.e. street segment) and weaker when assessed on a larger scale (i.e. district). Because inhabitants spend most of their time in their immediate residential surroundings, it is assumed people are more aware of the ethnic composition of relatively small areas (Öberg, Oskarsson and Svensson, 2011; Sluiter, Tolsma and Scheepers, 2015). According to this reasoning, inhabitants are more likely to be affected by diversity levels within smaller spatial units than larger ones. Methodologically, it can also be expected that zooming in will result in stronger effects. The logic is that the statistical power to detect effects increases when analyzing smaller areas because these areas tend to be more homogeneous in their characteristics. This is why 'smaller is better' according to Oberwittler and Wikström (2009: p.2). Two recent studies examining diversity effects

on trust among neighbours (Tolsma and Van der Meer, 2017) and on intra-neighbourhood social capital (Sluiter et al., 2015), however, showed the opposite. In these studies, it was found that ethnic diversity effects are generally stronger when analyzed in relatively large geographic areas.

An important limitation of studying the impact of context using administrative units is that these areas often have arbitrary boundaries, especially from the perspective of their inhabitants. To overcome this, I have introduced a more innovative way of measuring context and apply egohoods to fear of crime research (in **Chapter 4**). So far, fear-of-crime scholars have mainly used administrative neighbourhoods to research the relevance of context. In more recent contributions, researchers have also examined the role of spillover effects of neighbouring neighbourhoods (Brunton-Smith and Jackson, 2012; Barton et al., 2016; Breetzke and Pearson, 2014; Wyant, 2008). Another promising way forward is the use of egohoods. Egohoods, also called bespoke neighbourhoods, are areas in the form of concentric circles surrounding each individual inhabitant (Hipp and Boessen, 2013; Petrović et al., 2019). It is an individualized measure of context, and its size can be easily adjusted. Using egohoods instead of administrative areas has two significant advantages. First, it is expected that egohoods better align with how residents experience their local surroundings. Research has shown that inhabitants tend to travel in concentric circles within their neighbourhood area. In addition, when people are asked to define their own neighbourhood, they often place themselves in the centre of it (Hipp and Boessen, 2013). A second advantage of using egohoods is the flexibility of this approach. By adjusting the radii, a researcher can easily create larger or smaller egohoods. This flexibility may help researchers to explore which spatial scale is the most relevant to assess the influence of context on a specific outcome. In sum, the assumption is that egohoods provide a more precise way of measuring a person's context than administrative units. A disadvantage is that very detailed geocoded data are required to construct egohoods. These data are not always available or can be difficult to access because of privacy concerns. In **Chapter 4**, I construct egohoods with radii ranging from 50 to 750 m. The role of ethnic diversity, crime, disorder and facilities in relation to fear of crime are then studied in this framework.

A third and last main contribution of the current dissertation is that it empirically studies how feelings of perceived neighbourhood unsafety develop over time, and what factors explain potential shifts. There is surprisingly little research on the time dynamics of fear. Besides, the descriptive evidence that exists is rather mixed: some studies have shown that fear levels remain relatively stable over time (Ditton et al., 2000; Warr, 1995). According to Ditton and colleagues (2000), a 'criminological maxim' exists which means that 'rates of fear may climb when crime rates climb, but fail to fall when crime rates fall' (p.143). More recent contributions found that fear levels, similarly to crime levels, have decreased

(Skogan, 2011; Smeets and Foekens, 2018). Even fewer researchers have studied how to account for changes in fear levels. To my knowledge, only Skogan (2011) has both described and explained fear trends. In his study on Chicago, Skogan showed that fear levels went down 'dramatically' in the years 1994-2003 and that this decrease was best explained by declining crime rates, improved perceptions of neighbourhood conditions and an increased confidence in the police. **Chapter 5** examines fear levels among residents of Rotterdam from 2003 to 2017. The necessary data were collected by repeated cross-sectional surveys. Special attention was paid to how decreases or increases in fear are spatially distributed across the city. I also aim to explain the observed trends in fear and to consider the role of changing levels of crime, ethnic diversity and disorder. These factors were assessed at the spatial level of the administrative neighbourhood. This chapter also illustrates the difficulties that can be encountered when analyzing survey data over a considerable period of time and shows how to deal with these issues.

1.3 Research design

Data

The empirical chapters of this dissertation rely on survey data drawn from two different sources: the Dutch Safety Monitor (**Chapter 2** and **Chapter 3**) and the Rotterdam Safety Index (**Chapter 4** and **Chapter 5**).[2] In both surveys, respondents are asked about their crime-related feelings of unsafety and victimization experiences. In the first two empirical chapters, I use the Safety Monitor 2014 (N = 86,382). Because the Safety Monitor is based on a representative sample of the Dutch population (aged 15 years and older) it is a suitable source for studying ethnic diversity effects across the entire Netherlands. Another advantage of the Safety Monitor is that the questionnaire contains items on both fear of crime and neighbourhood cohesion. The two last chapters rely on waves of the Rotterdam Safety Index. The analyses in **Chapter 4** are based on the Safety Index 2015 (N = 14,620). For the last chapter, 11 waves of the Safety Index were combined into one dataset, covering the years 2003 to 2017 (N = 148,344). The Rotterdam Safety Index proved to be a very suitable tool for studying the role of place and time in relation to feelings of unsafety. The municipality of Rotterdam provided unique access to the geocoded residential location of the respondents (for the 2015 wave), making it possible to construct egohoods. In addition, because the survey has already been conducted for many years, I was able to analyze trends in feelings of unsafety over a 15-year period.

[2] From 2008-2012, the Rotterdam Safety Index was part of the Dutch Safety Monitor. In the years before and after, both surveys existed and continue to exist independently of each other.

To analyze the role of context, I enriched the survey data with administrative register data. The Safety Monitor was used in combination with non-public individual register data (microdata), drawn from the System of Social Statistical Datasets (SSD). Access to the SSD was granted by Statistics Netherlands. For the last two chapters, the necessary administrative data were provided by the research department of the municipality of Rotterdam, Research and Business Intelligence (OBI). More detailed information on the administrative data can be found in the specific chapters.

Operationalizations

Neighbourhood cohesion and fear of crime are the two main concepts and dependent variables of this dissertation. Neighbourhood cohesion is defined as the ability of residents to live together. It relates to aspects such as feelings of solidarity, a shared sense of belonging, forms of social interaction and the absence of conflict. To measure neighbourhood cohesion, I constructed a five-point scale based on the following items: *people in this neighbourhood socialize pleasantly; I live in a cosy neighbourhood where people help each other out and do things together*; *I feel at home with the people living in this neighbourhood*; *I have a lot of contact with other neighbours; people in this neighbourhood hardly know each other*; and *I am satisfied with the population composition of the neighbourhood* (answer categories: completely agree, agree, neither agree nor disagree, disagree, and completely disagree). In this dissertation, fear of crime is characterized as the feelings, thoughts and behaviours people have regarding their subjective risk of becoming a victim of crime. There is considerable debate in the literature on the most appropriate method of measuring fear of crime, but there is no clear consensus. Skogan (1996) identified at least four different ways of measuring fear. The first three measurements are cognitive in nature and relate to people's concerns about crime (concern), their perceived risk of becoming a crime victim (risk) and their beliefs as to whether they will be harmed when exposed to risk (threat). The fourth operationalization focuses on forms of behaviour, specifically on whether people exhibit avoidance behaviour. In chapters 2 through 4, I rely on a combination of elements related to risk, threat and avoidance behaviour to measure fear of crime.[3] The main concept of the last chapter is 'perceived neighbourhood unsafety'. It is measured based on a question asking respondents whether they ever feel unsafe in their neighbourhood and, if so, how often (answer categories: seldom or never; occasionally; frequently), resulting in a four-point scale. For the operationalization of the different contextual determinants, I refer to Table A1.1 in the Appendix or to the specific chapters.

[3] Chapter 2 and Chapter 3: respondents were asked how often they do not answer the door during evening hours; avoid certain areas in their neighbourhood, feel unsafe walking in their neighbourhood or being home alone during the evening, and are afraid of being victimized. Chapter 4: respondents were asked how often they do not answer the door during evening hours; avoid certain areas in their neighbourhood, feel unsafe walking in their neighbourhood or being home alone during the evening, and are afraid of being victimized. Answer categories: seldom or never, occasionally, and frequently.

Analytical strategies

The empirical chapters rely on multiple regression to assess the impact of the different contextual variables on individual perceptions of fear of crime and neighbourhood cohesion, while at the same controlling for relevant individual-level characteristics. The adopted analytical strategies will be discussed in more detail in the following paragraphs. An overview is provided in Table 1.2. In **Chapter 2**, I present the results of two linear multilevel models with random slopes. The first model predicts levels of fear of crime and the second model estimates levels of neighbourhood cohesion. Both models consist of three levels: the individual / street segment level, the neighbourhood level and the district level. Street-level characteristics are considered as individualized measures of context and are therefore included at the individual level. The two models include cross-level interactions to determine whether and to what extent ethnic diversity effects (on fear or cohesion) depend on a person's ethnic background. A distinction is made between Dutch natives and Dutch non-natives.[4] In **Chapter 3**, the impact of ethnic diversity and other contextual factors on fear and cohesion are assessed at the neighbourhood level. Only native respondents were selected for this study. To analyze all potential relationships, I rely on multilevel structural equation modelling (random intercepts, fixed slopes) and distinguish between two levels: the individual (within) level and the neighbourhood (between) level. A multilevel structural equation model is the most appropriate to test whether perceptions of cohesion mediate the relationship between ethnic diversity and fear (Preacher, Zyphur and Zhang, 2010; Preacher, Zhang and Zyphur 2011). Mediation will be assessed at the between level. In **Chapter 4**, I employ two different ways of measuring the local residential context: one based on (administrative) neighbourhoods and one based on egohoods, with radii ranging from 50 to 750 m. For the analysis relying on neighbourhood-level data, I estimated a two-level linear multilevel model (random intercept, fixed slope). Ordinary least-squares (OLS) models were estimated for the analyses based on egohoods. The analytical strategy adopted in **Chapter 5** consists of two steps. First, I visualized the relative change in perceived neighbourhood unsafety scores across neighbourhoods in Rotterdam. The second step involved the estimation of three linear multilevel models consisting of four levels, taking into account that respondents are nested in neighbourhoods, years and neighbourhood-years. This enabled me to control for all possible statistical dependence (Schmidt-Catran and Fairbrother, 2016). So-called splines were included in the analyses in order to model the dimension of time and to take into account that the trend line of perceived unsafety is not linear. To ensure that the changes observed in the models are 'real' and not an artefact of survey methodology, the analyses control for the different survey modes used across the waves because changes in the survey mode may affect the outcome under study.

[4] Natives are defined as people who were born in the Netherlands and whose parents were both born in the Netherlands.

Table 1.2. Overview of the four chapters.

	DV	Contextual IV	Survey data	Spatial level(s)	Models
Chapter 2	Fear of crime Cohesion	Ethnic diversity Δ in ethnic diversity Registered crime Econ. disadvantage	Dutch Safety Monitor 2014 (N = 86,382)	Street segments, neighbourhoods, districts	Multilevel models with cross-level interactions
Chapter 3	Fear of crime Cohesion	Ethnic diversity Out-group size Registered crime Cohesion Econ. disadvantage	Dutch Safety Monitor 2014 (N = 71,760, only natives)	Neighbourhoods	Multilevel structural equation models
Chapter 4	Fear of crime	Ethnic diversity Registered crime Disorder Facilities Econ. disadvantage Residential mobility	Rotterdam Safety Index 2015 (N = 14,620)	Neighbourhoods, egohoods	Multilevel and Ordinary Least-Squares models
Chapter 5	Perceived neighbourhood unsafety	Ethnic diversity Registered crime Victimization rates Disorder Econ. disadvantage Residential mobility	Rotterdam Safety Index 2003-2017 (N = 148,344)	Neighbourhoods	Multilevel models with splines

1.4 Summary of the empirical chapters

All four empirical chapters of this dissertation address how and in what ways the residential context shapes individual perceptions of fear of crime (**Chapter 2**, **Chapter 3**, **Chapter 4** and **Chapter 5**) and of neighbourhood cohesion (specifically **Chapter 2** and **Chapter 3**). In the following subsections, I will summarize the findings of each separate chapter in more detail.

Chapter 2 – The Street Level and Beyond: The impact of ethnic diversity on neighbourhood cohesion and fear of crime among Dutch natives and non-natives

This chapter examines the effects of ethnic diversity on both neighbourhood cohesion and fear of crime. The 'traditional' Herfindahl-Hirschman-Index (HHI) is used to calculate diversity levels.[5] The impact of diversity is assessed at three different spatial levels: street segments, neighbourhoods and districts (all administratively defined). In addition, it is considered whether the potential diversity effects are moderated by a person's ethnic background and how changes in diversity levels over time affect levels of cohesion and

[5] The HHI represents the probability that two randomly selected individuals within the same context are from a different ethnic background. Its value varies between zero (total homogeneity) and one (total heterogeneity).

fear. I find that higher levels of ethnic diversity within streets and neighbourhoods are related to less neighbourhood cohesion. The ethnic composition of the larger district unit is unrelated to a person's level of cohesion. These findings show that the diversity effects on neighbourhood cohesion tend to be localized. There is, however, no clear evidence that the impact of diversity on cohesion is larger when assessed at the smallest level (i.e. street segment). The observed diversity effect on neighbourhood cohesion is in line with the findings of most previous research on this relationship (Bécares et al., 2011; Gijsberts et al., 2012; Laurence and Bentley, 2016; Scheepers, Schmeets and Pelzer, 2013).

As for fear, significant diversity effects are detected across all three spatial scales. Again, there is no consistent evidence that the diversity effect becomes stronger when the association between diversity and fear is analyzed in a smaller unit. The current study is one of the first to empirically address and find a diversity effect on fear in a local European context (see also Hooghe and De Vroome, 2016). Regarding the conditionality of the observed diversity effects, the findings indicate that diversity affects Dutch natives and non-natives largely in the same way. Aside from some small differences, the observed diversity effects on fear and cohesion do not differ much by ethnic background. Regarding the timing of diversity effects, no empirical support was found for the oft-held assumption that (sudden) changes in diversity levels are better able to explain differences in fear or cohesion than 'static' levels of diversity; the indicator measuring change in diversity levels over a five-year period was not significantly related to either fear or cohesion. In addition to changing levels of ethnic diversity, the role of crime and economic disadvantage was also taken into account at the contextual level. It was shown that economic disadvantage – at specific levels – reduces neighbourhood cohesion and feelings of safety. It was also found that people feel more unsafe in neighbourhoods and districts where more burglaries are registered.

Chapter 3 – Estimating Diversity Effects in the Neighbourhood. On the role of ethnic diversity and out-group size and their associations with neighbourhood cohesion and fear of crime

In this chapter, I aim to further improve our understanding of how and why ethnic neighbourhood composition affects individual levels of fear and neighbourhood cohesion. This involves simultaneously testing the role of ethnic diversity and out-group size. In order to do so, a modified measure of the HHI was calculated, based on the level of diversity among members of the out-group (see also Koopmans and Schaeffer, 2015). As a result, it is possible to determine whether levels of cohesion or fear are better explained by the population's diversity level or rather the relative size of the out-group. The relationships were analyzed for native Dutch only. I also examine more closely the association between

neighbourhood cohesion and fear of crime, both at the individual level and neighbourhood level. I find that the hypothesized negative diversity effect is most consistently found in relation to neighbourhood cohesion. Research shows that levels of cohesion are lower in neighbourhoods with more diversity. The analyses do not support the expectation that native inhabitants living in more ethnically diverse neighbourhood report more fear (thereby altering the findings of the previous chapter). The relative size of the out-group turned out to be related to both less cohesion and more fear.

As for the relationship between cohesion and fear, two opposing patterns were observed: at the individual level, more neighbourhood cohesion is weakly related to experiencing more fear. This finding supports the idea that local social ties may elevate fear levels because inhabitants who are socially integrated in the neighbourhood are more exposed to crime-related news and stories (Boessen et al., 2017; Covington and Taylor, 1991). At the neighbourhood level, higher levels of cohesion are associated with less fear. This is in line with the literature suggesting that inhabitants living in cohesive neighbourhoods are more likely to use informal means to control their neighbourhood, which then positively affects levels of safety in the neighbourhood. The included control variables at the neighbourhood level indicate that economic disadvantage is related to lower cohesion levels but not to more fear. In addition, it is shown that inhabitants living in neighbourhoods with more registered burglaries and violent crimes feel less safe.

Chapter 4 – Going Spatial: Applying egohoods to fear of crime research

This chapter analyzes fear of crime patterns among inhabitants of Rotterdam and examines how fear levels are affected by the residential context. Two different ways of measuring context were used: the first approach relies on administrative neighbourhoods and the second, more innovative, approach relies on egohoods. In total, six different-sized egohoods were constructed with radii ranging from 50 to 750 m. The expectation is that egohoods offer a more precise and meaningful way of measuring context, which will empirically result in stronger contextual effects on fear (when compared to analysis based on the administrative neighbourhood). It is hypothesized that fear can be affected by the following contextual characteristics: crime; economic and demographic factors (including ethnic diversity, economic disadvantage and residential mobility); disorder and facilities.

I find that, with the exception of residential mobility, all included contextual characteristics are in some way related to the level of fear. The results also demonstrate that the contextual effects are not observed at every spatial scale, suggesting that the role context plays depends on the spatial unit being studied (cf. Hipp, 2007). In addition, the strength of the observed contextual relationships differs from scale to scale. For instance, the effects

of ethnic diversity and economic disadvantage on fear are stronger when analyzed in relatively large egohoods. A potential explanation is that in smaller areas, inhabitants are more familiar with each other. This local sense of familiarity may lessen the negative impact of diversity and economic disadvantage. As for disorder, the opposite is the case: the effects of fear on disorder seem to be more 'localized', indicating that disorder is more likely to affect the perceptions of residents who live close by. This may be because inhabitants tend to be more aware of disorderly things happening in their immediate surroundings than those located further away (Hinkle and Weisburd, 2008). The effect sizes of crime and facilities lack a clear pattern. It was also shown that, contrary to expectations, the number of facilities is related to *more* fear instead of less. This finding indicates that the mere presence of facilities does not bring down unsafety levels. A last important outcome of the current study is that, compared to the different-sized egohoods, the administrative neighbourhood proved to be the least relevant context in which to study the contextual impact on feelings of unsafety; it is the context in which the least significant contextual effects were detected. The most significant relationships between context and fear were observed in the smallest egohood with a 50 m radius.

Chapter 5 – Crime is Down and so is Fear? Analyzing resident perceptions of neighbourhood unsafety, from 2003 to 2017

In this chapter, I analyze and explain trends in perceived neighbourhood unsafety within the municipality of Rotterdam. The analyses conducted in this study examine how changes in the amount of crime, economic status, level of ethnic heterogeneity, degree of residential mobility and presence of disorder in the neighbourhood play a role in how unsafe inhabitants have felt in a period of 15 years. In addition, it was observed how increases and decreases in fear levels are distributed across the different neighbourhoods. The trend line describing the share of inhabitants who sometimes feel unsafe in their neighbourhood shows that it is best to divide the years 2003-2017 into three different periods. A different trend was observed in each period. Between 2003 and 2007, the figures show a steady decrease in the level of fear (Period 1). During this period, a 'fear drop' seemed to emerge. However, from 2007 to 2008, an abrupt *in*crease in fear was observed (Period 2). In the last period, 2008-2017, the level of fear more or less stabilized and only a small decrease was observed over these years (Period 3). The next aim was to determine whether the observed changes in the trend line were significant and, if so, how they could be accounted for. The analyses showed that the significant drop in fear observed in Period 1 was best explained by increases in economic status and decreases in victimization rates and disorder. I found that the role of registered crime levels was only limited. It was also shown that the abrupt increase in Period 2 was most likely an effect of switching survey modes and using more

self-administered surveys (i.e. mail and internet) instead of interviewer-administered surveys (i.e. phone and face-to-face) and not because neighbourhood conditions had suddenly worsened. Once the survey mode had been taken into account, the increase observed in Period 2 was no longer significant. In Period 3, no significant change in fear levels was detected, suggesting that a period of stabilization had begun.

1.5 Conclusions and discussion

The main goal of this dissertation was to contribute to the literature on neighbourhood cohesion and fear of crime. I have empirically assessed the role of different contextual determinants of cohesion and fear. Within these studied relationships, the focus was on the dimensions of space and time. The advancements made in this dissertation can be summarized in the following four ways. First, **Chapter 2** and **Chapter 3** have extended our knowledge on the social consequences of living in a society in which a decreasing number of inhabitants share a common ethnic background (Dinesen, Schaeffer and Sønderskov, 2020). I find that this development can affect both levels of neighbourhood cohesion and fear of crime. Most previous research has focused on determining the impact of ethnic diversity on various aspects of social cohesion (Van der Meer and Tolsma, 2014). To gain a better understanding of why the ethnic composition of the residential environment may impact levels of fear and cohesion, I argue that it is necessary to make a distinction between the level of ethnic diversity present in a context and the relative size of the out-group. In this way, it can be theorized whether decreasing levels of cohesion and perceived safety are better explained by the anomie mechanism (i.e. diversity) or by the threat mechanism (i.e. out-group size). Failing to do so will prevent the diversity debate from moving forward. By constructing a group-specific diversity measure, it was ensured that both dimensions were also empirically distinct. The results suggest that the threat mechanism is most likely to operate in relation to levels of fear and of cohesion. Support for the anomie mechanism was restricted to cohesion. These findings illustrate that it is useful to measure concepts such as diversity in a more precise way because it helps us to understand under which conditions ethnic composition influences cohesion and fear. In most previous studies, scholars have failed to do so (for an exception, see Koopmans and Schaeffer, 2015).

Secondly, this dissertation, and in particular **Chapter 4** and **Chapter 5**, has further advanced the debate on how the residential context influences individual levels of fear of crime. Until recently, there were 'important ambiguities' about whether and how characteristics of the wider residential environment influence fear of crime (Barton et al., 2016; Brunton-Smith and Sturgis, 2011: p.333). Traditionally, scholars have focused on the extent to which crime levels explain variation in fear levels. Most studies have only found weak associations

between fear and neighbourhood levels of crime (Brunton-Smith and Jackson, 2012; Rountree, 1998). The findings of this dissertation show that various contextual factors contribute to explaining levels of fear. In addition to crime-related indicators, other relevant characteristics include ethnic composition, economic status, amount of disorder, presence of facilities and perceived neighbourhood cohesion. This clearly suggests that fear of crime is a product of the wider environment and that there are several pathways through which context affects individual levels of unsafety. In fact, employing mainly independent measures of context ensured that the observed effects were not endogenous. Despite the relevance of context, it should not be overlooked that fear is also determined by processes at the individual level. For instance, a meta-analysis conducted by Collins (2016) showed that gender and previous experiences of victimization are more powerful predictors of fear of crime than any neighbourhood-level factor that was included in this analysis.

Moving beyond the administrative neighbourhood and exploring other ways of conceptualizing and measuring the residential context is considered the third advancement made by this research. Two alternatives were explored: the first relied on using different administrative units (in **Chapter 2**) and the second involved constructing so-called egohoods (in **Chapter 4**). Not surprisingly, it was found that the hypothesized effects of context on cohesion and fear were also observed within spatial units other than the administrative neighbourhood. In addition, the results showed that the administrative neighbourhood, although often used in research, was not necessarily the most relevant unit for detecting contextual effects. This suggests that the importance of context for individual outcomes partly depends on the spatial level at which the relationship is examined. A more complete picture of what effects are observed at which spatial level may increase our understanding of the mechanisms behind these effects (Lupton and Kneale, 2012). Egohoods can be considered a promising research strategy in this context. Because the size of these units can be adjusted flexibly, it is easy to zoom in and zoom out and to test mechanisms at different scales. Fortunately, the creation of egohoods has become more feasible in recent years because of the increased availability of highly-detailed geocoded data (Petrović et al., 2019). As moving beyond the administrative neighbourhood may increase our understanding of the importance of context with regard to individual-level outcomes, I agree with Sharkey and Faber (2014) that 'residential context' and 'residential environment' are the preferred terms here (instead of 'the neighbourhood').

Finally, **Chapter 5** has improved our knowledge on how fear of crime develops over time. It was observed that the over-time dynamics of fear are largely understudied, and that there is even less research on how to account for potential changes in fear levels. The analyses conducted for this chapter provide the following insights. I found that observed

trends in feelings of unsafety may differ from period to period. In the 15 years analyzed for this study, there were both periods of decline (2003-2007) and of relative stabilization (2009-2017). This demonstrates that fear levels can fall as well as climb (Ditton et al., 2000) and that in order to gain a better understanding of such developments, a relative long-time frame is required. When comparing survey answers over time, special attention needs to be paid to changes in survey mode and whether these changes have affected or compromised the comparability of the results. The findings of the current study also refute the unsubstantiated claim that is sometimes made, that fear levels are continuing to rise despite falling crime rates (Lub and De Leeuw, 2017; Valente, Valera and Guàrdia Olmos, 2020). The last main finding of this chapter is that the decrease in fear observed in the years 2003-2007 is best explained by changes in disorder, economic status and victimization rates and not in registered crime.

Based on the advancements made in this dissertation, I aim to inform policy in at least three ways. The results of this study prove that in residential environments where the share of out-group and the level of ethnic diversity is higher, it becomes more complicated to develop social ties and to create a space where inhabitants feel safe. Obviously, these involve developments that policymakers should be aware of. At the same time, we need to keep in mind that ethnic composition is only one of the factors associated with individual levels of fear and cohesion. I would argue, nevertheless, that it is important to invest in social relations in these areas in order to counter such developments. In addition, research has shown that positive contact may help to reduce prejudice between groups (Hayward et al., 2017; Laurence, Schmid and Hewstone, 2018). I therefore recommend that policymakers invest in a well-maintained public space that encourages encounters (Blokland, 2008) and facilitate or support the creation of meeting places as it has been empirically established that using facilities contributes to a feeling of community and belonging (Corcoran et al., 2018; Curley, 2010; Van Bergeijk et al., 2008; Völker et al., 2007).

The second policy recommendation is based on the finding that crime is just one of the contextual characteristics associated with increased levels of fear. It follows that, when the aim is to reduce levels of unsafety, it is insufficient to only fight crime. A fear-reducing policy should also aim at improving economic status, reducing the level of disorder and increasing the level of neighbourhood cohesion in an area. The municipality of Rotterdam has already put considerable effort into creating neighbourhoods that are clean, well-maintained and, as a result, safe. It is recommended that these efforts are continued. In addition, I agree with Schuilenburg and colleagues that policies aimed at increasing perceptions of safety could benefit from adopting a more positive approach towards this issue (Schuilenburg, Van Steden and Oude Breuil, 2014; Schuilenburg, Schoenmakers and Van Zanten, 2017).

Part of this approach involves implementing measures to increase a sense of belonging instead of taking additional repressive measures which may be counterproductive. What is also important to recognize is that fear may also be functional as it can motivate individuals to take action and feel safer as a result. In this case, fear may serve as a 'healthy precaution' (Jackson and Gray, 2010).

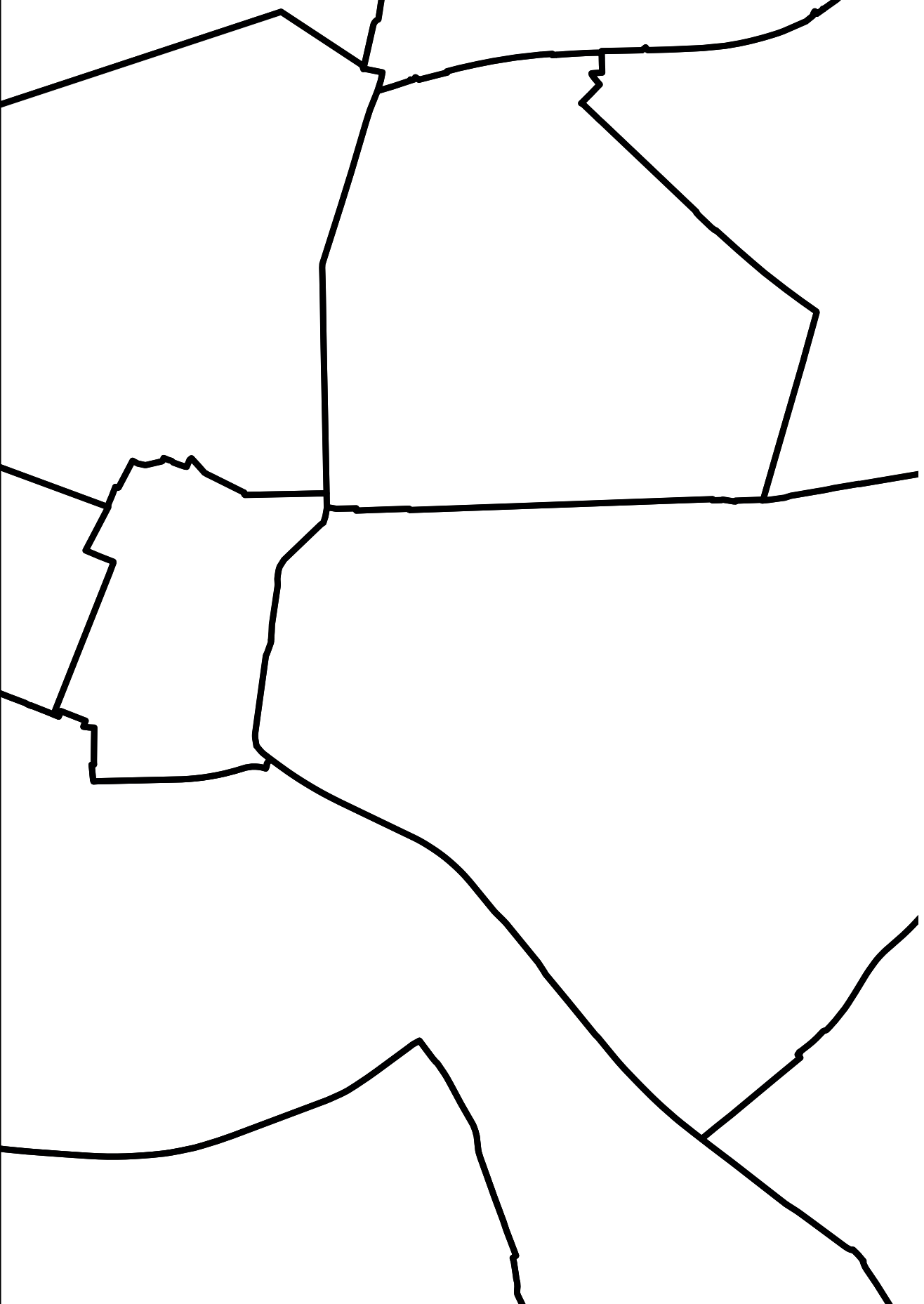
Thirdly, this dissertation may have implications for adopting the administrative neighbourhood as the most relevant spatial scale for government interventions aimed at solving social problems related to unsafety and liveability. By critically examining different ways of measuring context, the current research supports the notion that not all problems that occur within a neighbourhood should be addressed at this scale. It advocates against the fixation on the neighbourhood as the most appropriate scale of intervention (Van Steenbergen et al., 2017). What scale is appropriate depends on the problem that needs to be solved and the proposed policy. Flexibility is required. For instance, when the aim is to improve levels of perceived safety by creating a clean and well-maintained public space, it is recommended to zoom in and target specific hotspots of disorder.

Notwithstanding the contributions of this dissertation, there are two main limitations that must be addressed. The first limitation is that the studies relied on cross-sectional data. As a result, causal claims cannot be made. Assuming a causal effect from cross-sectional findings can be problematic, mainly because of selection-bias processes. When associations are driven by selection bias, observed differences in cohesion or fear levels are not a product of contextual factors – as assumed – but rather of the differential selection of certain individuals into particular residential environments. In the latter case, the observed ethnic diversity effect on cohesion is, for instance, a consequence of diversity having increased in areas where cohesion levels were already lower (Laurence and Bentley, 2016). Longitudinal data are therefore the preferred way forward in future research. The second limitation is related to the generalizability of the conclusions and the practices that may have affected this, mainly due to issues related to data availability (or lack thereof). In **Chapter 3**, for instance, the effects of out-group size and diversity on cohesion and fear are only studied among Dutch natives. A substantial part of the Dutch population has been excluded, limiting the generalizability of the findings and leaving open the question of whether the results of this chapter also apply to inhabitants with a migration background. Besides, the analyses conducted in **Chapter 4** and **Chapter 5** were based on survey data collected only among inhabitants of Rotterdam. Although I did not rely on a nationwide sample in these chapters, my expectation is that the observed patterns in this study are not necessarily restricted to Rotterdam.

Appendix

Table A1.1. Operationalization of contextual determinants.

	Chapter 2	Chapter 3	Chapter 4	Chapter 5
Ethnic diversity	- HHI_{18}	- Group-specific HHI_{17}	- % non-Western minorities	- HHI_9
Δ in ethnic diversity	- Relative change in % of non-Western minorities in 2009-2014			
Out-group size		- % out-group		
Crime	- Registered burglaries	- Registered burglaries - Registered violent crimes	- Registered burglaries - Registered violent crimes	- Registered number of selected crime incidents - Burglary victimization rate - Violent crime victimization rate
Disorder			- Self-reported perceptions	- Systematic observations
Cohesion		- Self-reported perceptions		
Facilities			- Number of facilities	
Residential mobility			- Average length of residence	- Average length of residence (dummies)
Econ. disadvantage	- Index of % low-income households, average income, % household relying on social security	- Index of % low-income households, average income, % household relying on social security	- Average housing value	- Index of average income, % of low-income households, average housing values



Chapter 2

The Streel Level and Beyond: The impact of ethnic diversity on neighbourhood cohesion and fear of crime among Dutch natives and non-natives

This chapter is co-authored by Godfried Engbersen and Erik Snel. A slightly different version of this chapter has been published as Glas, I., Engbersen, G., and Snel. E. (2019). The street level and beyond: The impact of ethnic diversity on neighbourhood cohesion and fear of crime among Dutch natives and non-natives. *Journal of Urban Affairs, 41(6),* 737-755.

2.1 Introduction

The population of Western countries is becoming increasingly ethnically diverse (Crul, 2016; Meissner and Vertovec, 2015) and, as a consequence, an increasing number of people reside in ethnically diverse neighbourhoods and streets. Ethnic diversity in the residential environment may lead to more mutual understanding between ethnic groups and a greater tolerance toward diversity (e.g. Townley et al., 2011; Wessendorf, 2014). Alternatively, researchers have argued that living in an ethnically heterogeneous environment may have certain negative consequences for its inhabitants. This chapter focuses primarily on the latter. Negative effects of diversity include declining levels of social cohesion and rising levels of fear of crime. The claim that ethnic diversity harms cohesion has attracted widespread scholarly interest following the introduction of Putnam's (2007) 'constrict hypothesis'. According to this hypothesis, ethnic diversity in the living environment challenges social solidarity and reduces social trust among all ethnic groups. The assumed detrimental effect of diversity on cohesion has been studied frequently, resulting in mixed findings (for overviews, see Portes and Vickstrom, 2011; Van der Meer and Tolsma, 2014). Overall, the various studies tend toward the conclusion that ethnic diversity has negative effects on neighbourhood-related indicators of cohesion in particular, but not on other dimensions of cohesion, such as generalized trust and citizen participation (Morales, 2013; Van der Meer and Tolsma, 2014). There is still no consensus as to why and under which circumstances diversity leads to a deterioration in neighbourhood relations (Koopmans, Lancee and Schaeffer, 2014).

In addition to lower levels of cohesion, ethnic diversity is considered to be associated with a second negative consequence: increased levels of fear of crime. This line of reasoning suggests that living in close proximity to ethnic others induces fear (Merry, 1981). Research on ethnic diversity and fear of crime has been conducted almost exclusively in the American context (Chiricos, Hogan and Gertz, 1997; Covington and Taylor, 1991; Moeller, 1989; Pickett et al., 2012). The relationship between these variables is under-researched in the European context of diversity. To my knowledge, only one study has explicitly analyzed the association between ethnic diversity and fear of crime (among Belgian natives) at a local European level (Hooghe and De Vroome, 2016). This lack of research is surprising because feelings of unsafety experienced by residents of ethnically mixed neighbourhoods are a major social and political issue in a range of Western European countries, including Sweden, France, Great Britain and the Netherlands, which is the focus of this study (Müller and Fischer, 2015). Ethnic diversity and the extent to which it affects social cohesion or fear of crime are generally studied separately; scholars focus either on cohesion or on fear of crime. These negative outcomes of diversity can, however, be explained by similar

mechanisms (Van der Meer and Tolsma, 2014). Accordingly, I will examine both cohesion and fear of crime and their associations with ethnic diversity. The overall aim of this study is to refine our understanding of the two diversity effects. I will use data from the Dutch Safety Monitor 2014 (N = 86,382) in combination with individual-level register data from Statistics Netherlands. Respondents to the Safety Monitor are recruited from all over the Netherlands, and live in areas with varying levels of ethnic diversity. In total, approximately 80% of all districts (in Dutch: *wijken*) and around 60% of neighbourhoods are included in the survey. On an index from zero (total homogeneity) to one (total heterogeneity), these contextual units have an average diversity level of approximately 0.30.

This chapter aims to contribute to previous research in the following three ways. First, I will analyze whether the associations between ethnic diversity and the two outcome variables – neighbourhood cohesion and fear of crime – are the same for both Dutch natives and non-natives. Although this issue is not entirely unexplored (e.g. Lancee and Dronkers, 2011; Tolsma, Van der Meer, and Gesthuizen, 2009), scholars generally assume that the effect of diversity – especially on cohesion – is negative for both natives and non-natives (Demireva and Heath, 2014). It has also been common practice for researchers to study the consequences of diversity based on samples composed only of native respondents. This has nevertheless led to generalizations on the effect of diversity in societies at large (Bécares et al., 2011). It is, however, reasonable to expect that diversity effects are contingent on ethnic background: for the native majority more diversity translates to living with fewer co-ethnics. For minorities, the reverse holds true (Schaeffer, 2013). Living with similar others may contribute to neighbourhood cohesion and generate feelings of safety. I will therefore examine to what extent diversity effects on neighbourhood cohesion and fear of crime are moderated by ethnic background, distinguishing between respondents with and without a migration background.

Second, I will explicitly consider which spatial scales are the most appropriate for studying diversity effects. Instead of focusing on one specific context, I will simultaneously assess the relationship between ethnic diversity on the one hand and neighbourhood cohesion and fear of crime on the other hand at three spatial levels: districts, neighbourhoods and street segments. Although it is still unusual to include multiple contextual levels in the same analysis, such a 'multi-scale approach' is considered to be more appropriate for researching contextual effects (Boessen and Hipp, 2015). The more common approach – looking exclusively at diversity within neighbourhoods – ignores the potential eroding effect of ethnic diversity at lower or higher spatial levels. Omitting these levels may also result in overestimating the role of ethnic diversity at the neighbourhood level and, consequently, to misleading research conclusions (Opdenakker and Van Damme, 2000). In

addition, the street segments provide a unique opportunity to assess the extent to which ethnic diversity in the micro-context (e.g. Dinesen and Sønderskov, 2015) is associated with neighbourhood cohesion and feelings of safety and to examine whether the effects of diversity are the strongest within smaller contexts. The final contribution is that I further explore the conditions under which diversity has negative consequences by including a time dimension. More specifically, a dynamic measure of ethnic diversity will be added to the analyses to capture changes in the level of diversity. Rather than solely relying on a 'static' measure of ethnic diversity, I will also consider how rapidly a context's level of ethnic heterogeneity has changed. The underlying argument is that recent increases in ethnic diversity are more disruptive to cohesion and feelings of safety than stable levels of diversity (Pickett et al., 2012; Schaeffer, 2014).

To sum up, this research examines two specific consequences of ethnic diversity and aims to obtain a more nuanced understanding of how diversity is related to fear of crime and neighbourhood cohesion. More specifically, I investigate 1) to what extent diversity effects are moderated by ethnic background; 2) at which spatial level diversity effects are most prevalent and 3) to what extent rapid increases in ethnic diversity are related to less neighbourhood cohesion and more fear of crime.

2.2 Theoretical framework

The current study builds primarily on literature that centres on the downsides of living in a diverse residential context. This literature suggests that ethnic homogeneity – as opposed to ethnic diversity – fosters cohesion and feelings of safety. In the next section, two mechanisms are presented that explain why diversity deteriorates neighbourhood cohesion and generates feelings of unsafety. Local communities may, however, also benefit from diversity. I will briefly elaborate on these positive diversity effects. The beneficial consequences of diversity are often explained with reference to Allport's (1954) contact hypothesis, which posits that interethnic contact fosters social trust and solidarity between groups by diminishing stereotypes. Building on this hypothesis, community psychologists have suggested that inhabitants of diverse settings are more likely to develop respect for or tolerance towards diversity because ethnically diverse environments offer more opportunities for contact with diverse others (Neal and Neal, 2014; Townley et al., 2011). In addition, ethnographic research conducted by Wessendorf (2014) shows that interactions between different ethnic group members can lead to mutual understanding and the acceptance of difference, especially in superdiverse contexts where there are no majorities. It appears that whether diversity is considered as potentially beneficial or harmful to a local community depends on the phenomena under study. Because of the

focus on neighbourhood cohesion and fear of crime, this study is more likely to find negative diversity effects. I will now expand on the two mechanisms which may underlie these effects.

Anomie, social disorganization and threat

Since the introduction of Putnam's (2007) constrict hypothesis, numerous scholars have examined the supposed negative effect of diversity on social cohesion and a range of related phenomena within various countries, including the United States, Great Britain and the Netherlands. In contrast, the relationship between ethnic (or: racial) composition and fear of crime has mainly been studied in the context of American neighbourhoods. To explain the detrimental consequences of diversity, Van der Meer and Tolsma (2014) have explicated two mechanisms – the anomie mechanism and the threat mechanism – that are likely to underlie the negative diversity effects. The anomie mechanism emphasizes how diversity and its different facets – in terms of linguistic diversity and diversity in social norms – cause feelings of anxiety and uncertainty among inhabitants of ethnically diverse environments. Consequently, residents avoid interaction and socially isolate themselves from their co-residents. When an environment is increasingly perceived as being unfamiliar, feelings of insecurity will also increase, in the same way that the ability to interpret and order an environment improves feelings of safety (e.g. Blokland, 2008). In an 'orderly' environment, inhabitants know who to trust and what to expect. Disorder, by contrast, signals the loss of such control. In these environments, residents will feel more vulnerable and thus more fearful (Covington and Taylor, 1991).

The logic of the anomie mechanism shares similarities with social disorganization theory. Of particular importance in this regard is the work of Shaw and McKay (1942) who identified three structural factors, one of which is ethnic heterogeneity, which lead to the disruption of community social organization and, ultimately, to increases in crime and delinquency rates.[6] The theory suggests that ethnic diversity hinders communication and interaction among inhabitants, thereby thwarting communities' ability to maintain social order and to control delinquent and other forms of deviant behaviour. Shaw and McKay (1942) refer primarily to 'urban areas' or 'local communities' when discussing the forces of social disorganization. More recent formulations of social disorganization theory have introduced the concept of collective efficacy in order to improve our understanding of why crime rates vary within cities. Collective efficacy refers to the process of activating or converting social ties among neighbourhood residents in order to achieve collective goals, such as control over crime (Sampson, 2010). Research has shown that inhabitants are more willing to take collective action in contexts that are perceived as socially cohesive. This relationship is

[6] The other two factors are residential instability and economic deprivation.

particularly strong in ethnically homogeneous neighbourhoods (Collins, Neal and Neal, 2016). Differences in collective efficacy are considered a major source of variation in crime, over and beyond structural characteristics of a neighbourhood (Sampson, 2010). When collective efficacy is reduced, or inhabitants experience it as such, fear of crime might also increase. Greenberg (1986) labels this perspective the 'social-control model' of fear of crime. Environments that are seen as being unpredictable, unfamiliar and beyond the control of oneself or one's community may generate a sense of disquiet and, ultimately, a feeling that 'anything could happen' (Jackson, 2009). In such an unpredictable context, feelings of safety and neighbourhood cohesion are negatively affected.

The second mechanism is mainly inspired by conflict theory and proposes that ethnic diversity fosters competition between ethnic groups for scarce resources, such as jobs and housing and non-material resources, such as morality and identity (Van der Meer and Tolsma, 2014). This real or perceived state of competition and conflict translates into feelings of threat. Originally, this argument was primarily about an in-group versus an out-group and how the settlement of the latter group spurs competition between these groups while simultaneously improving solidarity within a group (Blalock, 1967; Quillian, 1995). The presence of minority groups is also associated with feelings of threat among the native majority and is therefore considered as a determinant of fear of crime (De Hooghe and Vroome, 2016). In the case of diversity and in the light of the constrict hypothesis, it is expected that living in close proximity to ethnic others results in generalized negative effects – both within and between the different groups. A possible explanation might be that diversity intensifies the processes of competition and threat; the more 'dissimilarity' in people's direct surroundings, the more inhabitants feel that their status and habits are under threat (Scheepers, Schmeets and Pelzer, 2013). These processes will result in general feelings of hostility and uncertainty, ultimately causing fear of crime and hesitation to mingle with others.

Previous studies testing Putnam's constrict hypothesis have concluded that ethnic diversity is consistently associated with only certain components of social cohesion and, more specifically, with neighbourhood-related indicators of cohesion (Morales, 2013; Van de Meer and Tolsma, 2014). British studies in particular have found that higher levels of ethnic diversity in a neighbourhood is related to a lower level of neighbourhood cohesion (Bécares et al., 2011; Laurence and Bentley, 2016; Twigg, Taylor and Mohan, 2010). A similar picture emerges when we consider the outcomes of Dutch research that primarily examined the effect of ethnic heterogeneity on forms of citizen participation, generalized or interethnic trust, and, most frequently, indicators related to neighbourhood cohesion. These results show that the frequency of contact with neighbours is particularly negatively influenced by ethnic diversity (Gijsberts, Van der Meer and Dagevos, 2012; Scheepers et al., 2013; Tolsma

et al., 2009; Völker, Flap, and Lindenberg, 2007). Other dimensions of cohesion, such as trust or volunteering, seem to be unaffected by ethnic diversity (Lancee and Dronkers, 2011; Tolsma et al., 2009). It appears that the relationship between diversity and cohesion depends on the components under study. Moreover, based on a replication of Putnam's original analysis, Abascal and Baldassarri (2015) argued that the association Putnam found between diversity and generalized trust is spurious as levels of trust are better explained by individual differences and contextual economic disadvantage. Other scholars have shown that the association between ethnic diversity and contact disappears after controlling for the ethnicity of the neighbour an inhabitant may have contact with (Tolsma and Van der Meer, 2018).

In American studies on the relationship between ethnic diversity and fear of crime, diversity is generally equated with the actual or perceived proportion of African American residents (Chiricos et al., 1997; Covington and Taylor, 1991; Moeller, 1989; Pickett et al., 2012) and, to a lesser extent, Hispanics (Eitle and Taylor, 2008). Results indicate that the (perceived) racial composition in the living environment is associated with fear of crime. In particular, white residents living in a 'black' neighbourhood are more likely to experience fear, presumably because whites stereotypically associate the presence of black residents with violence and crime (Pickett et al., 2012; Quillian and Pager, 2001). Key to this hypothesis is the concentration of minority groups (in this case, of black residents), *not* the level of diversity. In the European context, cross-national research has shown that higher levels of fear of crime are reported when inhabitants describe their neighbourhood as having a lot of migrants (Semyonov, Gorodzeisky and Glikman, 2012). The actual size of the migrant population at the country level is, however, unrelated to fear of crime and feelings of safety in the neighbourhood (Semyonov et al., 2012; Visser, Scholte and Scheepers, 2013). More recently, Hooghe and De Vroome (2016) concluded in their study on fear of crime in Belgian communities that the actual level of non-European Union nationals in municipalities – rather than the perceived composition – is positively related to fear of crime among Belgian natives.

The role of ethnic background

With few exceptions, scholars in the European context either tend to assume that the hypothesized effects of diversity are similar for both the native majority and ethnic minorities (e.g. Gijsberts et al., 2012; Scheepers et al., 2013; Völker et al., 2007) or only study the effects among native respondents (e.g. De Hooghe and Vroome 2016; Dinesen and Sønderskov, 2015; Sluiter, Tolsma, and Scheepers, 2015; Tolsma and Van der Meer, 2017).[7] It is, however, reasonable to expect that the effects of living in diversity will vary

[7] Putnam (2007) acknowledges that the impact of diversity is 'definitely greater among whites'. At the same time, he writes that the effect of diversity 'is visible as well among non-whites' (p. 54). No empirical evidence is provided for these claims.

depending on whether or not an individual is a native. For members of the native majority, living in a highly-diverse area means living among fewer co-ethnics and more minorities. For non-natives, high diversity tends to translate into living with other minorities and their co-ethnics (Schaeffer, 2013). Because people are more likely to interact with similar others (McPherson, Smith-Lovin, and Cook, 2001), it is expected that negative diversity effects are less prevalent among ethnic minorities. To investigate this possibility, I will examine whether the effects on neighbourhood cohesion and fear of crime are moderated by ethnic background.

A multi-scale approach

In addition to distinguishing between different ethnic backgrounds, a 'multi-scale' approach was adopted (e.g. Boessen and Hipp, 2015) with the aim of producing a more complete and interdependent understanding of diversity effects by including three different spatial levels (street segments, neighbourhoods, and districts) in the same model. In previous research, scholars have often relied on neighbourhoods to measure residential context. Perceptions of unsafety and neighbourhood cohesion, however, do not necessarily align with how neighbourhoods are administratively defined. These perceptions may also be affected by processes operating at lower or higher spatial scales. Because larger and smaller contexts have been added to the analysis, I was able to examine at which spatial scale ethnic diversity has the strongest effect on neighbourhood cohesion and fear of crime. The ways in which aggregation affects the results under study is a familiar issue in spatial statistics and is known as the modifiable areal unit problem (MAUP) (Oberwittler and Wikström, 2009).

For theoretical and methodological reasons, I expect stronger diversity effects at a smaller spatial scale. Theoretically, it is often assumed that the negative effects of ethnic diversity are most pronounced in smaller contexts (Putnam, 2007) because people spend most of their free time in their immediate residential surroundings (Öberg, Oskarsson and Svensson, 2011). Inhabitants might thus be more aware of the ethnic composition of smaller contexts (Sluiter et al., 2015). Consequently, it is expected that streets and neighbourhoods reflect people's daily experiences with ethnic heterogeneity more accurately than larger contexts, such as districts. Researchers have frequently tested diversity effects within the context of neighbourhoods because the neighbourhood is in most cases the smallest unit of analysis available (for recent exceptions, see Dinesen and Sønderskov, 2015; Tolsma and Van der Meer, 2017). The data of this study, however, allow me to examine the relationship on an even smaller scale: street segments (six position postal codes), which in most cases represent one street or one side of a street. For methodological reasons it is also preferable to zoom in on smaller units of aggregation when studying contextual effects (Oberwittler

and Wikström, 2009). At a smaller spatial level, areas tend to be more homogeneous in their structural characteristics. Increased homogeneity within these smaller contextual units will be reflected in enhanced statistical power to detect contextual effects (Hipp, 2007).[8] When data are analyzed at a higher level of aggregation – lumping areas with different levels of diversity together – more subtle diversity effects will be rendered insignificant because the degree of spatial homogeneity has been watered down. This inconsistency, caused by using different scales of aggregation is known as the scale problem, one of the sub-problems of the modifiable areal unit problem (Wong, 2009).

Given these theoretical and methodological considerations, I expect that the negative effects of ethnic diversity will be larger at a smaller level (i.e. the street segment) and weaker in larger contexts. These expectations are in line with the findings of Dinesen and Sønderskov's (2015) study on the relationship between ethnic diversity and social trust, showing that ethnic diversity in the micro-context – measured by an 80 m radius around a respondent – is most strongly related to social trust. Although the diversity effects are more likely to be pronounced at the street segment and neighbourhood levels, I expect that the two outcome variables will also be affected by diversity in the larger district context. In two recent studies on intra-neighbourhood social capital and trust in neighbours respectively, Dutch scholars observed that the impact of diversity is not necessarily stronger at a smaller spatial scale (Sluiter et al., 2015; Tolsma and Van der Meer, 2017). Considerable diversity effects were also found in spatial units larger than the neighbourhood, suggesting that it is not only the smaller neighbourhood context that matters. Because people's daily activities generally take place in relatively large areas, ethnic diversity effects may be also detected in larger spatial contexts (Boessen and Hipp, 2015).

Changes in ethnic diversity

Lastly, I consider the role of 'dynamic' ethnic diversity (i.e. increases or decreases in diversity in a certain period of time) compared to 'static' levels of diversity (i.e. the level of diversity in a specific year). This approach makes it possible to examine the role of changing levels of ethnic diversity under the constrict hypothesis. Other researchers have argued that such a time dimension should be included when testing the constrict hypothesis (Hooghe et al., 2009; Schaeffer, 2014). The underlying argument is that rapid increases in diversity generate more threat, social disorganization and anomie than stable levels of heterogeneity. It might even be the case that these increases, as opposed to stable levels of ethnic diversity, drive down social cohesion and erode neighbourhood ties. Most research on the constrict hypothesis has, however, focused on current levels of diversity rather than

[8] It should be noted that homogeneous contexts could refer to heterogeneous characteristics, in this case ethnic diversity. Contexts could thus be 'homogeneously heterogenic' within their area boundaries (Oberwittler and Wikström, 2009: p.56).

on changes in diversity over time. Although some cross-national studies include dynamic measures of ethnic diversity (Gesthuizen, Van der Meer and Scheepers, 2009; Hooghe et al., 2009; Kesler and Bloemraad, 2010), these measures are rarely applied in within-country studies (for exceptions, see Dinesen and Sønderskov, 2012; Schaeffer, 2014). The same holds for research on fear of crime (for an exception, see Pickett et al., 2012).

Hypotheses

I derive four hypotheses from the theoretical framework:

Hypothesis 1: In contexts with more ethnic diversity, people experience less neighbourhood cohesion (1a) and more fear of crime (1b).
Hypothesis 2: Ethnic diversity has a stronger effect on neighbourhood cohesion for natives than for non-natives (2a). The same holds for fear of crime (2b).
Hypothesis 3: Ethnic diversity has a stronger effect on neighbourhood cohesion in smaller contexts (3a). The same holds for fear of crime (3b).
Hypothesis 4: In contexts where there are rapid increases in ethnic diversity, people experience less neighbourhood cohesion (4a) and more fear of crime (4b).

Other determinants of neighbourhood cohesion and fear of crime

Ethnic diversity and changing levels of diversity are obviously not the only determinants of neighbourhood cohesion or fear of crime. There is a considerable amount of literature on other individual and contextual factors that may explain differences in cohesion and fear of crime. Rather than discussing all of these determinants at length, I will examine a selection. As for cohesion, some scholars consider economic disadvantage – rather than diversity – as the key element undermining neighbourhood relations. Research has shown that deprivation damages the sense of community; being disadvantaged and living in a disadvantaged environment undermines the willingness to interact and engage socially, thereby decreasing the sense of belonging (Laurence, 2011; Letki, 2008). Because ethnically diverse areas also tend to be the more disadvantaged areas, it is crucial to take a context's level of deprivation into account. The same holds for deprivation at the individual level.

The incidence of crime and individual differences regarding age, gender, ethnicity, and economic status are considered relevant predictors of fear of crime. Although the linkage between crime and fear of crime lacks consistent empirical support (Rountree, 1998), research has provided evidence for a relationship between crime and fear of crime (Breetzke and Pearson, 2014; Ferraro and Grange, 1987). The individual determinants relate to what is known as the vulnerability hypothesis, which aims to explain why certain groups

of individuals – the elderly, women, ethnic minorities, members of the lower class – report relatively high levels of fear without being victimized more often. The hypothesis posits that these groups feel more unsafe because they see themselves as being more physically or socially vulnerable to victimization (Brunton-Smith and Sturgis, 2011; Eitle and Taylor, 2008).

2.3 Research design

Data

I draw on data from the Safety Monitor 2014 and Statistics Netherlands. The Safety Monitor is a survey on crime-related feelings of insecurity and victimization. Its sample is drawn from the municipality population register. In total, 86,382 respondents (38.8% of the total sample) completed the self-administered questionnaires, either online (47.9%) or through a written questionnaire (52.1%).[9] Because I want to track diversity levels over a five-year period, I only include those respondents who live in districts and neighbourhoods for which the diversity levels are available in the years 2009-2014. There are 67,446 respondents who meet this criterion. The smaller sample size can be explained by the frequent changes to how districts and neighbourhoods are categorized, making it difficult to compare diversity scores across time. The selected respondents reside in 2136 districts, 7080 neighbourhoods and 67,446 street segments. The data of the Safety Monitor were merged with non-public individual register data (microdata) from Statistics Netherlands. Access to microdata is granted under specific conditions.[10] The register data contain the ethnicity of all Dutch inhabitants and information on the economic situation of all Dutch households. The crime rate and changes in ethnic diversity were also derived from Statistics Netherlands and are publicly available at the district and neighbourhood levels.

Operationalizations

In the analyses, two outcome variables are distinguished: neighbourhood cohesion and fear of crime. The former is measured through a set of six items. These items include the following: *people in this neighbourhood hardly know each other; people in this neighbourhood socialize pleasantly*; *I live in a cosy neighbourhood where people help each other out and do things together*; *I feel at home with the people living in this neighbourhood*; *I am satisfied with the population composition of the neighbourhood*; and *I have a lot of contact with other neighbours* (answer categories: agree completely, agree,

[9] Statistics Netherlands (2015). Veiligheidsmonitor 2014. Retrieved from download.cbs.nl/pdf/ veiligheidsmonitor-2014.pdf (accessed July 7, 2020).

[10] Statistics Netherlands (2017). Catalogue of services Microdata services 2018. Retrieved from www.cbs.nl/-/media/_pdf/2017/48/171201%20services%20catalogue%202018.pdf (accessed July 7, 2020).

neither agree nor disagree, disagree and disagree completely). The first item – *people in this neighbourhood hardly know each other* – was recoded to ensure that a higher score corresponds to a more positive view on the neighbourhood. A factor analysis indicated that all six items load onto a single factor (for details, see the Appendix). The six items also appear to form a unidimensional scale, accounting for 59.77% of the variance. The scale is based on the average of at least four valid answers and is internally consistent with a Cronbach's α of 0.86.

There has been considerable debate on the appropriate operationalization of fear of crime. Although there is no clear consensus on its measurement, scholars agree that fear of crime is a multidimensional concept (Brunton-Smith and Sturgis, 2011; Ferraro and Grange, 1987). The current measure of fear of crime combines three different dimensions and focuses on elements related to behaviour, threat and risk (Skogan, 1996). More specifically, I constructed a scale consisting of five items. Respondents were asked how often they do not answer the door during evening hours; avoid certain areas in their neighbourhood; feel unsafe walking in their neighbourhood or being home alone during the evening; and are afraid of being victimized (answer categories: seldom or never, occasionally and frequently). A factor analysis resulted in one single factor (for details, see Appendix). The items also proved to form a unidimensional and internally coherent scale, explaining 52.91% of the variance with a Cronbach's α of 0.85. The fear of crime scale represents the average of at least three valid answers. A higher score on the scale indicates more fear of crime.

To measure the static level of ethnic diversity, a Herfindahl-Hirschman-Index (HHI) was constructed for each context based on its ethnic composition in 2014. The HHI represents the probability that two randomly selected individuals within the same context are from a different ethnic background. Its value varies between zero (total homogeneity) and one (total heterogeneity). Most Dutch researchers measure diversity either by the percentage of non-Western migrants or an HHI based on the proportion of seven different groups (e.g. Gijsberts et al., 2012; Lancee and Dronkers, 2008) or less (e.g. Vervoort, Flap and Dagevos, 2011). The current study uses a more fine-grained measure of diversity and distinguishes between 18 different categories in order to do full justice to a context's level of diversity. The categorization is a geo-linguistic classification, predominantly based on language and religion and refined with information on the political system of the country of origin (Jennissen et al., 2018).[11] The dynamic measure of ethnic diversity captures the changes in diversity over a five-year period. An individual regression slope was estimated for each

[11] I distinguish between people from Anglo-Saxon countries; German-speaking countries; Scandinavian countries; Mediterranean countries; Middle and Eastern Europe; Arab countries; Latin America; sub-Saharan Africa; South Asia; Central Asia; Southeast Asia and the Pacific; East Asia; former Dutch colonies (Surinam and former Netherlands Antilles); Belgium; Indonesia; Morocco; the Netherlands; and Turkey.

neighbourhood and district, based on the level of diversity in the years 2009, 2010, 2011, 2012, 2013 and 2014 (Pfister et al., 2013). Due to data limitations, this measure is based on the proportion of non-Western migrants and is not available at street level.[12]

Several control variables are included at the contextual level. To measure the degree of economic disadvantage, an index was constructed that combines the percentage of low-income households, the average income of the context, and the percentage of households for which social security is the main source of income (e.g. Vervoort, 2012). Before constructing the index, the distribution of average income was reversed and all indicators were standardized. Lastly, the mean of the standardized indicators was calculated. To control for crime, I have included the registered number of reported burglaries. This variable represents the incidence of burglary per 1000 members of the population in 2014 in a neighbourhood and district and is included in the analysis on fear of crime. Due to data restrictions, it is not possible to control for the incidence of burglary within street segments. I also control for a range of variables at the individual level. The individual control variables are age (in decades), gender, education level, presence of children in the household, whether social benefits are the main source of income, ethnicity and income level. In the analysis on fear, I also control for burglary victimization. This variable is self-reported and is measured by asking respondents whether they have been victims of burglary during the last five years. The descriptive statistics for all variables are presented in Table 2.1. Missing values are either included as dummy variables (education level, social benefits, ethnicity, income level and burglary victimization) or deleted listwise (other variables).

Defining contexts

I have included the following contextual units in the analyses: 1) street segments, 2) neighbourhoods and 3) districts. These administratively defined areas vary considerably in population size. Districts are, in terms of both size and population, the largest entity that is distinguished in this study. The average population size of a district in the Netherlands is 6157 inhabitants. Dutch districts are subdivided into several neighbourhoods, which have an average size of 1400 inhabitants. Street segments (or six position postal codes) are the smallest contexts I distinguish. This spatial unit represents in general a part of a street and has on average only 40 inhabitants.

Analytical strategy

In order to take into account the nested structure of the data, I carried out linear multilevel regression analyses with random slopes. Street segment variables were included at the

[12] Non-Western minorities are defined as those who are born in or who have at least one parent who was born in Africa, Latin America or Asia (including Turkey). Because the share of non-Western minorities tends to correlate strongly with the HHI, researchers sometimes rely on the share of this group to measure ethnic diversity (e.g. Scheepers et al., 2013; Sluiter et al., 2015).

individual level because the values of these variables are unique to each respondent.[13] To determine whether all contextual levels should be included in the models, three different intercept-only (or: null) models were estimated and compared for both neighbourhood cohesion and fear of crime.[14] I decided to estimate three-level models as these models proved to have the best fit for both outcome variables. This suggests that the multi-scale approach is necessary. The intraclass correlations (ICCs) were calculated on the basis of the three-level intercept-only models. The ICC indicates how much variation in the respondents' answers can be attributed to each contextual level. The ICC values indicate that only a low proportion of the variance can be attributed to the contextual levels. More specifically, the proportion of variance attributed to the neighbourhood and district levels for neighbourhood cohesion is 0.08 and 0.04 respectively. For fear of crime, the ICC values differ between 0.05 (district level) and 0.01 (neighbourhood-level). Because multilevel models are designed to analyze variables from different levels and their interactions simultaneously (Hox, 1995), multilevel modelling was considered the preferred method for analyzing the nested data.

To test the four hypotheses, it was necessary to estimate two models: one model to predict neighbourhood cohesion and a second model to predict fear of crime. I added cross-level interactions to these models in order to analyze whether and to what extent potential diversity effects are different for natives and non-natives. To avoid problems of collinearity, not all hypothesized cross-level interactions could be included simultaneously in the same model but only a selection. I started with a base model that included all individual and contextual variables, but no interaction terms. For the final model, I grand-mean centred the ethnic diversity variables and followed a stepwise procedure. As a criterion of entry and removal of the interaction terms, I used the significance of the parameter estimates ($p < 0.05$). The order of introduction was determined by improvement in model fit (e.g. Tolsma et al., 2009). For the final two models, I investigated the presence of multicollinearity using variance inflation factors (VIFs). The resulted VIFs were under or around 10, which is considered acceptable (Finch, Bolin, and Kelley, 2014).

2.4 Results

The descriptive statistics are presented in Table 2.1. The table shows that the average level of cohesion is 3.44 (on a scale ranging from one to five) and the average fear level is 1.27 (on a scale from one to three). I also examined to what extent native and non-native

[13] The street level characteristics are individualized measures of context and are therefore included at the individual level. These individualized contexts of small size are considered 'a promising avenue for further research' (Dinesen and Sønderskov, 2015: p.565). Because the street segments are not treated as a separate contextual level, I do not need to worry about having too few respondents per street segment.

[14] Specification of the three models: 1. Individual and neighbourhood; 2. Individual and district; 3. Individual, neighbourhood and district. The models were compared based on their AIC and BIC values, assuming that lower values indicate a better model fit (Finch et al., 2014).

respondents differ in their cohesion and fear scores. It appeared that natives experience slightly more cohesion and a little less fear when compared to non-native respondents.[15] Independent sample *t*-tests indicated that the differences in cohesion and fear levels are significant ($p < 0.001$). The results presented below are based on the final multilevel

Table 2.1. Descriptive statistics for individual and contextual variables.

	Min.	Max.	Mean	SD
Neighbourhood cohesion	1	5	3.44	0.73
Fear of crime	1	3	1.27	0.41
Age in decades	1.5	10.3	5.14	1.81
Gender (ref. = male)	0	1	0.52	
Education				
Low (= ref.)	0	1	0.31	
Middle	0	1	0.28	
High	0	1	0.32	
Children (ref. = none)	0	1	0.41	
Social benefits main income source (ref. = yes)	0	1	0.92	
Ethnicity				
Dutch (= ref.)	0	1	0.83	
Western	0	1	0.09	
Moroccan	0	1	0.01	
Turkish	0	1	0.03	
Surinamese and Antillean	0	1	0.03	
Other non-Western	0	1	0.03	
Income				
First quintile (= ref.)	0	1	0.13	
Second quintile	0	1	0.21	
Third quintile	0	1	0.20	
Fourth quintile	0	1	0.21	
Fifth quintile	0	1	0.23	
Victim of burglary (ref. = not)	0	1	0.13	
Street segment				
Ethnic diversity	0	0.90	0.31	0.23
Economic disadvantage	-9.05	14.65	-0.01	0.54
Neighbourhood				
Ethnic diversity	0	0.88	0.36	0.21
Economic disadvantage	-4.50	5.63	0.01	0.83
Burglary	0	230	5.51	3.39
Δ ethnic diversity	-15	9.37	0.15	0.56
District				
Ethnic diversity	0	0.84	0.37	0.21
Economic disadvantage	-3.98	4.25	0.05	0.93
Burglary	0	47.62	5.55	2.89
Δ ethnic diversity	-5.31	7.46	0.15	1.28

[15] More specifically, the average cohesion scores differ between 3.48 (natives) and 3.27 (non-natives) and average fear of crime levels between 1.25 (natives) and 1.38 (non-natives).

regression models including individual variables, contextual variables and a selection of cross-level interactions. I will first discuss to what extent the measures of ethnic diversity affect neighbourhood cohesion and fear of crime and to what extent the diversity effects are moderated by ethnicity. The role of changing levels of diversity will also be addressed. The results of the control variables are briefly discussed in the final section.

Ethnic diversity and neighbourhood cohesion

Table 2.2 shows the results of the multilevel regression model predicting neighbourhood cohesion. I find that more diversity at the street level and neighbourhood level is associated with less cohesion. More specifically, an increase of 10% points of diversity at the street level decreases cohesion for non-natives by 0.045 (b = -0.452 × 0.10) and for natives by 0.057 (b = (-0.452 + -0.121) × 0.10). At the neighbourhood-level, non-natives and natives experience respectively 0.035 (b = -0.348 × 0.10) and 0.058 (b = (-0.348 + -0.231) × 0.10) less cohesion if diversity increases by 10% points. The composition of the larger district unit is unrelated to cohesion. This finding seems to prove that 'small is better' (e.g. Oberwittler and Wikström, 2009): in the two smaller areas, significant diversity effects are detected. These diversity effects disappear at the larger aggregation scale. Hypothesis 1a, which predicted lower levels of cohesion in contexts with more ethnic diversity, is thus supported within the two smallest contextual units. In line with Hypothesis 2a, it is shown that the diversity effects on cohesion are significantly stronger for natives than for non-natives. This outcome suggests that inhabitants without a migration background are slightly more affected by ethnic diversity. More specifically, native respondents living in the most ethnically diverse streets and neighbourhoods experience 0.121 and 0.231 less cohesion respectively (measured on a five-point scale) compared to non-native respondents, confirming Hypothesis 2a in neighbourhoods and streets.

Table 2.2. Multilevel linear regression analyses of neighbourhood cohesion.

	B SE
Contextual levels	
Street segment	
Ethnic diversity	-0.452 (0.048) ***
Ethnic diversity * natives	-0.121 (0.052) *
Economic disadvantage	-0.002 (0.005)
Neighbourhood	
Ethnic diversity	-0.348 (0.073) ***
Ethnic diversity * natives	-0.231 (0.053) ***
Economic disadvantage	-0.055 (0.009) ***

Table 2.2. Continued.

	B SE
Δ ethnic diversity	-0.009 (0.008)
District	
Ethnic diversity	0.118 (0.060)
Economic disadvantage	0.002 (0.009)
Δ ethnic diversity	-0.015 (0.014)
Individual level	
Age in decades	0.018 (0.002) ***
Gender (ref. = male)	0.000 (0.005)
Education (ref. = low)	
Middle	-0.003 (0.007)
High	0.004 (0.007)
Children (ref. = none)	0.117 (0.006) ***
Social benefits main income (ref. = yes)	0.058 (0.012) ***
Ethnicity (ref. = Dutch)	
Western	-0.014 (0.009)
Moroccan	0.148 (0.034) ***
Turkish	0.123 (0.026) ***
Surinamese and Antillean	-0.009 (0.019)
Other non-Western	0.028 (0.019)
Income (ref. = lowest)	
Second quintile	0.034 (0.010) ***
Third quintile	0.050 (0.010) ***
Fourth quintile	0.054 (0.010) ***
Fifth quintile	0.085 (0.010) ***

N 65,898
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

For both groups, I hypothesized that the diversity effects on cohesion would be larger at a smaller spatial scale. No consistent evidence was found for this third hypothesis. For non-natives, a slightly larger effect of diversity was found at the street level. For natives, however, the opposite is the case. Consequently, Hypothesis 3a is not fully supported. I also considered whether the dynamic indicator of diversity, which captures changes in diversity during a five-year period, is associated with less cohesion. I find that increases in diversity within neighbourhoods and districts are unrelated to neighbourhood cohesion. Hypothesis 4a, predicting a negative relationship between increases in diversity and cohesion, is thus rejected.

Ethnic diversity and fear of crime

Regarding the effects of ethnic diversity on fear of crime, Table 2.3 shows that diversity measured at the level of the street, neighbourhood and district is related to more fear of crime. Hypothesis 1b – more diversity results in more fear – is thus supported in all spatial contexts. More specifically, an increase in diversity of 10% points within streets and districts is accompanied by 0.006 more fear (for streets: $b = 0.063 \times 0.10$ and for districts: $b = 0.064 \times 0.10$). At the neighbourhood level, the impact of diversity is slightly larger: in neighbourhoods with 10% points more diversity, non-natives experience 0.023 ($b = 0.233 \times 0.10$) more fear and natives 0.015 ($b = (0.233 + -0.079) \times 0.10$).

A significant cross-level effect between diversity and ethnicity was detected within neighbourhoods. The interaction shows that the diversity effect is slightly less prevalent for native respondents, indicating that non-natives are more affected by neighbourhood diversity than their native counterparts. When living in the most ethnically diverse neighbourhoods, native respondents experience 0.079 less fear (measured on a three-point scale) compared to non-native respondents. I hypothesized, however, that the diversity effect on fear would be larger for native respondents. It follows that Hypothesis 2b does not hold: non-natives' feelings of safety are not less affected by diversity, even though more diversity for this group implies living with more co-ethnics and other ethnic minorities. In addition, I find no evidence for the third hypothesis, which predicted a larger diversity effect in the street context and weaker effects in the larger neighbourhood and district contexts. Instead, it is shown that the strongest effect of diversity is found within neighbourhoods, leaving Hypothesis 3b unconfirmed. I also have to reject Hypothesis 4b, which predicted a positive relationship between increases in diversity and fear. There are, however, no significant effects of the dynamic measure of diversity.

Table 2.3. Multilevel linear regression analyses of fear of crime.

	B SE
Contextual levels	
Street segment	
Ethnic diversity	0.063 (0.011) ***
Economic disadvantage	0.007 (0.003) *
Neighbourhood	
Ethnic diversity	0.233 (0.034) ***
Ethnic diversity * natives	-0.079 (0.019) ***
Economic disadvantage	0.019 (0.005) ***
Δ ethnic diversity	0.000 (0.004)
Burglary	0.002 (0.001) ***

Table 2.3. Continued.

	B SE
District	
Ethnic diversity	0.064 (0.031) *
Economic disadvantage	-0.001 (0.004)
Δ ethnic diversity	0.005 (0.007)
Burglary	0.006 (0.001) ***
Individual level	
Age in decades	0.003 (0.001) **
Gender (ref. = male)	0.146 (0.003) ***
Education (ref. = low)	
Middle	-0.032 (0.004) ***
High	-0.073 (0.004) ***
Children (ref. = none)	-0.027 (0.004) ***
Social benefits main income (ref. = yes)	-0.058 (0.006) ***
Ethnicity (ref. = Dutch)	
Western	-0.007 (0.005)
Moroccan	-0.011 (0.014)
Turkish	0.047 (0.014) **
Surinamese and Antillean	0.064 (0.011) ***
Other non-Western	0.013 (0.009)
Income (ref. = lowest)	
Second quintile	-0.013 (0.005) *
Third quintile	-0.041 (0.006) ***
Fourth quintile	-0.059 (0.006) ***
Fifth quintile	-0.071 (0.006) ***
Victimization experience (ref. = yes)	0.181 (0.004) ***

N 63,378
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Control variables

Table 2.2 reveals that various control variables are significantly associated with neighbourhood cohesion. Older residents and respondents who are part of a household with children score higher on the neighbourhood cohesion scale. This finding also holds for respondents belonging to higher income groups (compared to the lowest income group). Gender and a person's level of education are unrelated to cohesion. A statistically significant association between cohesion and receiving social benefits was also reported, indicating that those who do not depend on social benefits experience more cohesion. Respondents with a Moroccan or Turkish background also report higher levels of cohesion. The contextual control variable economic disadvantage only decreases cohesion at the level of the neighbourhood.

Several control variables are also significantly related to fear of crime (Table 2.3). Fear of crime is higher among older respondents, women, victims of burglary, and those who rely on social benefits. In contrast, highly-educated respondents and those with a higher income or with children in the household experience less fear of crime. Respondents with a Turkish and Surinamese background also report higher fear levels. These findings seem to confirm the hypothesis that vulnerable groups in particular feel unsafe. As for the associations between the contextual control variables and fear of crime, there are significant effects of economic disadvantage and crime at specific spatial levels. Deprivation at the two lowest levels (street and neighbourhood) increases fear of crime. Lastly, the number of reported burglaries is a relevant predictor of fear of crime within districts and neighbourhoods.

2.5 Discussion and conclusion

Numerous scholars have recently examined the negative effects of living in an ethnically diverse environment. Following Putnam's constrict hypothesis, most research has focused on outcomes related to social cohesion. This chapter researched the effects of diversity on both neighbourhood cohesion and fear of crime. Using both the multi-scale approach and time span of five years enabled me to provide a nuanced understanding of the role of ethnic diversity. The results demonstrate that ethnic diversity aggregated at specific spatial levels is associated with less neighbourhood cohesion and more fear of crime. The first finding seems to confirm that ethnic diversity causes people to withdraw from social life. I also show that the consequences of diversity are not limited to the deterioration of cohesion: fear of crime may also be affected by diversity. This study is one of the first to empirically address the relationship between ethnic diversity and fear of crime in a local European context. The results suggest that the hypothesized mechanisms of threat and anomie are applicable to both neighbourhood cohesion and feelings of unsafety.

Another main finding of the current study is that similar patterns are observed for both native and non-native respondents. These outcomes are once more in line with the constrict hypothesis, which predicts an overall negative effect of diversity for all inhabitants, regardless of ethnicity. I did, however, find some slight differences in the degree to which the two groups of respondents are negatively affected by diversity. Natives living in diverse streets and neighbourhoods experience slightly less cohesion when compared to non-natives. The impact of neighbourhood diversity on fear is, in contrast, larger for non-natives than for natives. The direction of the studied relationships, however, does not differ according to ethnic background. It seems that, to a large extent, all respondents react in similar ways to ethnic diversity. The idea that the impact of diversity is less prevalent for non-natives because diversity for this group is accompanied by more familiarity – in the

form of co-ethnics or other minorities – is thus not fully supported, probably because inhabitants with a migration background have become a highly diverse group themselves (Jennissen et al., 2018).

In contrast to most previous research, I also explicitly examined the role of spatial scale by employing a multi-scale approach. By taking into account the micro-context (streets) as well as larger contexts (neighbourhoods and districts), I was able to demonstrate which contextual characteristics operate at which spatial scale. Most importantly, it was found that ethnic diversity at the street and neighbourhood levels decreases cohesion, whereas fear is affected by diversity within streets, neighbourhoods and districts. The effects of diversity on cohesion seem to be more localized than the relationship between diversity and fear of crime.

This study also showed that decreases or increases in ethnic diversity at the level of the neighbourhood and district were unrelated to neighbourhood cohesion and fear of crime. This outcome can be interpreted in multiple ways. A possible explanation is that current levels of ethnic diversity in these contexts are apparently better able to explain differences in neighbourhood cohesion and fear of crime than sudden increases or decreases over the past five years. Another possibility is that, to better capture the dynamics of 'time', a shorter (or longer) time period should be examined. Schaeffer (2014), for instance, considered increases in diversity during a two-year period and found a negative association between these increases and social cohesion.

In addition to static and dynamic measures of ethnic diversity, other contextual variables were included in the analyses. In line with other research, the findings indicate that economic disadvantage – at specific levels – reduces cohesion and feelings of safety (Laurence, 2011; Tolsma et al., 2009). I also found evidence that people feel more unsafe in neighbourhoods and districts with a higher burglary rate. These findings demonstrate that fear of crime is not entirely an 'irrational' response, unrelated to the objective crime threat (Brunton-Smith and Sturgis, 2011).

Despite the relevance of 'context', the role of contextual characteristics in explaining differences in neighbourhood cohesion and fear of crime should not be exaggerated as individual characteristics provide a better explanation of these differences. It emerged that victims of burglary and vulnerable groups in particular feel unsafe. Vulnerable persons are those who feel physically vulnerable, such as females and the elderly, and inhabitants who feel socially vulnerable because they lack the means to reduce the likelihood of victimization (Eitle and Taylor, 2008). Inhabitants with lower education and income levels and those who rely on social benefits are considered socially vulnerable. In contrast to this,

the presence of children in a household is related to less fear and more cohesion. This may be because children bring their parents into more consistent contact with their neighbours and the community, creating more familiarity between inhabitants (Hipp, 2009). Higher levels of cohesion are also reported among older inhabitants, a finding that is in line with previous research (Lancee and Dronkers, 2011; Tolsma et al., 2009). Lastly, having a lower income and receiving social benefits are related to less cohesion. This may be because those groups lack the means to move to a neighbourhood of their choice and, as a result, feel 'trapped' in their neighbourhood (Hipp, 2009).

It should be noted that this study has certain limitations. The measure of diversity correlates quite strongly with measures of ethnic concentration and, as a consequence, I was unable to empirically disentangle diversity from concentration.[16] As already observed by Gijsberts et al. (2012), it is therefore not possible to determine whether the presence of many different ethnic groups is harmful to cohesion and feelings of safety or rather the concentration of a specific group. Another limitation is the use of cross-sectional data. A causal effect of diversity on cohesion or fear of crime therefore cannot be assumed. Rather than reflecting causal relationships, the found cross-sectional associations may be a consequence of diversity having increased in areas that were already characterized by lower cohesion and more fear of crime. If minorities are more likely to settle in these areas, the observed associations might be driven by selection bias (for a more elaborate discussion of this point, see Laurence and Bentley, 2016). Longitudinal data are needed to make actual causal claims.

Overall, this chapter provides a nuanced understanding of how specific characteristics at specific spatial levels are associated with fear of crime and neighbourhood cohesion among native and non-native inhabitants. Future research can build on this study by studying the interrelationships between cohesion and fear of crime (e.g. Boessen et al., 2017; Collins and Guidry, 2018) and the ways in which diversity is related to these outcomes and, in addition, by examining more directly the mechanisms that underlie the negative effects of diversity.

[16] Correlations between HHI_{18} and % non-western minorities: 0.85 (neighbourhood-level) and 0.87 (district-level).

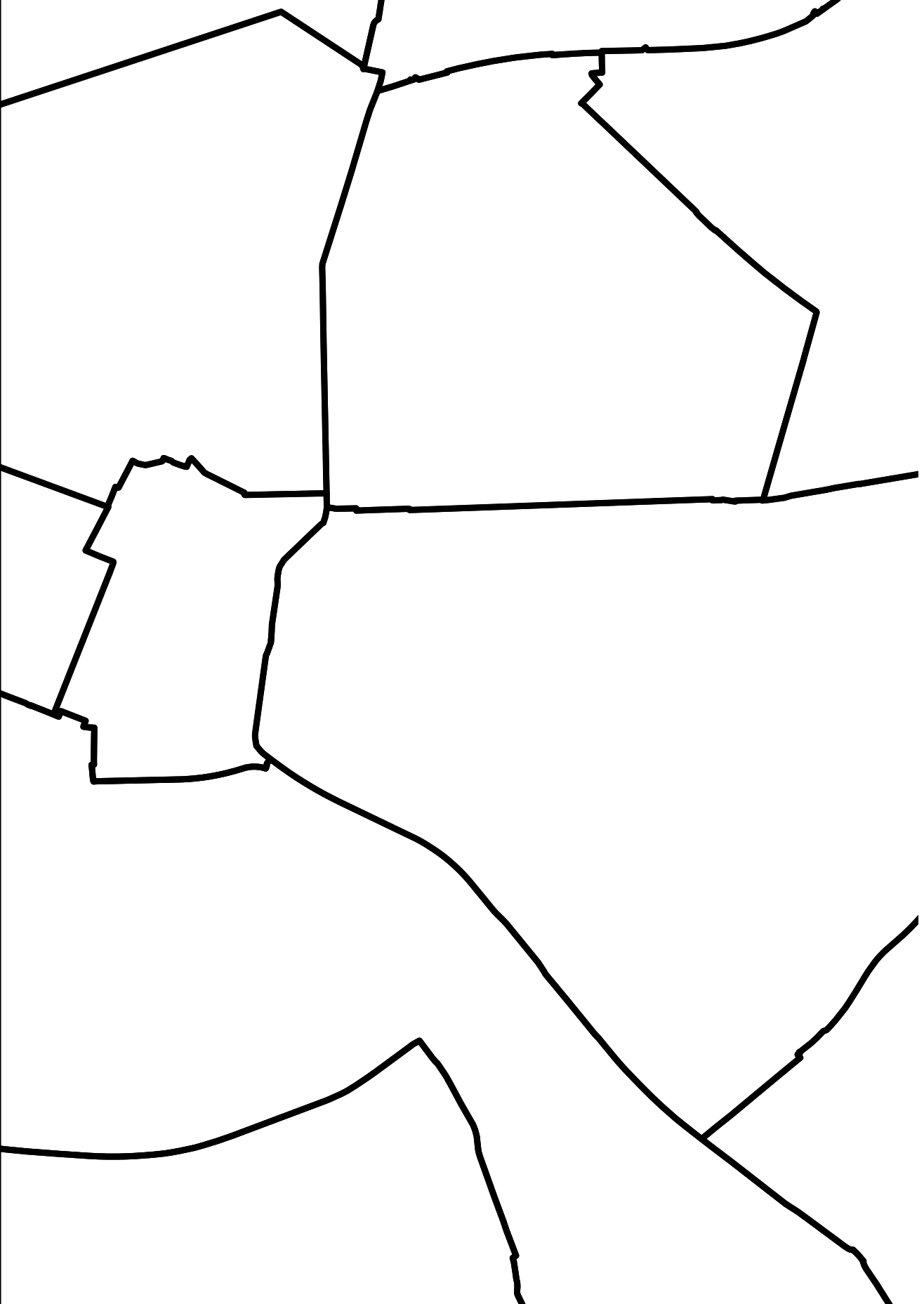
Appendix

Table A2.1. Summary factor analysis neighbourhood cohesion.

Item	Factor loading
People hardly know each other	0.628
People socialize pleasantly	0.792
I live in a cosy neighbourhood	0.855
I feel at home	0.856
I am satisfied with the population composition	0.695
I have a lot of contact with other neighbours	0.785
Eigenvalue	3.586
% of variance	59.77

Table A2.2. Summary factor analysis fear of crime.

Item	Factor loading
Do not answer the door during evening hours	0.719
Avoid certain areas in the neighbourhood	0.735
Feel unsafe walking in the neighbourhood	0.831
Feel unsafe being home alone during the evening	0.768
Afraid of being victimized	0.753
Eigenvalue	2.095
% of variance	58.10



Chapter 3

Estimating Diversity Effects in the Neighbourhood. On the role of ethnic diversity and out-group size and their associations with neighbourhood cohesion and fear of crime

This chapter is co-authored by Godfried Engbersen and Roel Jennissen.
A slightly different version of this chapter is currently under review at an international peer-reviewed journal.

3.1 Introduction

Contemporary societies are becoming increasingly ethnically diverse. Diversity levels are likely to increase as migration continues. Researchers have also observed that migration flows have become highly diverse with migrants originating from an increasingly diverse array of countries (Castles, De Haas and Miller, 2014; Vertovec, 2007). The societal consequences of these rising diversity levels have become the topic of heated debate. Scholars and policymakers have directed their attention in particular to the question of whether and how diversity complicates social relationships. Putnam's (2007) study on the eroding effect of diversity on social cohesion has been especially influential in this regard. Empirical evidence suggests that ethnic diversity is mainly associated with decreasing levels of intra-neighbourhood cohesion.[17] Criminologists have also examined the role of ethnic diversity in local communities. Here, diversity is considered a relevant predictor of fear of crime. Research demonstrates that greater ethnic diversity in the residential context is associated with higher fear levels (Brunton-Smith and Sturgis, 2011; Covington and Taylor, 1991; Hooghe and De Vroome, 2016; Liu and Polson, 2016).

This chapter challenges the ways in which ethnic diversity has been generally understood and measured in most previous research. I argue that commonly-used measures insufficiently reflect the enormous diversity of modern societies and propose a modified and refined operationalization of diversity, which involves an adapted version of the classical Herfindahl-Hirschman-Index (HHI). The HHI is widely used to measure ethnic heterogeneity in neighbourhoods.[18] The modified HHI measure is group-specific and assesses the level of diversity among members of the out-group (i.e. the group an individual does not belong to). In this way, I follow up on Koopmans and Schaeffer (2015) who introduced a similar innovation to test diversity effects on neighbourhood cohesion among German respondents (N = 7500). I use the modified HHI to estimate diversity effects on both neighbourhood cohesion and fear of crime, relying on large-scale survey data from the Dutch Safety Monitor 2014 (N = 71,760) combined with individual-level register data from Statistics Netherlands. One of the main aims of the current research is to improve our understanding of the social implications of living in diversity.

Not only do I consider the effect of diversity on patterns of cohesion and fear, but I also examine the role of out-group size. Taken together, this approach allows for a more adequate analysis of the mechanisms that help to explain why and how a neighbourhood's ethnic composition affects cohesion and fear levels. Two mechanisms have been identified (Van

[17] Support for negative diversity effects is most frequently found in relation to indicators of cohesion that are spatially bound to the neighbourhood. Other aspects of cohesion, such as generalized trust or citizen participation, seem to be largely unaffected by diversity (Lancee and Dronkers, 2011; Laurence, Schmid and Hewstone, 2019; Tolsma, Van der Meer and Gesthuizen, 2009)

[18] Note that researchers almost always use the inverse of the HHI: one minus the HHI. In this version of the HHI, a higher score indicates a higher level of diversity. I also use the HHI in this way.

der Meer and Tolsma, 2014). The first mechanism considers how diversity causes feelings of anomie, which ultimately result in social isolation and fear. The second mechanism is informed by conflict theory, and specifies that a large out-group induces feelings of threat which negatively affect cohesion and perceived safety. Most previous studies are unable to differentiate between these two mechanisms as existing measures of diversity and out-group size appear to be highly collinear (Koopmans and Schaeffer, 2016; Laurence et al., 2019; Schaeffer, 2013; Uslaner, 2011). In the current study, I distinguish between diversity and out-group size (both conceptually and empirically).

I also examine potential interrelationships between fear of crime and neighbourhood cohesion, and aim to explore to what extent neighbourhood cohesion mediates the relationship between ethnic diversity and fear of crime. Theoretically, there are two opposing views on how neighbourhood cohesion and feelings of unsafety may relate to each other: attachment in the neighbourhood is expected to either reinforce or weaken feelings of safety (Boessen et al., 2017; Kanan and Pruitt, 2002; Yuan and McNeeley, 2016). The empirical evidence is somewhat mixed, although most studies have found a negative relationship between cohesion and fear (Franklin, Franklin and Fearn, 2008). These associations are most often empirically tested at the individual level (e.g. Adams and Serpe, 2000; Drakulich, 2015; Gibson et al., 2002; for an exception, see Yuan and McNeeley, 2015). The current research design, however, makes it possible to assess the relationship between fear and cohesion at both the individual level and the neighbourhood level.

Overall, this chapter contributes to the literature in the following ways: first, by using an alternative measure to study diversity effects on fear of crime and neighbourhood cohesion and second, by examining whether the relationship between diversity and fear of crime is mediated by neighbourhood cohesion. Multilevel equation modelling techniques are applied to study the relationships and to test the potential mediation effect. The two main research questions of this chapter are:

1. To what extent does ethnic diversity in the neighbourhood relate to neighbourhood cohesion and fear of crime?
2. Is the association between ethnic diversity and fear of crime mediated by neighbourhood cohesion?

This chapter proceeds as follows. Firstly, I elaborate on the role of ethnic diversity (versus out-group size) and why diversity in a neighbourhood may impact levels of cohesion and fear. Secondly, I look more closely at how to measure diversity. Next, I consider the relationship between fear and cohesion. I then describe the data and the modelling strategy in more detail before presenting the results of the statistical analyses. I conclude with a discussion of the results and their implications, and address the chapter's limitations.

3.2 Theoretical framework

The current study distinguishes two dimensions of ethnic composition: ethnic diversity and out-group size (i.e. the share of the group a person does not belong to). Diversity refers more specifically to the distribution of inhabitants among different groups. The level of diversity is determined by two conditions: the number of groups present and the relative size of each group. A neighbourhood is highly diverse if there is a large variety of groups and if the population is evenly distributed across these groups (Blau, 1977: p.77-78).

Empirical findings linking ethnic composition to cohesion and fear of crime

A lot of studies have empirically tested the relationship between ethnic composition and social cohesion. Scholars have looked at the impact of diversity on generalized trust (e.g. Hooghe et al., 2009), citizen participation (e.g. Gijsberts, Van der Meer and Dagevos, 2012) and intra-neighbourhood cohesion (e.g. Bécares et al., 2011). In most studies, these relationships were examined within the residential context of neighbourhoods. More recently, researchers have also considered other contexts, such as the workplace (Laurence, Schmid and Hewstone, 2018). Van der Meer and Tolsma's (2014) meta-analysis demonstrated that ethnic diversity in the residential environment is most consistently associated with decreases in intra-neighbourhood cohesion. Unfortunately, these results tell us little about diversity effects per se because of the previously mentioned entanglement of diversity and out-group measures (Koopmans and Schaeffer, 2016; Schaeffer, 2013; Tolsma and Van der Meer, 2017; Uslaner, 2011). As for fear of crime, most empirical research has been conducted within the context of American neighbourhoods. Those studies are primarily restricted to examining the effect of minority concentration on feelings of safety and have repeatedly shown that the presence of African American residents is related to more fear, in particular amongst white Americans (Chiricos, Hogan and Gertz, 1997; Moeller, 1989; Pickett et al., 2012). This relationship is possibly caused by stereotypes depicting African Americans as being prone to crime and violence (Eitle and Taylor, 2008). Research examining contextual effects of ethnic composition on feelings of unsafety outside the United States is rather limited (for exceptions, see Brunton-Smith and Sturgis, 2011; Glas, Engbersen and Snel, 2019; Hooghe and De Vroome, 2016). The next section will discuss the mechanisms that help explain why it is expected that diversity and out-group size have an impact on fear and cohesion.

Mechanisms linking ethnic composition to cohesion and fear of crime

Scholars examining diversity effects generally do so on the basis of the constrict hypothesis (Putnam, 2007) or the sub-cultural diversity hypothesis (Merry, 1981). The former hypothesis relates greater diversity to decreasing levels of social cohesion, while the latter predicts a positive relationship between diversity and fear. Both propose that diversity complicates social relationships, because shared values and a shared language are less likely to be present in a diverse setting. Inhabitants of these settings may therefore feel they lack knowledge of how to socially interact with each other (Van der Meer and Tolsma, 2014). Feelings of anomie and uncertainty emerge, causing inhabitants to avoid interaction and socially isolate themselves. Fear-of-crime scholars emphasize that people living in diverse settings find it more difficult to interpret each other's behaviours and manners, which makes the presence of other ethnic groups 'fear-inspiring' (Covington and Taylor, 1991: p.232). This argument centres on the difference between one's own ethnicity and that of one's surrounding neighbours and does not link ethnicity to fear per se (Bennett and Flavin, 1994; Liu and Polson, 2016; Merry, 1981).

Based on conflict and threat theory, scholars have pointed out how increases in out-group size may spur competition between ethnic groups for scarce resources, such as jobs and housing and non-material resources, such as morality and identity (Van der Meer and Tolsma, 2014). Out-group size is thus considered a crucial indicator of inter-group competition (Schlueter and Scheepers, 2010). Processes of competition improve in-group solidarity, but at the same time increase out-group distrust and prejudice (Blalock, 1967; Quillian, 1995). Inhabitants who feel threatened interact less with their out-group neighbours and experience more fear. The extent to which an individual perceives an out-group as threatening, may depend on his or her own socio-economic status (Laurence et al., 2019). Studies show that in particular the native majority feels unsafe when more ethnic minorities are present (Hooghe and De Vroome, 2016; Pickett et al., 2001). This line of research distinguishes between members belonging to the 'dominant' majority and those belonging to 'subordinate' minority groups, and how the presence of the latter causes feelings of threat among majority group members (Quillian, 1995). These feelings easily result in prejudice and stereotyping and may, in turn, negatively affect perceptions of neighbourhood safety and cohesion (Pickett et al., 2001; Quillian and Pager, 2001).

Measuring and testing the role of ethnic diversity

This section looks more closely at the measurement of ethnic diversity (for a more elaborate discussion of population diversity, see Lieberson, 1969). In the current paper, the level of diversity is calculated based on an adjusted version of the HHI. This version is group-specific

and assesses diversity among members of the out-group in each neighbourhood. Those living in the same neighbourhood and sharing the same ethnicity obtain a similar score. This differs from the traditional HHI where all habitants from the same neighbourhood receive an identical score, regardless of their ethnicity. The formulas of the traditional HHI and group-specific HHI are largely comparable:

$$\text{traditional HHI} = 1 - \sum_{i=1}^{N} s_i^2$$

$$\text{group-specific HHI} = 1 - \sum_{j=1}^{G} s_j^2$$

In the traditional formula, S_i is the share of ethnic group i (of the total population) and N stands for the total number of groups. For the group-specific formula, S_j denotes the share of out-group j (of the out-group population) and G the number of out-groups.

For both versions of the HHI, the researcher decides how many groups are distinguished and included in the calculations. Most Dutch scholars calculate the HHI based on a distinction of seven groups or less (Gijsberts et al., 2012; Lancee and Dronkers, 2011; Tolsma et al., 2009; Vervoort, Flap and Dagevos, 2011).[19] I argue that a HHI based on only seven groups fails to capture the 'enormous diversity of ethnic groups' present in European cities (Crul, 2016: p.57), resulting in underestimated diversity levels. In contrast, Koopmans and Schaeffer (2015), who study group-specific diversity effects on neighbourhood cohesion, do not use any clustering and include every ethnic group separately. Here, the level of diversity may be overestimated. In the current study, I distinguish between 18 groups to do justice to the diversity within Dutch neighbourhoods.[20] The categorization is a geo-linguistic classification, predominantly based on language and religion and refined with information on the political system of the country of origin (Jennissen et al., 2018). [21]

The group-specific HHI is preferred over the 'traditional' HHI for two reasons. First, it makes it possible to test the effects of diversity and out-group size simultaneously because correlations between the two measures are reduced. Secondly, the adjusted HHI is a less ambiguous diversity measure. Most existing diversity indices implicitly assume that all inhabitants experience 'diversity' in their neighbourhood in a similar way. This is, however, unlikely: for native inhabitants, living in an area with high diversity means living amongst

[19] These researchers distinguish between inhabitants from a Turkish, Moroccan, Surinamese, Antillean, other non-Western, Western and Dutch background.

[20] To illustrate: the average group-specific diversity level for natives based on five groups is 0.45; based on 17 groups the average diversity level is 0.74.

[21] I distinguish between people from Anglo-Saxon countries; German-speaking countries; Scandinavian countries; Mediterranean countries; Middle and Eastern Europe; Arab countries; Latin America; sub-Saharan Africa; South Asia; Central Asia; Southeast Asia and the Pacific; East Asia; former Dutch colonies (Surinam and former Netherlands Antilles); Belgium; Indonesia; Morocco; the Netherlands; and Turkey.

fewer co-ethnics. For non-natives, the reverse tends to be true (Abascal and Baldassarri, 2015; Schaeffer, 2013). These patterns can also be observed in Dutch neighbourhoods.[22] Because people are more likely to interact with similar others (i.e. members of their in-group), native Dutch living in relatively homogeneous neighbourhoods are more likely to have contacts with other natives than those living in diverse neighbourhoods (McPherson, Smith-Lovin and Cook, 2001). The opposite is the case for non-natives residing in a diverse neighbourhood. It follows that it cannot be concluded whether a possible diversity effect – when measured by the traditional HHI – is the result of actual diversity or of living with fewer co-ethnics. The group-specific HHI, in sum, enables researchers to better locate diversity effects since the share of the in-group and hence the role of in-group contact is left out. The group-specific diversity measure ensures that the effect of diversity is now disentangled from the effect of not living with co-ethnics.

To better illustrate how out-group size, the group-specific HHI and the traditional HHI relate to each other, their relationships can be visualized (see Figure 3.1). The measures were calculated for Dutch natives as they are the focus of the current study. The points in the scatterplots represent the included neighbourhoods. The left plot (Figure 3.1a) shows that there is little distinction between out-group size and the traditional HHI, indicating that these variables are empirically almost entirely similar (see also Gijsberts et al., 2012: p.536). This is confirmed by the high correlation coefficient (r = 0.98). The right plot (Figure 3.1b), based on the group-specific HHI, shows a much more dispersed pattern: out-group size and diversity are now two empirically distinct dimensions of ethnic composition. The measures are only weakly correlated (r = 0.24). Figure 3.1b further suggests that there is a relatively large share of neighbourhoods with a small out-group that is highly diverse. Approximately one-fourth of the neighbourhoods fall into this category (compared to zero when diversity is measured in the traditional way). [23] This is not necessarily surprising because the share of native Dutch – which would bring down a neighbourhood's diversity level when included – is no longer part of how the diversity score is calculated. The specific characteristics raise the question of whether the hypothesized diversity effects operate similarly or differently depending on out-group size. I examine this option more closely in the empirical analyses.

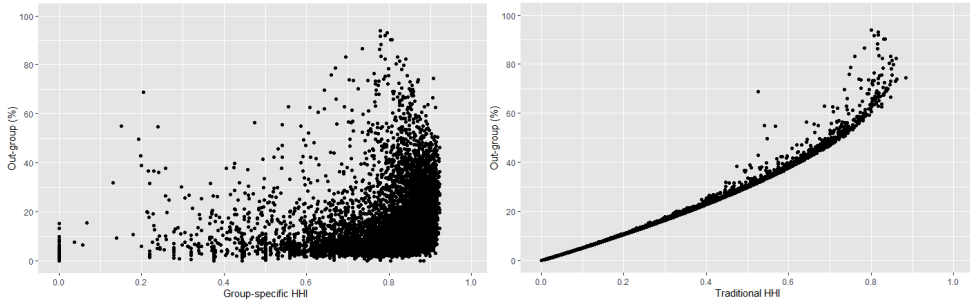
[22] In an average homogenous neighbourhood, approximately 90% of the residents are native Dutch. This percentage drops to 72% for an average heterogeneous neighbourhood. Diversity scores are calculated based on the traditional HHI. The median heterogeneity score is 0.27.

[23] In these neighbourhoods, the out-group is smaller than 10% and the HHI is larger than 0.8.

Figure 3.1. Measuring ethnic composition for natives. The dots represent all included neighbourhoods.

Figure 3.1a. Out-group size and the traditional HHI.

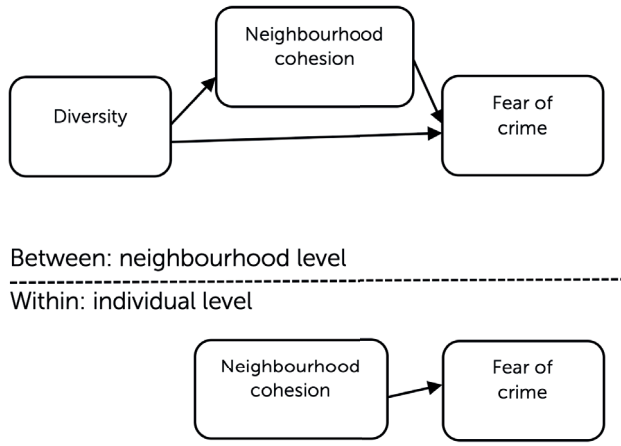
Figure 3.1b. Out-group size and the group-specific HHI.



A mediating effect of neighbourhood cohesion on fear of crime

In this last theoretical section, I further elaborate on the potential dependency between cohesion and fear, and on whether perceptions of cohesion mediate the relationship between ethnic diversity and fear. Note that the hypothesized mediation can only occur at the neighbourhood level (i.e. between level) since ethnic diversity is a contextual characteristic that does not vary within neighbourhoods. It follows that diversity levels cannot account for individual (i.e. within) differences in cohesion and fear (Laméris, Hipp and Tolsma, 2018; Preacher, Zyphur and Zhang, 2010). The potential mediating role of cohesion will thus be assessed at the between level. At the within level, I only consider the association between cohesion and fear. The different levels and pathways are illustrated in Figure 3.2.

Figure 3.2. Main conceptual model.



The mediating role of cohesion has already been well documented in studies aimed at understanding neighbourhood crime patterns. Based on collective efficacy theory, scholars found that the relationship between certain neighbourhood characteristics (including ethnic composition) and violent crime is largely mediated by the aggregated level of cohesion and informal social control in a neighbourhood (Morenoff, Sampson and Raudenbush, 2001; Sampson, Raudenbush and Earls, 1997). This line of research suggests that inhabitants living in cohesive neighbourhoods are more likely to use informal means to control their neighbourhood with the aim of reducing problems related to crime and disorder. The presence of these social informal controls in a neighbourhood may result (both directly and indirectly) in increased feelings of safety (Scarborough et al., 2010). Based on this literature, it is expected that cohesion (at least) partially mediates the hypothesized relationship between diversity and fear. The empirical evidence on the association between cohesion and fear is, however, rather limited and mixed. A study by Yuan and McNeeley (2015) demonstrated that the strength of social networks in a neighbourhood was not associated with inhabitants' perceived risk or worries about victimization. Rountree and Land (1996) showed that social integration (at the neighbourhood level) diminishes residents' perceptions of the neighbourhood as being unsafe, but simultaneously results in higher levels of burglary-specific fear.

At the individual level, there are at least three pathways that link cohesion to fear. The first two hypothesize that cohesion and feelings of safety are positively related. Cohesion contributes to more safety either by providing inhabitants with a greater sense of familiarity or by providing them with better access to support resources (Boessen et al., 2017). Being familiar with the neighbourhood and the inhabitants makes it easier to 'place' each other in public space, which in turn contributes to an improved sense of safety (Blokland, 2017). Besides, neighbourhood ties may function as potential resources for support on which residents can rely if necessary. Inhabitants who feel more supported will experience less vulnerability and, consequently, less fear (Boessen et al., 2017; Kanan and Pruitt, 2002). The positive relationship between neighbourhood cohesion and feelings of safety is supported by various studies. It has been shown that residents who feel more attached to their neighbourhood report lower levels of fear of crime (Adams and Serpe, 2000; Riger, LeBailly and Gordon, 1981). Yuan and McNeeley (2015) found that people are less likely to consider their neighbourhood as being unsafe when they have more friends or family living nearby.

Scholars have also hypothesized that cohesion may harm feelings of safety. In this case, neighbourhood ties are expected to increase fear levels because residents with more ties are more likely to be exposed to crime-related news and information. It is predicted that

increased exposure enhances the effect of indirect victimization and causes more concern about crime in the neighbourhood, resulting in higher levels of fear (Covington and Taylor, 1991; Yuan and McNeeley, 2015). Other researchers have argued that the relationship between social ties and fear may be reciprocal, implicating that diminished social ties are both a cause and a consequence of fear (Kanan and Pruitt, 2002; Liska, Sanchirico and Reed, 1988). The reverse causality cannot be ruled out because this chapter relies on cross-sectional data.

Hypotheses

Based on the literature outlined above, the following four hypotheses can be formulated:

Hypothesis 1: Residents living in neighbourhoods with more diversity experience more fear of crime.
Hypothesis 2: Residents living in neighbourhoods with more diversity experience less neighbourhood cohesion (2a), which in turn increases fear of crime (2b).
Hypothesis 3: Residents living in neighbourhoods with a larger out-group experience more fear of crime (3a) and less neighbourhood cohesion (3b).
Hypothesis 4: Residents who report higher levels of neighbourhood cohesion experience less fear of crime.

All hypotheses are tested at the between level, with the exception of the fourth hypothesis which is examined at the within level.

3.3 Research design

Data

The current study uses data from the Dutch Safety Monitor 2014 and individual register data from Statistics Netherlands. The Safety Monitor is a nationwide survey on crime-related feelings of unsafety and victimization. It is a high-quality national survey with a large and representative sample. Respondents were sampled from the municipality population register. The overall response rate was 38.8%. In total, 86,382 respondents completed the self-administered questionnaires, either online (47.9%) or through a written questionnaire (52.1%).[24] Only the native Dutch respondents were selected (N = 71,760) for this study.[25] Unfortunately, the sample is too small to test the hypotheses separately for other ethnic groups. On average, approximately 8.3 native respondents share the same neighbourhood. This is sufficient to correctly estimate regression coefficients and variance components, as

[24] Statistics Netherlands (2015). Veiligheidsmonitor 2014. Retrieved from download.cbs.nl/pdf/veiligheids monitor -2014.pdf (accessed September 23, 2019).
[25] A person is considered native if both parents were born in the Netherlands.

well as the corresponding standard errors (Maas and Hox, 2005). The selected respondents live across the entire Netherlands and reside in 8621 neighbourhoods; 72% of all Dutch neighbourhoods are included in the survey. The neighbourhoods are administratively defined and have an average population size of 1400 inhabitants. The survey data are merged with non-public individual register data ('microdata') from Statistics Netherlands. Access to microdata was granted under specific conditions.[26] Microdata contain information on the ethnicity of all Dutch inhabitants and the economic situation of all Dutch households.

Operationalizations

In the analysis, two outcome variables are distinguished: neighbourhood cohesion and fear of crime. The former is measured through a set of four items. These items are *people in this neighbourhood socialize pleasantly*; *I live in a cosy neighbourhood where people help each other out and do things together*; *I feel at home with the people living in this neighbourhood*; and *I have a lot of contact with other neighbours* (answer categories: agree completely, agree, neither agree nor disagree, disagree and disagree completely). A factor analysis indicated that all four items load onto a single factor (see Table A3.1 in the Appendix for details). The four items also appear to form a unidimensional scale, accounting for 71.10% of the variance. The scale is based on the average of at least three valid answers and is internally consistent with a Cronbach's α of 0.86.

To measure fear of crime, three sub-dimensions are combined that relate to elements of behaviour, threat and risk (Skogan, 1996). I constructed a scale consisting of five items. Respondents were asked how often they do not answer the door during evening hours; avoid certain areas in their neighbourhood; feel unsafe walking in their neighbourhood or being home alone during the evening; and are afraid of being victimized (answer categories: seldom or never, occasionally and frequently). A factor analysis resulted in one single factor (see Table A3.2 in the Appendix for details). The items also proved to form a unidimensional and internally coherent scale, explaining 52.91% of the variance with a Cronbach's α of 0.85. The fear of crime scale represents the average of at least three valid answers. A higher score on the scale indicates more fear of crime.

The diversity measure is based on the distribution of out-group members among (a maximum of) 17 groups. Because only native Dutch were included in the analysis, the out-group consists of inhabitants with a migration background (or, in other words, non-native Dutch). The out-group variable is calculated as the number of 'out-group' inhabitants divided by the total number of inhabitants. The diversity measure and out-group variable are based on the ethnic composition of neighbourhoods in 2014.

[26] Statistics Netherlands (2017). Catalogue of services Microdata services 2018. Retrieved from www.cbs.nl/-/media/_pdf/2017/48/171201%20services%20catalogue%202018.pdf (accessed September 23, 2019).

I control for several variables at the neighbourhood level and the individual level. Previous research has identified these controls as relevant determinants of neighbourhood cohesion and/or fear of crime. At the neighbourhood level, measures of economic disadvantage and crime are included. To measure the degree of economic disadvantage, an index was constructed that combines the percentage of low-income households, the average income of the context and the percentage of households for which social security is the main source of income (e.g. Vervoort, 2012). Before constructing the index, the distribution of average income was reversed and all indicators were standardized. Lastly, the mean of the standardized indicators was calculated. To control for crime, the registered number of reported burglaries and the registered number of violent crime incidents were included.[27] These variables represent the incidence of either burglary or violent crimes per 1000 members of the population in 2014 in a neighbourhood. The descriptive statistics for the neighbourhood-level variables are presented in Table 3.1.

The individual control variables are age (in decades), gender, education level, presence of children in the household, whether social benefits are the main source of income of the household, income level and length of residence in the neighbourhood (in years). When analyzing fear, I also controlled for burglary victimization. This variable is self-reported and was measured by asking respondents whether they had been a victim of burglary during the past five years. The descriptives for the individual-level variables are included in Table A3.3 in the Appendix.

Table 3.1. Descriptive statistics neighbourhood-level variables.

	Min.	Max.	Mean	SD
HHI	0	0.92	0.84	0.10
Out-groupz	0	94.05	19.95	15.49
Economic disadvantage	-4.5	5.63	-0.08	0.75
Burglary	0	225	5.22	4.31
Violent crime	0	615	5.38	9.10

Analytical strategy

Multilevel structural equation modelling (MSEM) was used to test the proposed pathways. MSEM is considered the most appropriate method to examine mediation in nested data because it explicitly separates the between level (neighbourhoods) from the within level (individuals). I follow the approach introduced by Preacher and colleagues (2010; 2011) to test mediation in a 2-1-1 design, with neighbourhood diversity as a level 2 characteristic

[27] Statistics Netherlands (2016). Geregistreerde criminaliteit per gemeente, wijk en buurt, 2010-2015. Retrieved from www.cbs.nl/-/media/_excel/2016/45/geregistreerde-criminaliteit-per-gemeente-wijk-en-buurt-2010-2015.xlsx (accessed September 23, 2019).

and cohesion and fear as level 1 characteristics. As mentioned previously, the mediation is examined at level 2 because diversity is a neighbourhood-level variable (for an illustration, see Laméris et al., 2018). Based on the null model, I calculated intraclass correlations (ICCs) for an indication of how much variance is located at the neighbourhood level. The ICCs vary between 0.07 (fear) and 0.09 (cohesion). AIC and BIC values were obtained to compare the model fit between the null model, the model with individual-level variables and the 'full' model with both individual and neighbourhood-level variables.[28] The full model proved to have the best model fit. I specified random intercepts and fixed slopes and performed the analyses in R, using the lavaan package (version 0.6-4).

3.4 Results

The results of the main model are shown in Table 3.2. All control variables are included. Most effects of the individual-level controls are in line with previous research (see Table A3.3 in the Appendix for details). This is also the case for the results regarding the neighbourhood-level control variables. I find that in economically disadvantaged neighbourhoods, cohesion levels are lower on average (b = -0.040). There is, however, no significant association between economic neighbourhood status and reported fear. In addition, it is shown that higher burglary rates and a higher incidence of violent crimes are significantly associated with more fear in the neighbourhood (b = 0.003 and b = 0.001, respectively).

Next, I considered the diversity effects more closely. It was observed that the diversity effect on fear of crime is not in line with the expectations: surprisingly, a higher level of diversity in the neighbourhood is related to *less* fear. More specifically, inhabitants experience 0.01 (b = -0.105 × 0.10) less fear if diversity increases by 10% points. A possible explanation is that in highly diverse neighbourhoods the out-group is more fragmented and, as a result, there is less threat because there is no dominant majority. The observed diversity effect – assessed at a three-point scale – is, however, relatively small. The societal significance of this finding should therefore not be overestimated (Bernardi, Chakhaia and Leopold, 2017). Moreover, in an additional robustness analysis, the diversity effect on fear was no longer significant.[29] It follows that Hypothesis 1, predicting more fear in more diverse neighbourhoods, is rejected.

The model also shows that more diversity in the neighbourhood is related to less neighbourhood cohesion. This diversity effect is in line with Putnam's constrict hypothesis (2007) and most previous research on this relationship (e.g. Gijsberts et al., 2012; Lancee and Dronkers, 2011). In a neighbourhood with 10% points more diversity, the average

[28] Other goodness-of-fit statistics are not yet available in R.

[29] When the out-group was included as separate out-group variables (each representing the share of one specific out-group) the diversity effect on fear was no longer significant. These results are not presented here but are available upon request.

level of cohesion decreased by 0.04 (b = -0.389 × 0.10), measured on a five-point scale. Hypothesis 2a – more diversity is associated with less neighbourhood cohesion – is thus confirmed.[30] It was also found that, at the between level, higher levels of cohesion are accompanied by less fear (b = -0.204). This result supports Hypothesis 2b. The indirect effect of diversity on fear is 0.079 (b = -0.389 × -0.204), indicating that inhabitants of ethnically diverse neighbourhoods experience more fear because diversity has weakened their social relationships in the neighbourhood. It also demonstrates that the level of perceived safety is higher in more socially cohesive neighbourhoods, which is consistent with the literature on collective efficacy and the previous findings of Rountree and Land (1996).

On the basis of the third hypothesis, I expect that a larger out-group in the neighbourhood is related to more fear (3a) and less cohesion (3b). The results indicate that a larger out-group is indeed associated with 0.03 more fear if the out-group increases by 10% points (b = 0.003 × 10). This finding confirms previous research showing that natives feel more unsafe in neighbourhoods inhabited by a relatively large out-group. Furthermore, the out-group effect on cohesion is also in line with the expectations. If the size of the out-group increases by 10% points, the respondents experience 0.06 (b = -0.006 × 10) less cohesion. Consequently, hypotheses 3a and 3b are both supported.

Table 3.2. Results path analysis.

	Cohesion	Fear of crime
	B SE	B SE
Between level		
Cohesion		-0.204 (0.037) ***
HHI	-0.389 (0.029) ***	-0.105 (0.023) ***
Out-group	-0.006 (0.000) ***	0.003 (0.000) ***
Burglary		0.003 (0.000) ***
Violent crime		0.001 (0.000) ***
Economic disadvantage	-0.040 (0.005) ***	-0.004 (0.004)
Within level		
Cohesion		0.006 (0.002) **

N 66,101
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Note: Individual level control variables are not shown.

[30] This remained unchanged in the additional robustness analysis (see pervious footnote).

At the within level, I also address the association between cohesion and fear. The fourth hypothesis predicts a negative relationship between a resident's level of cohesion and sense of unsafety. Contrary to the hypothesis, I find that more cohesion is associated with slightly higher fear levels (b = 0.006). This result seems to suggest that the negative aspects of being more socially integrated in a neighbourhood outweigh potential positive effects. Hypothesis 4 remains unconfirmed. All four hypotheses and their results are summarized in Table 3.3.

Table 3.3. Schematic overview of results.

Hypothesis		Outcome
H1	diversity ↑ → fear ↑	✗
H2a	diversity ↑ → cohesion ↓	✓
H2b	cohesion ↑ → fear ↓ (at the between level)	✓
H3a	out-group ↑ → fear ↑	✓
H3b	out-group ↑ → cohesion ↓	✓
H4	cohesion ↑ → fear ↓ (at the within level)	✗

✓= hypothesis is confirmed, ✗= hypothesis is rejected.

Robustness and additional checks

Three additional analyses were carried out to evaluate the robustness of the results and to explore whether our understanding of the observed effects can be improved. First, I wanted to consider the possibility that the detected diversity effect on neighbourhood cohesion depends on the size of the out-group. The expectation is that the effect of diversity is stronger when the share of the out-group increases. To test this, a model was estimated including interaction effects between diversity and out-group size. The interactions turned out not to be significant, suggesting that diversity effects do not depend on out-group size. As a second robustness check, I explored whether different outcomes are produced by excluding respondents who live in a relative diverse neighbourhood (with an HHI larger than 0.8) with only a small out-group (less than 10%). This model, which included 52,098 respondents, was estimated to assess whether the main model was biased by the characteristics of this specific group. The diversity effects did not, however, change much. The results of these two models are available upon request.

In the third model, I examined the role of cultural distance and whether the effects of diversity and the out-group are stronger when resulting from non-European/Anglo-Saxon ('non-Western') groups (in contrast to European/Anglo-Saxon, or 'Western', groups).[31] The idea is that anomie and threat are more likely to occur when the perceived cultural distance between different group members is larger. Dutch natives consider the non-European/Anglo-Saxon group to be the most culturally distant (Schlueter and Scheepers, 2010). The results of this additional analysis are reported in Table 3.4. The findings do not support these ideas: it is found that diversity based on the share of European/Anglo-Saxon groups even has a slightly larger effect on cohesion. Besides, it seems to make almost no difference whether the out-group measures are based on the composition of European/Anglo-Saxon or non-European/Anglo-Saxon groups.

Table 3.4. Results path analysis. (Non)European/Anglo-Saxon diversity and out-groups.

	Cohesion B SE	Fear of crime B SE
Between level		
Cohesion		-0.213 (0.035) ***
$HHI_{European/Anglo-Saxon}$	-0.301 (0.035) ***	-0.091 (0.015) ***
$HHI_{non-European/Anglo-Saxon}$	-0.118 (0.021) ***	-0.031 (0.009) **
Out-group Eur/Anglo-Saxon	-0.009 (0.001) ***	0.002 (0.000) ***
Out-group non-Eur/Anglo-Saxon	-0.009 (0.000) ***	0.003 (0.000) **
Burglary		0.003 (0.000) ***
Violent crime		0.001 (0.000) ***
Economic disadvantage	-0.045 (0.005) ***	-0.041 (0.005) ***
Within level		
Cohesion		0.006 (0.003) ***

N 66,101
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Note: Individual level control variables are not displayed.

3.5 Discussion and conclusion

The current chapter examined to what extent the ethnic composition of Dutch neighbourhoods is associated with residents' perceptions of cohesion and fear. I considered the role of two different composition aspects: 1) the level of ethnic diversity and 2) the size of the out-group. Previous scholars analyzing similar relationships have

[31] The category of European/Anglo-Saxon includes immigrants (and their children) from Europe (except Turkey), Canada, United States, South-Africa, Indonesia and Oceania. Indonesia is regarded as 'European' because many people who are of Indonesian origin are either descendants of Dutch colonists or Indo-Europeans born in the former colony of the Netherlands East Indies (Jennissen, 2013: p.185). The non-European/Anglo-Saxon category includes people from Turkey, Morocco, Arab countries, Asia, Latin-America, sub-Sahara Africa, Surinam and the former Netherlands Antilles.

often failed to specify whether it is expected that a neighbourhood's ethnic composition will affect perceptions due to diversity or due to out-group size. I argued that it is necessary to empirically distinguish between these two aspects as they are theoretically distinct and relate to different explanatory mechanisms. I did so by using group-specific measures of diversity and out-group and simultaneously analyzing their impact on both cohesion and feelings of unsafety among Dutch natives. Furthermore, in an additional analysis, I distinguished between different 'sorts' of diversity and out-groups to shed more light on the role of cultural distance and similarity. No support was found for the expectation that natives' levels of cohesion and unsafety are particularly affected by the presence of more culturally distant groups, although this is often implicitly assumed by researchers.

The results showed that the hypothesized effect of diversity is most consistently found in relation to neighbourhood cohesion. It was observed that more diversity in the neighbourhood is related to less cohesion. This study is one of the first to detect a diversity effect on cohesion based on this modified measure. It is possible that the found diversity effect on cohesion is slightly underestimated since the level of diversity was not calculated on the basis of the entire neighbourhood population (but only on the different shares of non-native groups). In prior research, scholars have often been unable to conclude whether reduced levels of cohesion were better explained by ethnic diversity or rather the concentration of specific minority groups (e.g. Dinesen and Sønderskov, 2015; Glas et al., 2019; Laurence et al., 2019; Sluiter, Tolsma and Scheepers, 2015). This chapter adds to this literature by providing empirical support for Putnam's constrict hypothesis. Despite this contribution, two limitations should be noted here: only natives were included in the analyses and, secondly, the focus was narrowed to *neighbourhood* cohesion, whereby I did not consider other elements of cohesion that are not neighbourhood specific. Another limitation of the current study that should be mentioned is the use of cross-sectional data. I therefore cannot control for selection processes or assume causality. In order to make actual causal claims, longitudinal data are necessary.

No support was found for the diversity hypothesis regarding fear of crime. This outcome contradicts the results of **Chapter 2** in which I found a positive association between ethnic diversity and fear at various spatial levels, including the neighbourhood. In this earlier study, ethnic diversity was measured using the conventional HHI. In addition, no distinction was made between the different aspects of ethnic composition. These differences may explain why contradicting results were found. The current chapter shows that differences in fear are better explained by the size of the out-group. I therefore conclude that diversity may induce negative effects, but that these effects are limited to neighbourhood cohesion and do not affect fear of crime. The results suggest that feelings of anomie – which explain

why cohesion levels are lower in ethnically diverse neighbourhoods – do not spill over into feelings of unsafety.

Based on the threat mechanism, I also researched the role of out-group size in relation to levels of cohesion and fear. The idea that living in a neighbourhood with ethnic 'others' – regardless of their internal diversity – may be threatening, gained support. It was observed that a larger out-group in the neighbourhood is associated with less cohesion and more fear. It follows that both the level of diversity and the size of the out-group in a neighbourhood are associated with lower cohesion levels. The out-group effect on fear confirms previous research showing a positive association between the presence of minority groups and fear among members of the (traditional) majority (Chiricos et al., 1997; Moeller, 1989).

This study also examines the interrelationship between neighbourhood cohesion and feelings of unsafety. I found a specific pattern for each level of analysis, indicating that the relationship between cohesion and fear operates differently at different levels. At the individual level, cohesion and fear are positively related: inhabitants who experience more cohesion report slightly higher fear levels. This supports the idea that local social ties may elevate fear levels because people who are socially integrated in the neighbourhood are more exposed to crime-related news and stories (Boessen et al., 2017; Covington and Taylor, 1991). The results also demonstrate that living in a neighbourhood that is considered cohesive decreases fear levels at the neighbourhood level.

Overall, the analyses have shown which elements of the ethnic composition of a neighbourhood play a role in explaining patterns of fear of crime and neighbourhood cohesion and, by doing so, the study provides a more nuanced understanding of the diversity debate. I agree with Koopmans and Schaeffer (2015) who urged scholars to move away from using conventional diversity measures in order to 'move ahead' the research field (p. 173). This chapter illustrates what can be gained from using a more innovative method to measure the ethnic composition of neighbourhoods when researching neighbourhood cohesion and fear of crime patterns.

Appendix

Table A3.1. Summary factor analysis neighbourhood cohesion.

Item	Factor loading
People socialize pleasantly	0.806
I live in a cosy neighbourhood	0.879
I feel at home	0.873
I have a lot of contact with other neighbours	0.812
Eigenvalue	2.844
% of variance	71.10

Table A3.2. Summary factor analysis fear of crime.

Item	Factor loading
Do not answer the door during evening hours	0.719
Avoid certain areas in the neighbourhood	0.735
Feel unsafe walking in the neighbourhood	0.831
Feel unsafe being home alone during the evening	0.768
Afraid of being victimized	0.753
Eigenvalue	2.905
% of variance	58.10

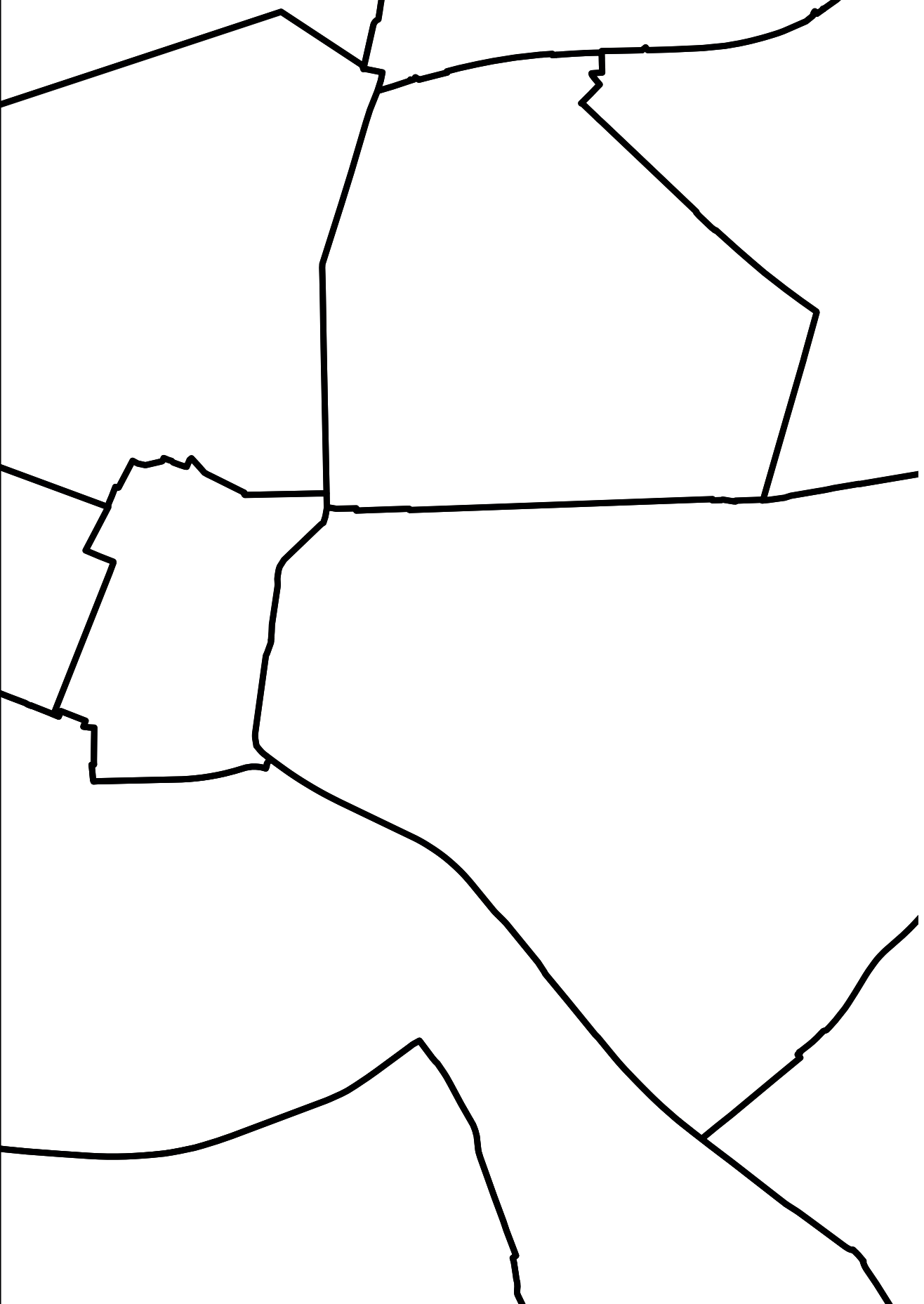
Table A3.3. Descriptive statistics individual-level variables.

	Min.	Max.	Mean	SD
Neighbourhood cohesion	1	5	3.46	0.77
Fear of crime	1	3	1.25	0.38
Age in decades	1.5	10.1	5.21	1.81
Gender (ref. = male)	0	1	0.52	
Education				
Low (= ref.)	0	1	0.31	
Middle	0	1	0.28	
High	0	1	0.32	
Children in household (ref. = none)	0	1	0.40	
Social benefits main income source (ref. = yes)	0	1	0.93	
Income				
First quintile (= ref.)	0	1	0.10	
Second quintile	0	1	0.21	
Third quintile	0	1	0.20	
Fourth quintile	0	1	0.22	
Fifth quintile	0	1	0.24	
Length of residence in the neighbourhood in years	0.08	95.05	18.76	13.07
Victim of burglary (ref. = not)	0	1	0.12	

Table A3.4. Results path analysis.

	Cohesion	Fear of crime
	B SE	B SE
Age in decades	0.037 (0.001) ***	-0.001 (0.001)
Gender (ref. = male)	0.051 (0.005) ***	0.140 (0.003) ***
Education (ref. = low)		
Middle	-0.029 (0.006) ***	-0.042 (0.003) ***
High	-0.060 (0.006) ***	-0.081 (0.003) ***
Children in household (ref. = none)	0.097 (0.005) ***	-0.022 (0.003) ***
Social benefits (ref. = yes)	0.050 (0.011) ***	-0.077 (0.007) ***
Income (ref. = first quintile)		
Second quintile	0.071 (0.008) ***	-0.005 (0.005)
Third quintile	0.065 (0.008) ***	-0.037 (0.005) ***
Fourth quintile	0.049 (0.008) ***	-0.048 (0.005) ***
Fifth quintile	0.061 (0.008) ***	-0.063 (0.005) ***
Length of residence in neighbourhood	0.002 (0.000) ***	0.001 (0.000) ***
Victim of burglary (ref. = not)		0.174 (0.004) ***

N 66,101
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Note: Neighbourhood-level control variables are not shown.



Chapter 4

Going Spatial:

Applying egohoods to fear of crime research

This chapter is co-authored by Godfried Engbersen and Erik Snel. A slightly different version of this chapter is published as Glas, I., Engbersen, G., and Snel. E. (2019). Going Spatial: Applying Egohoods to Fear of Crime Research. *British Journal of Criminology, 59(6),* 1411-1431

4.1 Introduction

From the 1970s on, fear of crime has emerged as a central topic in criminology and is perceived as a pressing issue in a range of countries (Brunton-Smith and Sturgis, 2011; Vanderveen, 2006). Scholars have examined both the consequences of fear of crime and its underlying causes. Research on the determinants of fear of crime is generally conducted along two lines. The first strand focuses on processes at the individual level and emphasizes, more specifically, the role of vulnerability in order to understand why certain groups of individuals – females, elderly adults and members of the lower class – report relatively high levels of fear without being victimized more often (Covington and Taylor, 1991; Pantazis, 2000). The second set of explanations centres on how fear of crime is shaped by the broader residential context in which individuals reside. I focus primarily on these contextual determinants of fear of crime.

Fear of crime studies examining the role of local context almost exclusively use administrative neighbourhoods with fixed boundaries to explore the ways through which context shapes individual-level fear (e.g. Covington and Taylor 1991; Markowitz et al., 2001; Scarborough et al., 2010; Brunton-Smith and Sturgis, 2011). Scholars tend to rely on these 'simple' measures of neighbourhood context mainly for reasons of data availability (Lupton and Kneale, 2012: p.122). This traditional approach of using neighbourhood units with predefined administrative boundaries has been criticized for its limited ability to adequately map the influence of context on individual-level outcomes (Sampson, Morenoff and Gannon-Rowley, 2002; Hipp and Boessen, 2013); most importantly, because the boundaries of these neighbourhoods are often arbitrary, resulting in areas that fail to reflect how individuals perceive and experience their local living environment (Brunton-Smith, Jackson and Sutherland, 2014).

To better capture the role of neighbourhood context in fear of crime, this chapter adopts a more sophisticated and spatially informed way of measuring context. More specifically, I will use a geographic information system (GIS) to construct so-called 'egohoods': individualized measures of context based on a person's residential location (e.g. Hipp and Boessen, 2013). The boundaries of these egohoods are drawn as concentric circles surrounding each individual, and the radii of these circles can be flexibly adjusted. This approach has become the preferred way to study contextual effects (Sharkey and Faber, 2014). This study is the first to apply egohoods to the study of fear of crime. By using these egohoods, I aim to meet the demand for more spatially explicit research into fear of crime (Doran and Burgess, 2012).

I consider four pathways through which the local context may shape fear of crime. The first pathway considers how crime affects feelings of unsafety. The second pathway focuses on demographic and economic characteristics of the context, such as the level of ethnic diversity, economic disadvantage and residential mobility, all of which are believed to increase fear levels. The third pathway looks at how signs of disorder – or incivilities – trigger feelings of fear. The fourth and final pathway explores the potential fear-reducing impact of having facilities in the local living environment. Drawing on the work of urban sociologist Blokland (2008; 2017), I hypothesize that local facilities promote public familiarity and, as a result, feelings of safety. The societal benefits of local facilities are empirically underexplored in fear of crime research, although scholars have analyzed the association with other positive societal outcomes, such as reductions in crime (e.g. Peterson, Krivo and Harris, 2000; Papachristos et al., 2011; Wo, 2016) and increased levels of social capital and cohesion (e.g. Völker, Flap and Lindeberg, 2007; Van Bergeijk, Bolt and Van Kempen, 2008; Curley, 2010; Corcoran et al., 2018).

I analyze the impact of these contextual characteristics on fear of crime in different ways, first using the 'traditional' approach that relies on administrative neighbourhoods and second, by using the more innovative and exploratory approach of egohoods. These egohoods are constructed based on different radii, ranging from 50 to 750 m. As a result, the present study sheds more light on the role of spatial scale within fear of crime research. Fear of crime patterns will be examined within the municipality of Rotterdam. Rotterdam is the second most populous municipality in the Netherlands and is known for its ethnically diverse population and relatively high unemployment rates. I will use geocoded survey data from the Rotterdam Safety Index 2015 (N = 14,620) in combination with geocoded administrative register data. The contextual measures are, with the exception of disorder and crime, constructed on the basis of individual point data. The disorder and crime measures are based on data aggregated to the administrative neighbourhood.

4.2 Theoretical framework

Linking context to fear of crime

I distinguish four pathways through which context may shape fear of crime. In the first place, fear may be a 'rational' reaction to actual crime incidents. A second pathway is through particular demographic and economic characteristics of the context that ultimately deteriorate inhabitants' sense of control. The third pathway centres on disorder and its negative effect on feelings of safety. The fourth pathway considers how local facilities contribute to the development of feelings of familiarity between residents, thereby mitigating feelings of unsafety. I will now elaborate on these pathways separately.

Crime

The first pathway relates fear to crime. Crime is perhaps the most likely underlying cause of feelings of unsafety. Researchers, however, often find a mismatch between fear and the actual crime rates: high levels of fear are reported not only in areas with high rates of crime, but also in those with lower rates (Covington and Taylor, 1991; Doran and Burgess, 2012). Scholars have pointed to methodological imprecisions, which may underlie the weak and inconsistent findings regarding 'crime-fear linkage' (Ferraro and Grange, 1987; Rountree, 1998). There are two sources of imprecision. First, the variety of ways in which fear of crime has been defined and measured. An extensive discussion on this matter is beyond the scope of the present chapter (for more elaborate discussions, see Ferraro and Grange, 1987; Skogan, 1996). Second, the lack of differentiation between different sorts of crime: researchers have argued that more insight into the crime-fear relationship could be gained by distinguishing between different sorts of crime and acknowledging their potentially unique effects on feelings of unsafety (Rountree, 1998). For instance, violent crime incidents arguably have a stronger impact on residents' feelings of safety than property crimes (Ferraro and Grange, 1987; Hooghe and De Vroome, 2016).

The outcome that fear levels do not consistently reflect local crime figures has also led to the suggestion that people behave 'irrationally', reporting 'inappropriately' high levels of fear (Doran and Burgess, 2012). Other scholars have argued that rather than dismissing such feelings as irrational – based on what official crime statistics state (or omit) – fear of crime should in itself be treated as a serious social problem, existing independently of actual victimization or crime rates (Ferraro, 1995; Lupton and Tulloch, 1999). To better understand the underlying causes of fear of crime, researchers should instead consider how people's fear is shaped by the wider environmental context (Jackson, 2004; Scarborough et al., 2010; Brunton-Smith and Sturgis, 2011). In the following paragraphs, I will therefore examine the extent to which specific contextual characteristics relate to feelings of unsafety.

Ethnic diversity, economic deprivation and residential instability

The second pathway considers how the context's economic and demographic characteristics increase fear. More specifically, researchers have related fear of crime to economic deprivation, ethnic heterogeneity and residential mobility. These aspects were already identified in the seminal work of Shaw and McKay (1942), who aimed to explain spatial concentrations of crime by pointing to the role of 'social disorganization'. In socially disorganized communities, inhabitants struggle to realize common values and to maintain effective social control over deviant and other forms of unwanted behaviour (Sampson and Groves, 1989). Shaw and McKay (1942) observed that low-income areas - which often

happen to be ethnically diverse and residentially unstable - lack the capacity to maintain social order and are particularly conducive to disorganization and, consequently, crime. As such, social disorganization in a community may be understood as the product of inhabitants' diminished feelings of self-efficacy combined with their difficulty to understand and interpret each other's behaviour. More recent formulations of social disorganization theory have introduced the concept of collective efficacy in order to improve our understanding of why crime rates vary within cities. Collective efficacy refers to the process of activating or converting social ties among residents in order to achieve collective goals such as control over crime (Sampson, 2010). Reduced collective efficacy may also be related to feelings of unsafety: as social organization deteriorates, or inhabitants perceive it as such, fear of crime may also increase (Greenberg, 1986).

According to this line of reasoning, fear of crime encompasses more than anxiety about crime or victimization alone. These feelings instead reflect a broader set of concerns about the breakdown of the local community. Environments that are judged as being unpredictable, unfamiliar and beyond the control of oneself or the community may generate a sense of disquiet and, ultimately, of unsafety caused by the feeling that 'anything could happen' (Jackson, 2009: p.12). It follows that deprivation, diversity and instability may influence fear of crime both directly and indirectly. Brunton-Smith and Sturgis (2011) express this as follows: 'neighbourhood social-structural characteristics are thought [...] to affect fear of crime both indirectly through their influence on criminality and disorder in the neighbourhood and directly as signifiers of deficient mechanisms of social control and weak or fragile feelings of efficacy within the local community' (p.336).

A range of studies has empirically examined the link between economic disadvantage, ethnic diversity and residential instability on the one hand and fear of crime on the other hand. Research into these factors has primarily been conducted within the context of American cities and, to a lesser extent, within the British context (for exceptions, see Hanslmaier, 2013; Hooghe and De Vroome, 2016). More fear of crime is found in neighbourhood contexts with higher levels of economic disadvantage (Scarborough et al., 2010; Brunton-Smith and Sturgis, 2011; Hanslmaier, 2013) and more ethnic diversity (Moeller, 1989; Covington and Taylor, 1991; Chiricos, Hogan and Gertz, 1997; Pickett et al., 2012). In the specific context of Dutch neighbourhoods, Oppelaar and Wittebrood (2006) found significant associations between the level of economic disadvantage and diversity on the one hand and feelings of unsafety on the other hand. The association between residential mobility and fear of crime has been less frequently examined; residential instability is more often considered a relevant predictor of crime (Sampson, Raudenbush and Earls, 1997; Boggess and Hipp, 2016; but see Brunton-Smith and Sturgis, 2011).

Disorder

A third pathway connects disorder on the street to feelings of unsafety. Hunter (1978) was the first to address how manifestations of disorder – also called incivilities – provoke feelings of fear. These incivilities, defined by LaGrange and colleagues (1992) as low-level breaches of community standards, do not necessarily trigger fear by themselves. Fear is triggered because they 'signal' the erosion of conventionally accepted norms and values and a lack of social control (LaGrange, Ferraro and Supancic, 1992). As such, residents perceive incivilities as symbolic cues that there is a greater possibility that they will become a victim of crime. Incivilities may thus be a better predictor of fear of crime than actual crime as they are more visible and present in public space (Hunter, 1978; Wyant, 2008). Signs of disorder may either be social, such as public drinking, drug use and fighting, or physical, such as litter, graffiti and vandalism (Covington and Taylor, 1991). Over the years, various scholars have further refined and redeveloped the incivilities thesis (see Taylor, 2001). Kelling and Wilson's (1982) broken window theory, on how persistent incivilities may eventually lead to higher neighbourhood crime rates, is considered especially influential (Robinson et al., 2003). The relationship between disorder and fear of crime appears to be well established, both theoretically and empirically (LaGrange et al., 1992). The effect of neighbourhood-level disorder on fear of crime has been observed in a range of studies (e.g. Covington and Taylor, 1991; Rountree and Land, 1996; Markowitz et al., 2001; Scarborough et al., 2010; Brunton-Smith and Sturgis, 2011).

Facilities and familiarity

The fourth and final pathway proposes that facilities may decrease fear levels by facilitating familiarity. Based on a systematic review of qualitative studies, criminologists suggest that familiarity with the living environment is key to reducing the fear-inducing impact of contextual features (Lorenc et al., 2013). Public familiarity is a relevant concept in this regard; it refers to a feeling of familiarity that emerges through running into the same people regularly (Blokland, 2008; 2017). Engaging in trivial and superficial forms of interaction makes inhabitants better able to 'place' each other in public space and to estimate whether other residents can (or cannot) be trusted: 'public familiarity makes the social clear, and can make us feel safe for that reason' (Blokland, 2017: p.127). The opportunity to meet and familiarize depends on the presence of facilities in the local environment (Van Bergeijk et al., 2008; Van Eijk and Engbersen, 2011). Facilities function as an everyday meeting place (Blokland, 2008). Oldenburg (1989) refers to these encounter opportunities as 'third places': public spaces that host regular, voluntary, informal and happily anticipated gatherings of individuals beyond the realms of home or work. Having nearby facilities may create 'a

casual social environment' for local residents. These facilities not only include shops and recreation facilities, but also schools, churches, community centres and so forth.

Only one study has researched the association between facilities and fear of crime in the context of US cities: it was shown that the use of local facilities was unrelated to levels of fear (Riger, LeBailly and Gordon, 1981). The role of local facilities is more frequently examined in relation to other societal outcomes such as increases in cohesion (or social capital) or declining crime rates. Quantitative analyses conducted in the Dutch context demonstrate that the presence or use of facilities is associated with more contact and friends in the neighbourhood (Van Bergeijk et al., 2008) and with an improved ability to accomplish shared goals in the neighbourhood (Völker et al., 2007). Besides, two other studies showed that the presence of facilities is related to improved access to social capital (Curley, 2010) and higher levels of collective efficacy and civic engagement (Corcoran et al., 2017). Studies on crime have analyzed which local facilities reduce crime rates in the context of American neighbourhoods. Facilities are expected to lower crime levels by stimulating social organization or collective efficacy (Wo, 2016). The evidence is, however, somewhat mixed. Certain facilities, such as recreation centres, religious facilities and other third places, are associated with lower crime rates (Peterson et al., 2000; Beyerlein and Hipp, 2005; Wo, 2016). Facilities may also elevate crime rates: studies show that schools (Slocum et al., 2013) and bars and banking establishments (Wo, 2016) are associated with higher crime rates.

Negative effects of facilities are also examined in the literature on non-residential land use. These effects include increased levels of crime (e.g. Wilcox et al., 2005; Lockwood, 2007; Stucky and Ottensmann, 2009) and incivilities (e.g. Taylor et al., 1995; Sampson and Raudenbush, 1999; McCord et al., 2007). One explanation suggests that non-residential land use blocks social control, thereby giving rise to uncontrolled deviant behaviour. The reason is two-fold: first, having more non-residential buildings implies having fewer inhabitants who may take care of the neighbourhood and, second, non-residential land use draws outsiders to these areas, decreasing familiarity within an area (Taylor et al., 1995).

Defining and measuring local context

Although 'the neighbourhood' is often perceived as the main contextual unit of interest in fear of crime research, the conceptualization and measurement of this unit generally lacks theoretical justification. Most existing research is instead driven and constrained by considerations of data availability. Consequently, neighbourhoods are often pragmatically defined as fixed entities with predefined administrative boundaries (Brunton-Smith

and Jackson, 2012; Van Ham et al., 2013). Using fixed and administratively defined neighbourhoods to detect contextual-level effects is considered problematic for at least two reasons. First, these rather simple measures of the neighbourhood generally lack meaningful boundaries. This is especially the case from the perspective of the inhabitants and especially for those who live near an administrative neighbourhood boundary. In the Dutch case, neighbourhoods are defined by the municipality and aimed at creating units with a homogenous planning structure and boundaries that follow natural demarcations (e.g. rivers, railway lines).[32] The resulting neighbourhoods, however, do not necessarily align with how inhabitants define their neighbourhood. Perceptions of the neighbourhood are structured not only by physical characteristics, but also by activity patterns and symbolic boundaries (Van Gent et al., 2016). In addition, researchers have found that Dutch administrative neighbourhoods are generally much larger in size than how residents experience their neighbourhood (Wassenberg et al., 2006). The second drawback of using administrative neighbourhoods lies in the inflexibility of this approach: relying on fixed neighbourhood boundaries limits the ability to explore patterns on a smaller scale. If inhabitants respond to their direct environment rather than the broader neighbourhood, researchers who rely on administrative neighbourhoods will omit such effects because the unit of aggregation is too large (Hipp, 2010). The lack of meaningful boundaries and inaccurate measurement of the local environment may in part explain why the empirical evidence for neighbourhood-level influences on fear of crime is 'surprisingly thin and inconsistent' (Brunton-Smith and Sturgis, 2011: p.331).

Because of the pitfalls of using administrative neighbourhoods, Hipp and Boessen (2013) proposed a new strategy for measuring context which they call egohoods.[33] As mentioned earlier, egohoods are concentric circles with a certain radius surrounding each inhabitant, providing each person with an individualized measure of neighbourhood context. It is argued and expected that egohoods better align with the behaviours and perceptions of inhabitants than the 'traditional' administrative neighbourhood. Research has demonstrated that people tend to travel within their neighbourhood area in concentric circles and do not necessarily stay within their own neighbourhood. Moreover, inhabitants who are asked to define their neighbourhood often place themselves in the centre (Hipp and Boessen, 2013). In addition to creating more meaningful boundaries, another advantage of the egohood approach is its flexibility. The radius size of each egohood can be flexibly adjusted, enabling the construction of multi-scale egohoods. Accordingly, I can assess which spatial scale is most relevant to research contextual influences and whether this implies zooming in (on the 'micro-context') or zooming out (on the broader environment).

[32] Statistics Netherlands (2018). Richtlijnen voor gemeenten bij het vaststellen van indeling naar wijken en buurten – Versie 2018. Retrieved from: www.cbs.nl/-/media/cbs/dossiers/nederland%20regionaal/gemeente/gemeente%20en%20regionale%20indelingen/richtlijnen-voor-gemeenten-vaststellen-indeling-naar-wijken-en-buurten.pdf (accessed January 28, 2019).

[33] Dinesen and Sønderskov (2015) introduced a similar approach in their article on ethnic diversity and social trust.

Egohoods with small radii arguably produce more statistical power to detect contextual effects due to increased levels of spatial homogeneity, resulting in more accurate measures of the contextual characteristics (Hipp, 2007; Oberwittler and Wikström, 2009). Other fear of crime researchers have advocated the need to zoom out in order to capture possible 'geographical spillover effects' of the broader environment (Brunton-Smith and Jackson, 2012). In any case, it is assumed that the egohood approach provides a more precise and hence relevant means of measuring context. I therefore expect that the contextual effects will be stronger when the analyses are based on egohoods rather than administrative neighbourhoods. I do not have specific expectations regarding the egohoods.

4.3 Research design

Data

The analyses in this chapter draw on a combination of survey data and administrative and register data. Survey data were obtained from the Rotterdam Safety Index 2015, a biennial survey on crime-related feelings of unsafety and victimization. The survey was conducted in 2015 among a subset of Rotterdam's population (aged 15 years or older). The survey sample was drawn from the municipality population register. In total, 14,620 respondents filled in the questionnaire, either online or through a written questionnaire. The net response rate was 23.6%. I only selected respondents whose residential location (in latitude and longitude) was known (N = 14,170).

To construct the contextual measures, I used data provided by the municipality of Rotterdam and Statistics Netherlands. The measure of disorder is based on the respondents' perceptions and is aggregated to the administrative neighbourhood level. The research department of the municipality of Rotterdam (Research and Business Intelligence, OBI) granted access to the Personal Records Database (PRD, in Dutch: *Basisregistratie Personen*). The PRD contains highly-detailed anonymized information about all individuals legally residing in Rotterdam, including their country of birth, their parents' country of birth, geographic location of residence (in latitude and longitude) and their length of residence at their current address. The measures of ethnic diversity and residential mobility were calculated based on this information. OBI also provided data on housing values (in Dutch: *WOZ-waarde*) and the locations of facilities. All data supplied by OBI are geocoded, meaning that longitude and latitude coordinates are attached to each data point (which represents respondents, inhabitants, housing units or facilities). For the remaining contextual variable – crime – I relied on publicly available data from Statistics Netherlands.[34] The crime statistics are only available at the aggregated level of administrative neighbourhoods.

[34] Statistics Netherlands (2016). Geregistreerde criminaliteit per gemeente, wijk en buurt, 2010–2015. Retrieved from www.cbs.nl/nl-nl/maatwerk/2016/45/geregistreerde-criminaliteit-per-gemeente-wijk-en-buurt-2010-2015 (accessed January 28, 2019).

Operationalizations

The outcome variable – fear of crime – was measured through a set of three items. Respondents were asked how often they feel unsafe in their neighbourhood; how often they do not open the door during the evening or at night because they feel unsafe and how often they avoid certain areas in their neighbourhood because they feel unsafe (answer categories: never, occasionally, frequently). It should be noted that this measurement of fear refers to how often respondents feel unsafe or take certain actions rather than the intensity of these feelings. Asking respondents about the frequency of crime fears is considered methodologically and empirically more meaningful than posing questions about the overall intensity of crime-related worries (Farrall and Gadd, 2004; Gray, Jackson and Farrall, 2008). The three items measuring fear appear to form a unidimensional scale, accounting for 66% of the variance. The scale is based on the average of at least two valid answers and is internally consistent with a Cronbach's α of 0.73. A higher score (on the four-point scale) indicates more fear.

Five variables were distinguished at the contextual level. To capture crime, I included police-recorded crime statistics and differentiated between the incidence of violent crimes (crimes such as sexual assault, homicide, stalking and human trafficking) and of burglaries. The relative incidence per 1000 inhabitants was calculated for both crime types. Ethnic diversity was measured by the percentage of non-Western minorities.[35] For economic status, I included the natural logarithm of the average housing value. Obviously, a higher average housing value indicates less economic disadvantage. The degree of residential mobility was calculated as the average length of residence. For the measure of incivilities, I relied on respondents' perceptions. The respondents were asked about physical incivilities in their neighbourhood and, more specifically, about how often there is litter on the street; garbage outside of containers; graffiti on walls or buildings and vandalism of street furniture (answer categories: (almost) never, sometimes and frequently). These items were combined into one scale with a Cronbach's α of 0.79. For the last contextual variable – facilities – I included the total number of facilities, including daily grocery shops; schools; healthcare facilities; religious facilities; community centres; restaurants, cafes and bars; and libraries. This variable is transformed by taking the square root of it. I also took into account several control variables at the individual level. These variables and their descriptive statistics are depicted in Table 4.1. Aside from the gender and ethnicity variables, all variables are based on self-reported answers. Missing values are either included as dummies or deleted listwise. Descriptive statistics for the contextual variables are summarized in the Appendix (Table A4.1).

[35] Non-Western minorities are defined as those who were born in or who have at least one parent who was born in Africa, Latin America or Asia (including Turkey). Instead of the share of non-Western minorities, researchers often use the Herfindahl-Hirschman Index to measure ethnic diversity. These measures, however, tend to correlate strongly with each other.

Measuring context

I employed two ways of measuring context. The first approach relies on administrative neighbourhoods and the second approach relies on egohoods. Depending on the approach, I included and aggregated contextual data at the level of administrative neighbourhoods or the level of the egohood. The calculations were conducted using ArcGIS Pro. Most contextual variables were calculated by averaging or adding the value of the data points that lie within a specific neighbourhood or egohood.

Table 4.1. Descriptive statistics of individual variables.

	Min.	Max.	Mean	SD
Fear of crime	1	4	1.79	0.85
Age	14	98	48.96	17.81
Gender (ref. = male)	0	1	0.55	
Ethnicity (ref. = Dutch)	0	1	0.54	
Moroccan	0	1	0.04	
Turkish	0	1	0.06	
Surinam	0	1	0.12	
Other non-western	0	1	0.11	
Western	0	1	0.12	
Education (ref. = low)	0	1	0.10	
Middle low	0	1	0.17	
Middle	0	1	0.31	
High	0	1	0.36	
Tenure (ref. = renter)	0	1	0.48	
Employment status (ref. = unemployed)	0	1	0.54	
Children in household (ref. = none)	0	1	0.38	
Victim of burglary (ref. = not)	0	1	0.18	

The construction of the individualized measures of crime and incivilities followed a different procedure, either because the underlying data is only available at the level of administrative neighbourhoods (crime statistics) or because there are too few data points to construct a reliable measure (disorder). To calculate the individualized measures of crime, I determined the proportions of administrative neighbourhoods that are located within an egohood before calculating the average level of burglary or violent crime using weights according to the proportion of the given neighbourhood(s) within the egohood and their values. I followed a two-step procedure to calculate disorder measure. First, the respondents' responses were aggregated to the administrative neighbourhood level. This resulted in an aggregated measure of incivilities based on an average of 226 observations (minimum: 2, maximum: 499). The second step is similar to the way in which the individualized

crime variable was constructed. I first determined which proportion of the administrative neighbourhood(s) falls within each egohood and then calculated an average level of disorder using weights according to the proportion of the given neighbourhood(s) that lies within a specific egohood.

In total, six different-sized egohoods were constructed with radii ranging from 50 to 750 m. The smallest egohood covers an area of 0.8 ha and has 130 inhabitants on average (median: 118). In contrast, the largest egohood, with a 750 m radius, encompasses an area of approximately 177 ha and has 12,305 inhabitants on average (median: 10,250). The size of a 750 m radius egohood corresponds closely to an average-sized Rotterdam administrative neighbourhood, which is approximately 187 ha (median: 120 ha). The average population size of an administrative neighbourhood is 7889 (median: 7760). It should be noted that only data on Rotterdam was used. This may be problematic for respondents who live near Rotterdam's boundaries and consequently end up with 'incomplete' egohoods if their egohood crosses the municipal boundary. It was calculated that between 0.5% (for a 50-m egohood) and 22% (for a 750-m egohood) of the respondents have an egohood that does not entirely fall within the boundaries. These cross-boundary areas are, however, relatively small. I ran the regression analyses based on both the full sample (i.e. all respondents) and the reduced sample (i.e. respondents with a 'complete' egohood). No large differences were observed. I therefore decided to report the results based on the full sample. The other results are available upon request.

Analytical strategy

For the regression analyses based on administrative neighbourhoods, I used two-level linear multilevel models in order to take into account the nested structure of the data (respondents nested in neighbourhoods). The contextual effects were assumed to be fixed. Before estimating the full model, I calculated the intraclass correlation (ICC) based on the intercept-only model. The ICC indicates the proportion of variance in respondents' answers that can be attributed to the administrative neighbourhood level. The null model results in an ICC of 0.06. Ordinary least-squares regression models are estimated for the analyses based on egohoods.[36]

[36] Because of potential spatial autocorrelation, I also estimated spatial error models in GeoDa with distance-based neighbours; the distance is based on the radius of the egohood (e.g. Tolsma and Van der Meer, 2017). These models produced virtually identical results. The results of the spatial error models are available upon request.

4.4 Results

I will first report the results of the multilevel regression analysis with contextual variables measured at the administrative neighbourhood level (see Table 4.2). Next, I will display the contextual effects of this model in Figure 4.1. Figure 4.1 also includes the contextual effects estimated on the basis of the egohoods of different radii. All findings reported below are based on regression models that include all individual control variables.

The results of the multilevel model shown in Table 4.2 indicate that fear is significantly higher among elderly adults, women and unemployed respondents. These findings are in line with the vulnerability hypothesis: fear is more widespread among people who perceive themselves as physically or socially vulnerable because they either see themselves as physically unable to resist potential attacks (e.g. females and older inhabitants) or lacking the resources needed to take actions to prevent victimization (e.g. the unemployed) (Covington and Taylor, 1991; Eitle and Taylor, 2008). Level of education and ethnicity are unrelated to feelings of unsafety, with the exception of middle-educated respondents and those with a Turkish background. These specific groups report higher levels of fear. Victimization experiences are also related to increased fear levels. In contrast, homeowners and respondents with children in their household report less fear.

As for the contextual variables at the neighbourhood level, I only observed significant effects of ethnic diversity and the two crime rates. The diversity and crime effects are in line with the expectations: residents living in ethnically diverse neighbourhoods express more fear of crime. More specifically, an increase of 10% points in diversity increases fear of crime by 0.03 (b = 0.003 × 0.10) on a four-point scale. In addition to this, higher levels of fear are observed in neighbourhoods where burglaries and violent crimes are relatively more prevalent. In neighbourhoods where burglaries and violent crimes are most prevalent, inhabitants report, respectively, 0.389 point (b = 0.009 × 43) and 0.529 point (b = 0.002 × 256) higher on the fear of crime scale. The remaining contextual variables – housing values, residential mobility, facilities and disorder – are unrelated to individual fear levels. These findings indicate that the administrative neighbourhood is not necessarily a relevant spatial unit for detecting contextual effects on fear of crime, with the exception of the diversity and crime effects.

Table 4.2. Multilevel analysis of fear of crime.

	B (SE)
Age	0.001 (0.000) *
Gender (ref. = male)	0.326 (0.014) ***
Ethnicity (ref. = Dutch)	
Moroccan	0.071 (0.038)
Turkish	0.178 (0.031) ***
Surinamese	-0.031 (0.023)
Other non-western	0.018 (0.024)
Western	0.014 (0.021)
Education (ref. = low)	
Middle low	0.037 (0.027)
Middle	0.058 (0.025) *
High	-0.002 (0.027)
Tenure (ref. = renter)	-0.088 (0.016) ***
Employment status (ref. = unemployed)	-0.075 (0.017) ***
Children in household (ref. = none)	-0.033 (0.018) *
Victim of burglary (ref. = not)	0.396 (0.016) ***
Ethnic diversity	0.003 (0.000) ***
Residential mobility	-0.000 (0.000)
Economic status	-0.096 (0.051)
Burglaries	0.009 (0.002) ***
Violent crime	0.002 (0.001) *
Disorder	0.169 (0.122)
Facilities	0.003 (0.004)

N 13,503
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The administrative neighbourhood and egohoods

I now will compare the impact of the seven contextual variables on fear of crime across the different spatial units and elaborate on differences and similarities. Figure 4.1 presents an overview of the estimated effects. It should be noted that the results of residential mobility are not displayed. This variable is not included in the figure because no significant associations between residential mobility and fear of crime were found. Overall, this study provides no evidence that inhabitants feel more unsafe in places where the average length of residence is low(er). Figure 4.1a shows that the occurrence of burglaries is a significant predictor of fear in all contexts. The impact of this predictor varies only slightly between the aggregation scales. The effects at the four smallest egohood levels and administrative neighbourhood level are especially similar in size. Besides, I observed somewhat of an

upward pattern regarding the two largest egohoods, which have radii of 500 and 750 m. The effect on fear of crime is strongest when the burglary rates are measured at the largest egohood level. In contrast to burglaries, violent crimes (see Figure 4.1b) are only significant predictors of fear of crime in the three smallest egohoods and within administrative neighbourhoods. Once more, the sizes of the significant effects are very similar. These similarities in effect sizes are perhaps not very surprising: if egohoods are located in just one administrative neighbourhood – which is more likely in the case of the smaller egohoods – these egohoods will obtain a similar score as a result of how the measurement is constructed. The same holds for the burglaries measure.

Figure 4.1. The impact of contextual variables estimated at different contextual units and sizes with 95% confidence intervals. Significant b-estimates are filled ($p < 0.05$), non-significant b-estimates are only outlined.
N = 13,503.

Figure 4.1a. Burglaries.

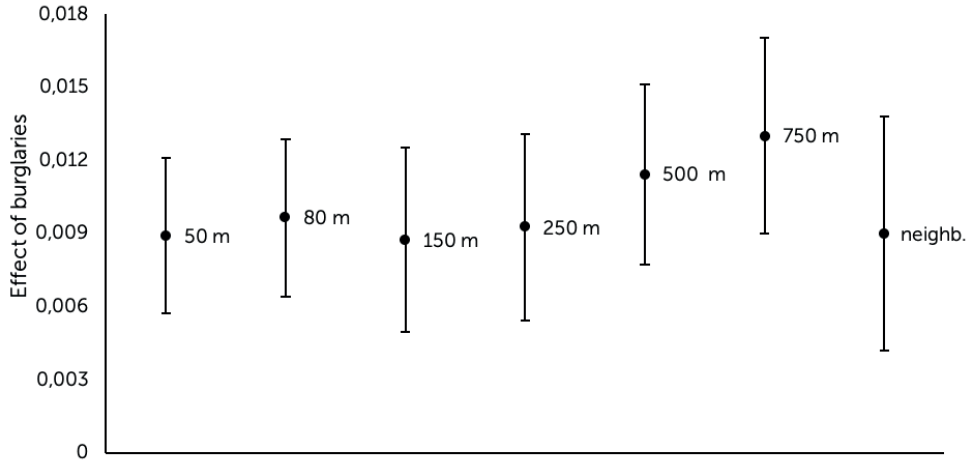


Figure 4.1b. Violent crimes.

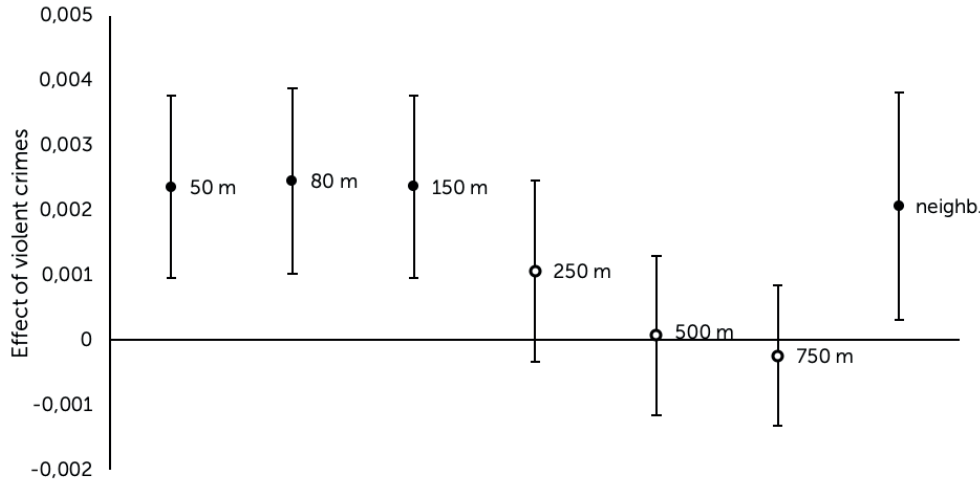


Figure 4.1c. Ethnic diversity.

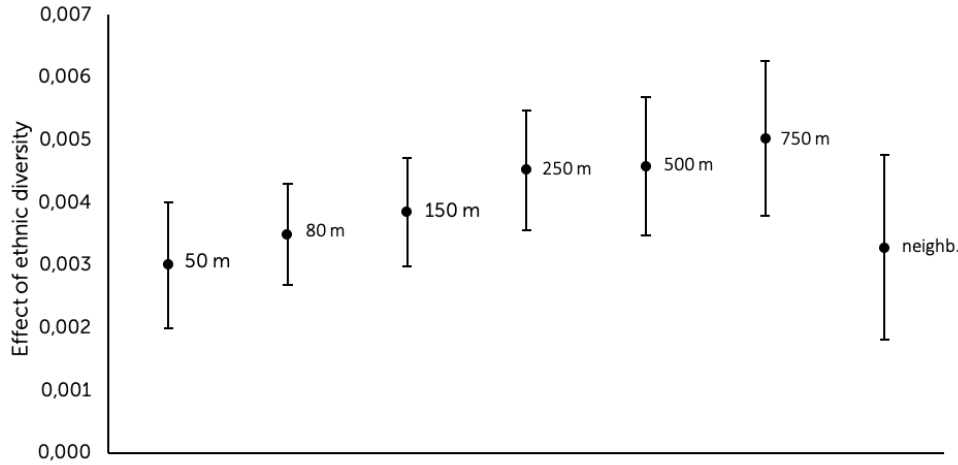


Figure 4.1d. Economic status.

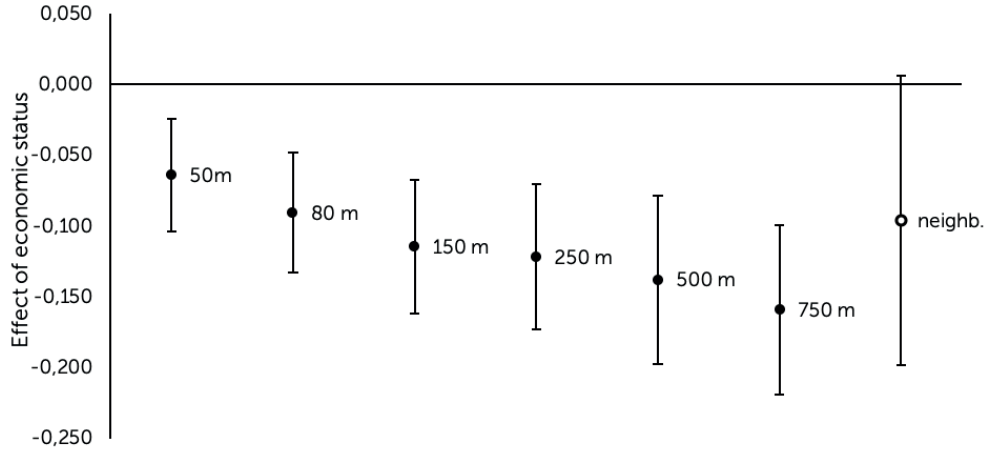


Figure 4.1e. Disorder.

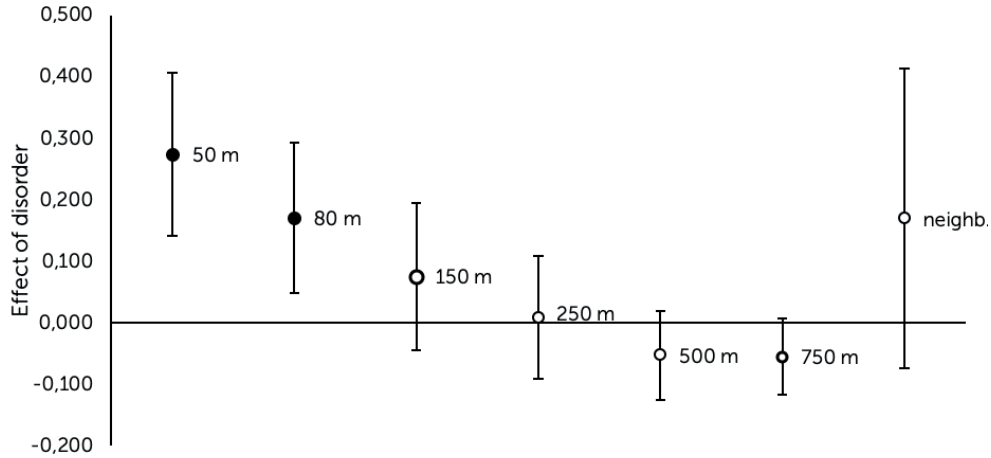
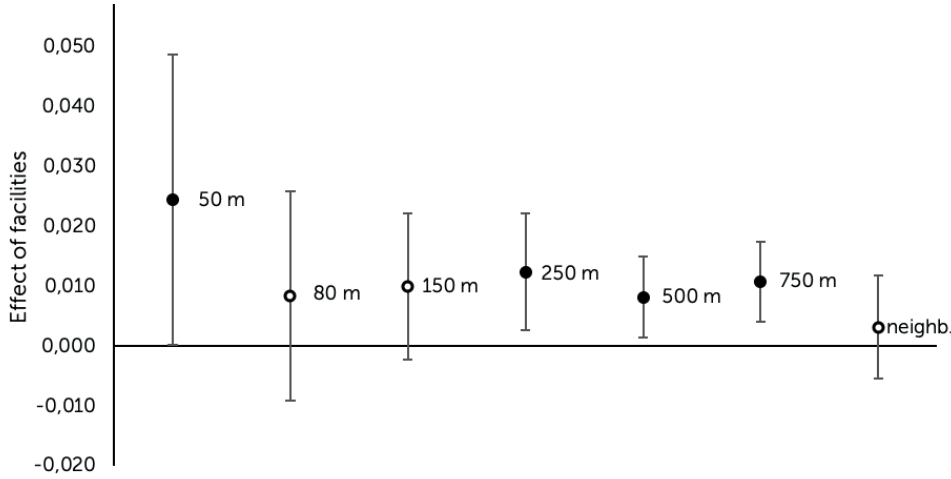


Figure 4.1f. Facilities.



The level of ethnic diversity (Figure 4.1c) is a significant predictor of fear of crime within all spatial units, including the administrative neighbourhood. Overall, the effects indicate that more fear of crime is reported in areas with higher levels of diversity. I observe a consistent pattern regarding the egohoods: the diversity effects become somewhat more prevalent when diversity is aggregated to egohoods with a larger radius. These findings confirm that the strongest effects of diversity are not necessarily found within the smallest contexts (cf. Tolsma and Van der Meer, 2017). In their study on trust in neighbours, Tolsma and Van der Meer (2017) also found stronger diversity effects on larger spatial scales. The results of the current analyses indicate that the effect of ethnic diversity on fear of crime is less detrimental in smaller contexts. This may be because inhabitants of smaller areas are more familiar with each other as a result of physical proximity. Research has shown that residents are most likely to interact with those who live closest to them (Hipp and Perrin, 2009). Increased familiarity and a better ability to 'place' each other in public space may lessen the negative impact of diversity on fear. This mechanism is less likely to operate in larger contexts. As the scale expands, familiarity between residents decreases and the diversity effect becomes more prevalent.

A similar mechanism may underlie the pattern of economic status, which is illustrated in Figure 4.1d. Significant associations between economic status and fear of crime are observed for all egohoods. More specifically, it has been shown that a higher economic status is related to less fear. It also appears that, similar to ethnic diversity, the impact of economic status is slightly stronger in egohoods with a larger radius. The notions of physical

proximity and familiarity may once more explain why weaker effects are found in smaller contexts. It could be that in these contexts the impact of economic status is minimized by a sense of familiarity that residents share. Overall, the results suggest that it is not only, and especially, characteristics of smaller local contexts that play a role in generating fear. It has already been observed that economic status measured at the level of the administrative neighbourhood is unrelated to fear levels.

Disorder (Figure 4.1e) aggregated to the administrative neighbourhood is also not significantly related to fear levels. Furthermore, Figure 4.1e shows that the measure of disorder is only significantly associated with more fear in the two smallest egohoods, which have radii of 50 and 80 m. The strongest disorder effect is found within the smallest egohood. Besides, Figure 4.1e demonstrates that the amount of disorder in larger egohood contexts is not related to fear of crime. In contrast to the effects of diversity and economic status, the effects of incivilities seem to be 'localized' (Hipp, 2007). This means that disorder only affects the perceptions of residents who live close by, probably because inhabitants tend to be more aware of disorderly things happening in their immediate surroundings than those located further away (Hinkle and Weisburd, 2008).

Last, I consider whether and how the number of facilities in the residential environment affects feelings of unsafety. These facilities include both commercial venues and non-commercial settings. The effects are displayed in Figure 4.1f. Significant associations are reported in egohoods with a 50, 250, 500 and 750 m radius. Contrary to the expectations, more facilities in these contexts are associated with higher levels of fear. It seems that facilities in the micro-context and in larger egohoods are fear generating. There is no clear pattern with regard to the effect sizes. The largest effect is found within 50-m egohoods, with a p-value just below 0.05. The significant effects detected in the larger egohoods are similar in size. Rather than facilitating familiarity and subsequently increasing feelings of safety, I provide tentative evidence that facilities may actually increase fear levels.

Overall, the findings suggest that fear levels are affected by a person's residential context. More specifically, I found that crime, ethnic diversity, economic status, disorder and facilities all have an effect on feelings of unsafety. These contextual effects differ, however, in size and are not detected in all spatial contexts, indicating that it matters how and to which scale data are aggregated (for an overview, see Table 4.3). This is a familiar issue in spatial statistics, known as the modifiable areal unit problem (MAUP). Central to the MAUP is the notion that analytical results are sensitive to the way in which spatial units are defined (Fotheringham and Wong, 1991).

Table 4.3. Schematic overview of results. Fear of crime and contextual effects.

	50 m egh.	80 m egh.	150 m egh.	250 m egh.	500 m egh.	750 m egh.	neighb.
Burglaries	***	***	***	***	***	***	***
Violent crimes	**	**	**	×	×	×	*
Ethnic diversity	***	***	***	***	***	***	***
Economic status	*	*	***	***	***	**	×
Residential mobility	×	×	×	×	×	×	×
Disorder	***	**	×	×	×	×	×
Facilities	*	×	×	*	*	**	×

× = no significant effect on fear, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

4.5 Discussion and conclusion

Whether and how the residential context shapes fear of crime has become a central theme in criminological research. Scholars studying the contextual determinants of fear of crime almost always rely on administrative neighbourhoods to define the residential context (e.g. Covington and Taylor, 1991; Chiricos et al., 1997; Brunton-Smith and Sturgis, 2011; Pickett et al., 2012). The present study combines this traditional neighbourhood approach with a more innovative way to measure the residential context. Using very detailed GIS data, I constructed egohoods with radii ranging from 50 to 750 m. These egohoods enable us to study fear of crime in a more spatially informed way.

The analyses show that individuals' feelings of unsafety are affected by their residential context. With the exception of residential mobility, all the included contextual variables are to some extent related to fear of crime. More importantly, however, I found that not every contextual characteristic is relevant at every spatial scale. The 'appropriate' spatial level seems to differ per characteristic. The results suggest that the effects of context operate at different levels (cf. Hipp, 2007). The strength of these relationships also depends on the spatial scale at which the contextual effects are assessed. In the case of ethnic diversity and economic status, stronger effects on fear of crime are observed in larger egohoods. As for disorder, the opposite holds true. The tendencies in the effect sizes of crime and facilities show less clear patterns.

Another notable result of the present study is that the administrative neighbourhood proved to be the least relevant spatial context in which to detect significant contextual effects. It suggests that administratively defined areas do not necessarily align with how inhabitants experience unsafety, thereby questioning the use of administrative units in fear of crime

research. This is consistent with outcomes of previous European studies, which also used administrative units to define context and examine fear patterns in Belgium and Germany. These studies offer only limited support for the impact of context on fear (Hanslmaier, 2013; Hooghe and De Vroome, 2016). In contrast, research conducted by Brunton-Smith and Sturgis (2011) and Brunton-Smith et al. (2014) provides stronger evidence that characteristics of the local level have a direct influence on fear among UK residents. An explanation for these diverging results is the measurement of context, and whether the resulting spatial units align with how individuals experience their local surroundings. Either way, it urges us to think about whether 'the neighbourhood' is still the most appropriate concept to adopt. I agree with Sharkey and Faber (2014) that the terms residential context and residential environment are more useful when studying how context shapes individual-level outcomes. Instead of asking 'do neighbourhoods generate fear of crime?' (Brunton-Smith and Sturgis, 2011), we should examine how the residential environment influences feelings of unsafety.

This chapter has explored the ways in which the residential environment impacts fear of crime. More specifically, I have distinguished four pathways and hypothesized that fear of crime may be affected through (1) crime; (2) demographic and economic characteristics of the context (i.e. ethnic diversity, economic disadvantage and residential mobility); (3) incivilities and (4) facilities that promote familiarity. The analyses support the first pathway: it has been shown that more burglaries and violent crimes are indeed related to higher fear levels, indicating that fear of crime is related to objective crime to at least some degree. This result is in line with other Europeans studies (Brunton-Smith and Sturgis, 2011, but also see Hooghe and De Vroome, 2016). I found mixed evidence for the second pathway. More fear of crime is observed in ethnically diverse areas with a lower economic status. The degree of residential mobility is, however, not associated with fear. The latter finding is particularly insightful: although residential instability is often linked to the breakdown of social control, its association with fear of crime has not been explored extensively (for an exception, see Brunton-Smith and Sturgis, 2011).

The third pathway, which centres on the role of incivilities, is partially supported. An effect on fear was observed, but only in the smallest egohoods. The link between incivilities and fear has already been well established by previous research (e.g. Covington and Taylor, 1991; Rountree and Land, 1996; Markowitz et al., 2001). I add to this literature by showing that incivilities are particularly important to inhabitants whose immediate surroundings are perceived as being disorderly. The findings regarding the fourth and final pathway were not in line with the expectations. Based on earlier research, the prediction was that fear levels would be lower in areas with more facilities. The analyses showed that the opposite

is the case. Rather than creating feelings of public familiarity and decreasing fear levels, the findings indicate that facilities may instead lower feelings of familiarity and safety. I should, however, note that I did not examine whether inhabitants actually use facilities, nor did we directly test the relationship between facilities and feelings of familiarity. Actual use is considered key to understanding the development of public familiarity (Blokland and Nast, 2014).

I should also consider other limitations of this study. For the measures of crime and disorder, I had to rely on data that were only available at the aggregated level of administrative neighbourhoods. The individualized measures of crime and disorder are therefore prone to measurement error since it is implicitly assumed that the administrative neighbourhoods are homogeneous in their disorder and crime scores. If this assumption is invalid, measurement errors are likely to occur, especially in the case of the smaller egohoods. This may result in biased results and an underestimation of the disorder and crime effects at smaller scales (Sluiter, Tolsma and Scheepers, 2015). More accurate estimations of these effects require access to more detailed data. A second limitation is the use of cross-sectional data, making it impossible to control for selective residential mobility. Consequently, a causal effect of context on fear of crime cannot be assumed. Longitudinal data are needed to overcome this limitation.

Overall, this study shows that it is important to consider the role of spatial scale when studying the contextual determinants of fear of crime. I outline two directions for future research. The first direction involves the construction of more sophisticated egohoods based on the road network and other natural demarcations to produce areas that better align with how residents experience their local environment. The other direction is examining to what extent the impact of the contextual factors depends on individual level characteristics. The effects of contextual characteristics may differ for different groups of individuals.

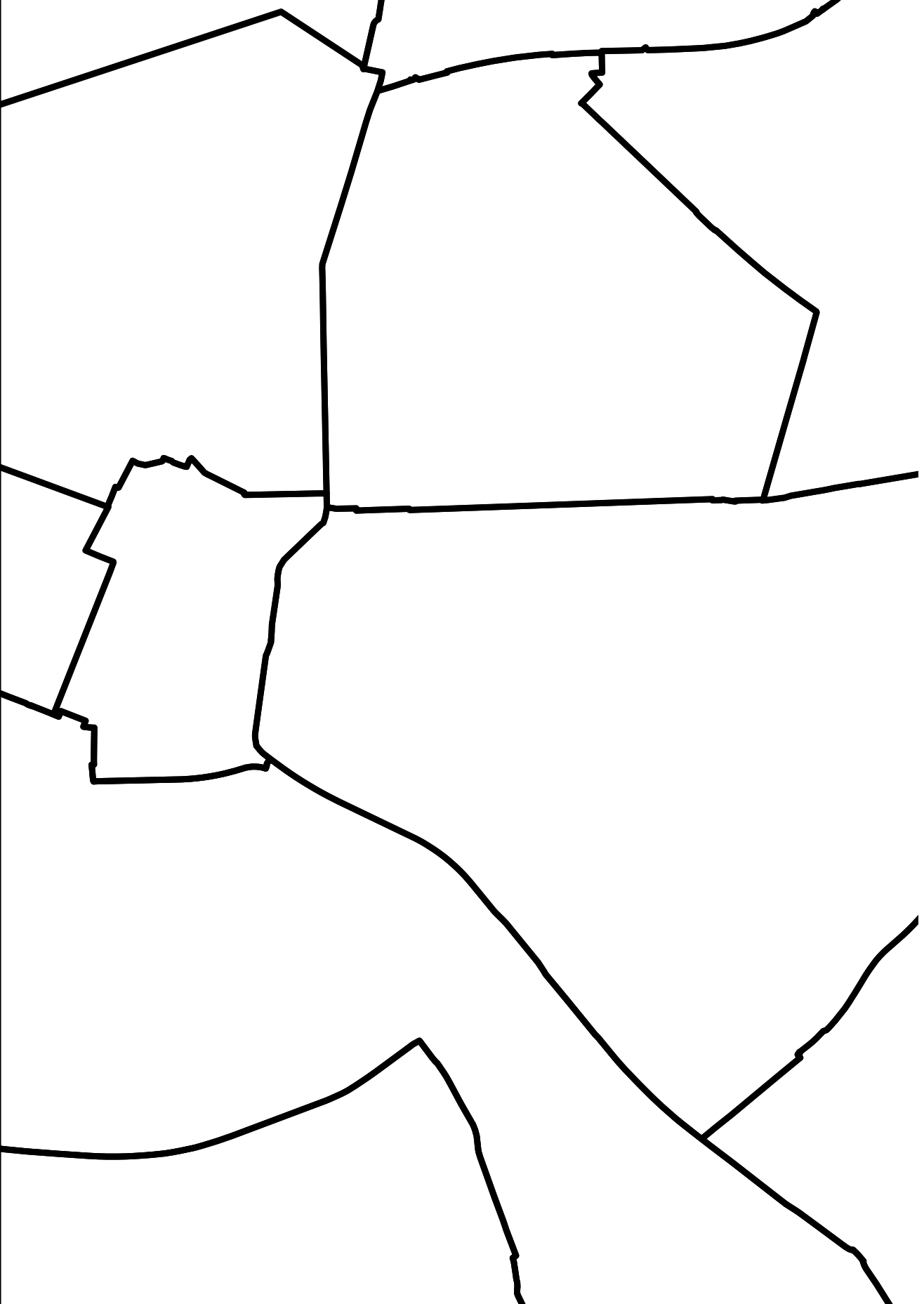
Appendix

Table A4.1. Descriptive statistics of contextual variables.

	Min.	Max.	Mean	SD
Administrative neighbourhood				
Burglaries	0	43	7.31	4
Violent crimes	0	256	9.51	9.99
Ethnic diversity	0	80.18	36.22	19.03
Economic status	11.22	12.98	11.83	0.33
Residential mobility	38	235	111.25	24.68
Disorder	1.33	2.30	1.89	0.15
Facilities	0	14.32	6.41	2.36
Egohood 50 m				
Burglaries	0	42.99	7.67	4.86
Violent crimes	0	256	9.65	10.03
Ethnic diversity	0	97.81	34.81	25.37
Economic status	10.78	15.67	11.88	0.48
Residential mobility	4.86	666	115.39	45.40
Disorder	1.17	2.30	1.89	0.15
Facilities	0	5.29	0.29	0.58
Egohood 80 m				
Burglaries	0	43	7.67	4.79
Violent crimes	0	256	9.71	10
Ethnic diversity	0	94.48	35.44	23.88
Economic status	10.76	14.98	11.87	0.45
Residential mobility	4.75	666	114.04	40.35
Disorder	0.75	2.30	1.88	0.16
Facilities	0	6.16	0.59	0.83
Egohood 150 m				
Burglaries	0	43	7.67	4.65
Violent crimes	0	256	9.94	10.18
Ethnic diversity	0	89.97	36.04	22.29
Economic status	11.02	14.08	11.86	0.41
Residential mobility	11	500	112.6	34.06
Disorder	0.48	2.19	1.88	0.17
Facilities	0	6.86	1.43	1.25

Table A4.1. Continued.

	Min.	Max.	Mean	SD
Egohood 250 m				
Burglaries	0	43	7.31	4.17
Violent crimes	0	256.01	10.08	10.60
Ethnic diversity	0	86.24	36.33	20.79
Economic status	11.08	14.03	11.84	0.37
Residential mobility	15.05	500	111.89	30.04
Disorder	0.37	2.19	1.86	0.19
Facilities	0	9.43	2.60	1.70
Egohood 500 m				
Burglaries	0	38.69	7.67	4.49
Violent crimes	0.13	251.62	11.42	11.98
Ethnic diversity	0	81.49	36.93	18.89
Economic status	11.19	13.56	11.82	0.32
Residential mobility	30.3	302.17	111.24	25.36
Disorder	0.33	2.14	1.80	0.24
Facilities	0	14.70	5.49	2.76
Egohood 750 m				
Burglaries	0	31.08	7.62	4.47
Violent crimes	0.46	218.13	12.65	13.51
Ethnic diversity	0	75.09	37.50	17.51
Economic status	11.22	13.12	11.81	0.30
Residential mobility	32.41	342.20	111.22	22.64
Disorder	0.28	2.09	1.74	0.29
Facilities	0	14.83	5.64	2.73



Chapter 5

Crime is Down and so is Fear? Analyzing resident perceptions of neighbourhood unsafety

A slightly different version of this chapter is currently under review at an international peer-reviewed journal.

5.1 Introduction

Various cities across Europe and Northern America have seen their crime rates dropping since the 1990s or early 2000s (Tonry, 2014; Van Dijk, Tseloni and Farrell, 2012). There has been extensive research on what has caused crime to decline. Explanations relate to changes in demographics, policies, imprisonment and drugs markets (Farrell, Tilley and Tseloni, 2014; Sharkey, 2018; Zimring, 2008). So far, the potential societal consequences of this development have been largely overlooked. Little is known about whether and how these declining crime rates have impacted or improved people's sense of safety over time (for an exception, see Skogan, 2011). This is surprising, since crime is considered one of the relevant determinants of fear of crime (Breetzke and Pearson, 2014; Brunton-Smith and Sturgis, 2011).

Only a few studies have addressed the over-time dynamics of fear, resulting in mixed empirical evidence. According to some criminologists, fear levels are relatively stable over time and do not really respond to fluctuations in crime rates (Ditton et al., 2000; Warr, 1995). In contrast, more recent studies demonstrate that fear levels do follow crime trends: these scholars observed that fear levels, similarly to crime, have also fallen (Skogan, 2011; Smeets and Foekens, 2018). It is, however, unlikely that fear levels are entirely consistent with changes in crime rates. Researchers have repeatedly pointed out that there are mismatches between the level of registered crime and individual-level fear rates (Covington and Taylor, 1991; Hooghe and De Vroome, 2016). This inconsistency between crime and fear is a recurring theme within the fear-of-crime literature (Rountree, 1998).

Overall, limited research exists on whether and why fear rises or declines over time and to what extent such trends can be attributed to changing levels of crime. The current study aims to address these questions by analyzing repeated survey data on resident perceptions of neighbourhood unsafety, in combination with administrative register data. The data was collected in Rotterdam, the second most populous municipality of the Netherlands. The surveys were conducted over a period of 15 years, from 2003 to 2017. More specifically, I have analyzed 11 waves of the Rotterdam Safety Index (N = 148,344 in 62 neighbourhoods). Like other European cities, Rotterdam has experienced a clear decline in crime numbers (Akkermans, 2015; Lub and De Leeuw, 2017). This trend is summarized in the graph below, which displays a selection of the number of registered crimes at the municipality level.[37] After a slight increase, registered crime in Rotterdam fell by almost 50 percent.

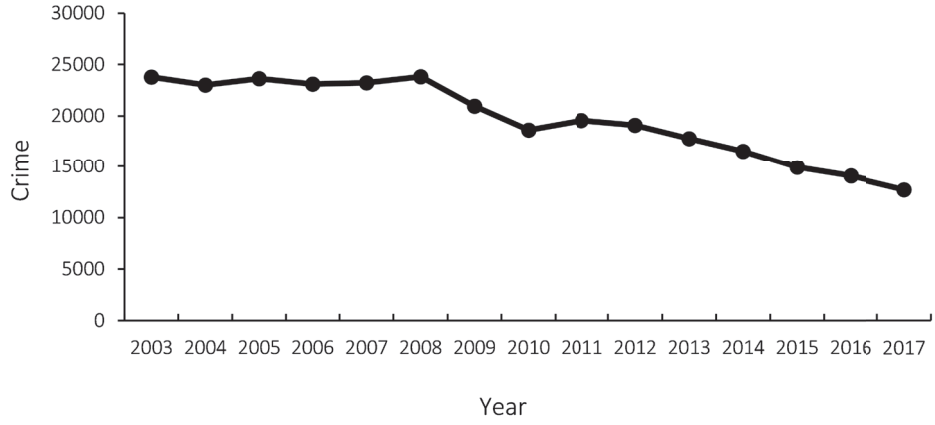
The amount of crime is not the only determinant that has been linked to perceived unsafety. Fear-of-crime researchers have identified a much broader set of factors that help

[37] The following crimes are included: burglaries; illegal drug trade; robberies; (aggravated) assault; battery; rape and sexual assaults; child sexual abuse; manslaughter and murder.

to explain patterns of fear. The current study mainly focuses on the characteristics of the local residential environment. In addition to crime, I take into consideration the following characteristics: economic status, level of ethnic heterogeneity, degree of residential mobility and amount of disorder. These factors will be assessed at the spatial level of the neighbourhood. The expectation is that changes in each neighbourhood condition may have had an independent influence on how safe or unsafe the inhabitants of Rotterdam have felt in their neighbourhood in the period 2003-2017.

The analytical strategy consisted of two steps. I first examined the trend of perceived unsafety more closely, and considered whether the observed changes are 'real' and not an artefact of survey methodology (Hout and Fischer, 2002). In this regard, special attention was paid to the survey mode and changes to it. I also considered how increases or decreases in fear are spatially distributed across neighbourhoods in Rotterdam. The second step involved analyzing the role of the different neighbourhood factors in multilevel regression models. The aim of these multilevel analyses was to obtain a more precise understanding of which factors help to explain the trends in fear observed previously.

Figure 5.1. Registered crimes in Rotterdam 2003-2017 (a selection).



Source: Municpality of Rotterdam / Police Department Rotterdam

This chapter proceeds as follows. The theoretical framework consists of four parts. In the first two parts, I further review the existing literature and research on fear of crime and explore how (changing) neighbourhood conditions can account for changes in fear levels. In the third part, I briefly discuss the case of Rotterdam and its situation with regard to safety and unsafety. The theoretical framework concludes with a discussion of how the survey mode may impact the observed level of unsafety. I then describe the data and analytical

strategies in more detail. Afterwards, the trends in perceived unsafety are inspected and I discuss the results of the multilevel analyses. I finish with a discussion and conclusion to position the findings within the broader literature.

5.2 Theoretical framework

The (in)stability of fear

It is a popular belief that although crime has decreased in many countries, citizens still feel unsafe and they continue to worry about crime (Skogan, 2011; Smeets and Foekens, 2018). Researchers have coined a term for this mismatch between beliefs and the objective risk of becoming a victim: the reassurance gap (Innes, 2004). Moreover, according to Ditton and colleagues (2000), a 'criminological maxim' exists which means that 'rates of fear may climb when crime rates climb, but fail to fall when crime rates fall' (p.143). Research has provided empirical evidence to support the existence of a widening gap between crime statistics and fear levels. More specifically, British and Scottish crime surveys conducted in the 1990s and early 2000s show that although crime rates were falling during this period, fear levels remained unchanged (Ditton et al., 2000; Innes and Fielding, 2002). Other researchers observed small but consistent increases in feelings of unsafety across the entire European Union in the years 1996-2002 (Barker and Crawford, 2006). These figures demonstrate that people may be concerned about or afraid of crime without experiencing actual victimization. It also suggests that other factors, besides crime, may shape perceptions of risk and fear (Ferraro, 1995). Scholars have, for instance, considered how certain policing strategies can be effective in bringing down crime and disorder while increasing the probability of feeling unsafe. For instance, increased police activity on the street may remind residents of the problems in their neighbourhood and make them believe that crime has increased (Innes, 2004; Hinkle and Weisburd, 2008). The news media may also play a negative role: studies have established that media consumption increases perceptions of both crime and fear (Lowry, Nio and Leitner, 2003; Pfeiffer, Windizo and Kleimann, 2005, but also see Ditton et al., 2004).

The view that fear levels tend to stabilize or even continue to grow despite lower crime rates has been altered by more recent research. In his study on fear and crime trends in Chicago, Skogan (2011) showed that fear levels decreased 'dramatically' in the years between 1994 and 2003. This downward trend was observed across different age, gender and income groups. Factors that explained the decreasing fear levels include declining crime rates, improved perceptions of neighbourhood conditions and increased confidence in the police. Similar insights on the fear drop came from Smeets and Foekens (2018) who

constructed a 'fear of crime trend index', which showed that in the last two decades large parts of the Western world experienced clear drops in fear rates. I expect to find these patterns as well in this study on feelings of unsafety among the inhabitants of Rotterdam. The aim is, however, not only to describe but also to explain trends in fear. With the exception of Skogan's (2011) study, there is almost no empirical research on how to account for changes in fear over time.

The role of changing neighbourhood conditions

The existing literature on fear of crime often treats fear as a static phenomenon, and mainly relies on data collected at a single point in time to analyze why differences in fear levels exist (e.g. Brunton-Smith and Sturgis, 2011; Collins and Guidry, 2018; Hooghe and De Vroome, 2016). The current study adopts a more dynamic approach. Part of this approach involves identifying conditions that may account for changes in fear (and are themselves subject to change). I focus on processes at the neighbourhood level, as individual determinants of fear – such as gender, ethnicity and class – are often fixed and therefore unable to explain shifts in fear levels. A distinction is made between three different sets of neighbourhood characteristics: 1) local crime rates; 2) demographic and economic characteristics of the neighbourhood; and 3) disorder.

Crime

For obvious reasons, the expectation is that the amount of crime in a neighbourhood is related to how unsafe people feel. A recurring point of discussion in fear-of-crime research is how strong (or weak) the link between crime and fear is, or whether there is any significant relationship at all (Rountree, 1998). Most recent studies have shown that inhabitants living in a residential environment with higher levels of registered crime feel less safe. This relationship has been found in various country contexts, including the United States (Zhao, Lawton and Longmire, 2015), the United Kingdom (Brunton-Smith and Sturgis, 2011) and New Zealand (Breetzke and Pearson, 2014).

In line with recent research, the expectation is that inhabitants of a crime-ridden neighbourhood perceive their living environment as being less safe because they are more likely to be victimized. However, the main focus is on how neighbourhood crime rates are reflected in feelings of unsafety over time. Because the level of registered crime is decreasing in Rotterdam – as shown previously in Figure 5.1 – the expectation is that inhabitants' perceptions of safety will have improved. An overall decline in crime at the city level, however, does not necessarily mean that every neighbourhood has experienced a similar drop in crime. Studies that examined the spatial distribution of the crime drop, have

shown that the declines are not evenly distributed across city areas (Kirk and Papachristos, 2011; Sharkey, 2018; Weisburd et al., 2004). The same may apply to feelings of unsafety. I will therefore pay close attention to the spatial distribution of fear levels.

It is common knowledge that fear of crime is not only a product of crime, but rather an outcome of various processes. Sacco (2005) expresses this as follows: 'changing fear levels over time may be related to shifts in other kinds of conditions that might be related to but are in fact quite separable from changing crime levels' (p.134). The next two sections will consider how changes to neighbourhood conditions (other than crime) may be related to changes in fear.

Economic status, residential mobility and ethnic heterogeneity

Scholars have also addressed how structural characteristics of the neighbourhood affect individuals' level of perceived unsafety. The focus has been mainly on the level of economic deprivation, residential mobility and ethnic heterogeneity of a neighbourhood. It is expected that all three neighbourhood aspects are related to increased fear. Shaw and McKay's (1942) social disorganization theory, originally introduced to explain spatial concentrations of juvenile delinquency, is relevant for understanding this relationship. The theory's main premise is that neighbourhoods characterized by deprivation, residential instability and heterogeneity are often socially disorganized. Inhabitants of these neighbourhoods lack the capacity to maintain social order and to combat collective problems, such as deviant and criminal behaviour. Also important in this regard is the concept of 'collective efficacy', defined by Sampson and colleagues (1997) as 'social cohesion among neighbours combined with their willingness to intervene on behalf of the common good' (p.918). People living in socially organized neighbourhoods with more collective efficacy are better able to maintain control over their neighbourhood and to reduce crime and violence and, consequently, they experience lower fear levels. A greater sense of control may also directly decrease fear.

Prior studies have shown that in particular the degree of economic disadvantage and ethnic heterogeneity in a residential environment relate to inhabitants' perception of unsafety (Breetzke and Pearson, 2014; Brunton-Smith and Sturgis, 2011). These studies were unable to examine the role of change because of their cross-sectional research design. In the current research the dimension of time will be considered more closely. The expectation is that fear levels fell in neighbourhoods where levels of deprivation, heterogeneity and mobility were decreasing. However, existing research suggests that neighbourhoods are relatively stable and durable systems where demographic patterns tend to persist over time – despite changes in the population composition (Sampson, 2012; Skogan, 1986).

This 'slothfulness' of neighbourhoods has been studied primarily in relation to their socio-economic and ethnic status (Fransham, 2019; Tunstall, 2016; Zwiers, 2018). In the Netherlands, Zwiers (2018) demonstrated that neighbourhoods experience little change in their socio-economic status and ethnic composition over time, concluding that significant neighbourhood change is rare and takes several decades to take effect. However, because of the study's relatively long time frame, I expect that these neighbourhood characteristics can be relevant to explain decreases or increases in fear.

Disorder

The third set of neighbourhood conditions I assess are signs of physical disorder and their role in shaping perceptions of unsafety. Physical disorder refers to the deterioration of public space, such as garbage on the street, graffiti and damaged street furniture (Sampson and Raudenbush, 1999). Hunter (1978) was one of the first to address how these manifestations of disorder – or incivilities – generate feelings of unsafety. Incivilities, defined by LaGrange and colleagues (1992) as low-level breaches of community standards, do not necessarily trigger fear by themselves. Rather, it is the fact that they send out a 'signal' to residents that conventionally accepted norms and values are eroding and social control is lacking, which may cause them to feel unsafe (Taylor, 2001).

The link between incivilities in the neighbourhood and fear of crime seems to be empirically well established. Numerous studies have shown that more neighbourhood disorder is associated with higher levels of fear (Brunton-Smith and Sturgis, 2011; Covington and Taylor, 1991; Markowitz et al., 2001; Rountree and Land, 1996; Scarborough et al., 2010). Most research on this relationship is, however, based on cross-sectional analyses. To my knowledge, there are only three studies that use longitudinal datasets (Markowitz et al., 2001; Robinson et al., 2003; Taylor, 2001). With the exception of Markowitz et al. (2001), these studies do not find consistent evidence that disorder has a longitudinal impact on feelings of unsafety. The effects of incivilities 'were neither as consistent nor as sizable as had been anticipated, given the theorizing to date' (Taylor, 2001: p.228).

Studies also differ with regard to their measurement of disorder. The vast majority relies on the self-reported perceptions of respondents: in these cases, perceptions of disorder and fear are measured within the same survey (for an overview, see O'Brien, Farrell and Welsh, 2019). This approach is considered problematic because a detected effect of disorder on fear can be endogenous, meaning that fear generates perceptions of disorder rather than (or in addition to) the other way round (Brunton-Smith and Sturgis, 2011; Sampson and Raudenbush, 1999). Research showed that residents who are more fearful of crime are more likely to judge their neighbourhood as being disorderly than residents without these

worries (Jackson et al., 2018). The alternative is to construct a measure of disorder based on independently collected observations, either through systematic social observation of public spaces (Sampson and Raudenbush, 1999) or by interviewer assessments (Brunton-Smith and Sturgis, 2011). The downside of this approach is that collecting all the necessary data is costly and time-consuming.

Unsafety in Rotterdam

Issues related to unsafety have been high on Rotterdam's agenda for over two decades. These themes began to dominate the agenda in the late 1990s and early 2000s, when Rotterdam had become an increasingly unsafe city. Inhabitants started to voice their discontent about the rising crime levels and – in their eyes – inadequate response from local government (Van Ostaaijen, 2010). This resulted in a 'regime change' following the local elections in 2002, during which the Labour Party lost its majority to a new populist party, Liveable Rotterdam (in Dutch: *Leefbaar Rotterdam*). Safety became Rotterdam's top priority, and a tougher approach to unsafety issues was announced and implemented (Tops, 2007). Most scholars and policymakers agree that this approach has made Rotterdam a safer city (Noordegraaf, 2008). How inhabitants of Rotterdam experience and perceive their safety has been studied more recently by Lub and De Leeuw (2017). One of the central questions of their qualitative research examined the extent to which residents believe that crime and disorder has declined in their neighbourhood. The researchers observe that the respondents are all predominantly positive about the crime levels they experience, and agree and acknowledge that the municipality of Rotterdam has made good progress in tackling crime and other safety issues (Lub and De Leeuw, 2017: p.432). Rotterdam's 'governmental crime fighting success' has already been well documented in previous research (Tops, 2007; Van Ostaaijen, 2010).

Actual change or methodological artefact

In order to describe and analyze whether perceptions of unsafety have actually improved over time, it is necessary to establish that the changes in the survey data are real and not an artefact of the survey. I therefore pay close attention to the representativeness and the comparability of the samples. Sample comparability is difficult to maintain over time, especially if changes are made to the survey's design (Brady and Johnston, 2015). As for the Rotterdam Safety Index, it is important to note that adjustments have been made to the survey mode over the years (Snel, 't Hart and Leerkes, 2015). In the first years of the Safety Index, until 2007, respondents were interviewed by phone or face-to-face. In more recent waves, survey data was collected using the following modes: phone, mail and internet.

These changes may have implications because survey answers may be influenced by the survey mode (Jäckle, Roberts and Lynn, 2010).

To better explain so-called 'mode effects', a distinction can be made between selection processes and transformation processes (Voogt and Saris, 2005). Mode effects as a result of selection exist if different modes attract different types of respondents. Or, in other words, when certain groups of respondents are more or less likely to participate in a survey based on the survey mode. Transformation takes place when respondents answer the survey questions. This process is biased when a respondent's answers differ depending on the survey mode. Here, social desirability plays a role: people misrepresent themselves in the survey because they feel the need to comply with certain social norms. Previous studies have shown that self-administrated questionnaires (mail and internet) yield fewer socially desirable answers than interviewer-administrated questionnaires (phone and face-to-face) (Kreuter, Presser and Tourangeau, 2008; Heerwegh, 2009). Research by the Pew Research Center (2015) demonstrates that compared to web respondents, telephone survey respondents are more likely to give answers 'that paint themselves or their communities in a positive light' (p.20) and are, for instance, more biased in their evaluation of how safe (or unsafe) their neighbourhood is.

5.3 Research design

Data

This study relies on a combination of survey data and register data. I used 11 waves of the Rotterdam Safety Index, a cross-sectional survey on crime-related feelings of unsafety and victimization. The Rotterdam Safety Index is a unique dataset with high-quality representative data at the neighbourhood level, collected over a considerable period of time. All surveys are conducted among a large representative sample of people living in Rotterdam, aged 15 years or older. The samples were drawn from the municipality population register. Response rates varied between 30% and 23%.[38] In total, 153,384 respondents participated in the surveys. Because the focus is on how neighbourhoods develop over time, I only selected respondents living in neighbourhoods that are included in every survey. There are 148,344 respondents who meet this criterion, living in 62 administratively defined neighbourhoods. The surveys were originally conducted every year, but in 2009, this changed to a biannual survey. In addition to survey data, I used administrative register data to construct the neighbourhood variables.[39]

[38] Response rates in 2009 (28.5%); 2011 (27.6%); 2013 (24.8%); 2015 (23.5%); 2017 (23.1%). The municipality was unable to provide the response rates of the surveys conducted before 2009

[39] The Rotterdam Police granted us access to the crime statistics and the research department of the Rotterdam Municipality (Research and Business Intelligence, OBI) provided access to the other statistics. Some of these statistics are also available through www.onderzoek010.nl.

Operationalizations

I use one item to measure perceived neighbourhood unsafety. Respondents were asked whether they ever feel unsafe in their neighbourhood and, if so, how often (rarely; occasionally; frequently). This resulted in a four-point scale ranging from one (never feeling unsafe) to four (frequently feeling unsafe). Unfortunately, no other items were available to measure perceptions of neighbourhood unsafety.

At the neighbourhood level, I considered the role of 1) crime; 2) ethnic diversity; 3) economic status; 4) residential mobility and 5) disorder. For the measurement of crime, I relied on both police-recorded crime data and self-reported victimization measures. Two data sources were used in order to provide a fuller picture of the levels of crime present. The police-recorded crimes include incidents related to burglaries; illegal drug trade; robberies; (aggravated) assault; battery; rape and sexual assaults; child sexual abuse; manslaughter and murder. This crime variable captures the relative incidence of these crimes per 100 inhabitants. For the victimization rates, I distinguished between burglaries and violent crimes. The rates were based on respondents' answers to the question whether they have been a victim of either burglaries or violent crimes – these being robberies or (violent) threats – during the last 12 months.

The level of ethnic diversity in a neighbourhood was assessed by the Herfindahl-Hirschman-Index (HHI). The HHI represents the probability that two randomly selected individuals living in the same neighbourhood are from a different ethnic background. I differentiated between nine different ethnic groups.[40] The HHI value varies between zero (total homogeneity) and one (total heterogeneity). Next, economic status was measured using an index that combines a neighbourhood's average income, percentage of low-income households and average housing value. Before constructing the index, the distribution of the percentage of low-income households was reversed and all measures were standardized. Lastly, the mean was calculated. A higher value indicates a higher economic status. For residential mobility, dummy variables were created based on the length of residence. I distinguished between the percentage of inhabitants living at their address for less than 3 years (reference category); between 4 and 10 years; between 11 and 15 years; and more than 16 years.

To capture the role of disorder, I used data collected by the municipality of Rotterdam. Approximately every three months, observers evaluate how orderly or disorderly the public space is.[41] More than 2300 spots located across the entire municipality are rated on their level of cleanness and absence of physical disorder. The ratings are based on a

[40] Distinguish between people from the Netherlands; Surinam; former Netherlands Antilles, Turkey, Morocco, Cape Verde; European Union countries, other Western and other non-Western countries.

[41] Officially referred to as Productnormering Rotterdam. See for more information (in Dutch): www.rotterdam.nl/ wonen-leven / schouwkaart/Folder-productnormering-2011.pdf (accessed March 3, 2020).

scale from one (high levels of disorder) to five (low levels of disorder).[42] For every year and neighbourhood, I calculated the average order/disorder score. A higher score indicates that the public space is considered clean and well-maintained.

A range of control variables were included at the individual level. These variables are age, age squared, gender, education level, employment status, ethnic background and previous victimization experiences regarding burglaries and threats. Missing values were deleted listwise or included as a dummy. I also controlled for the different modes of data collection. More specifically, I calculated the share of surveys conducted by phone, mail, online or face-to-face for each year. The descriptive statistics of all variables are reported in Table 5.1. Table A5.1 in the Appendix provides an overview of all neighbourhood and mode variables and their year-specific means.

Table 5.1. Descriptive statistics.

	Min.	Max.	Mean	SD
Perceived neighbourhood unsafety	1	4	1.56	0.97
Age	14	100	49.29	18.24
Gender (ref. = male)	0	1	0.55	
Ethnicity (ref. = Dutch)	0	1	0.38	
Education (ref. = low)	0	1	0.36	
Middle	0	1	0.28	
High	0	1	0.33	
Employment status (ref. = unemployed)	0	1	0.54	
Victim of burglary (ref. = not)	0	1	0.05	
Victim of violence (ref. = not)	0	1	0.05	
Survey mode in % (ref. = online)	0	60.16	31.47	26.54
Face-to-face	0	22.52	6.67	6.67
Mail	0	14.56	7.67	6.50
Phone	21.47	91.81	54.2	29
Registered crime	0.28	42.39	3.95	4.59
Victimization rate burglary in %	0	14.42	5.07	2.59
Victimization rate violence in %	0	12.94	5.19	2.19
Ethnic diversity	0.19	0.88	0.62	0.16
Economic status	-1.37	4.14	0	0.92
Residential length (ref. = % less than 3 years)	13.19	61	26.47	6.11
% less than 11 years	11.48	61.39	34.06	4.96
% less than 16 years	5.52	45.26	15.90	4.43
% more than 16 years	3.29	45.51	23.57	7.62
Absence of disorder	2.44	4.77	4.05	0.27

[42] Cleanness is measured by the absence of litter on the street; graffiti; dog mess; weed; and having well-maintained bins. Absence of other forms of disorder means having no bike wrecks; no wrongly parked cars; having a well-maintained green space; that all household waste is collected in the designated containers; and that all retail displays are well-organized.

Analytical strategy

The analytical approach consisted of two steps. I first mapped the relative change in perceived neighbourhood unsafety scores across the neighbourhoods of Rotterdam. To capture change, an individual regression slope was estimated for each neighbourhood, based on the aggregated level of neighbourhood unsafety reported in years in which the survey was conducted (Pfister et al., 2013). In the second step, multilevel regression models were estimated. A multilevel model is necessary because of the nested data structure. To account for the dependency in the data, I followed the strategy of Schmidt-Catran and Fairbrother (2016) and estimated three-level models that include years, neighbourhoods, and neighbourhood-years as contextual levels.[43] This model recognizes that 1) respondents within the same year are more likely to be similar than respondents from different years; 2) respondents within the same neighbourhood are more likely to be more similar than respondents from different neighbourhoods; and 3) respondents within the same year *and* neighbourhood are more likely to be similar than respondents from different years and neighbourhoods.

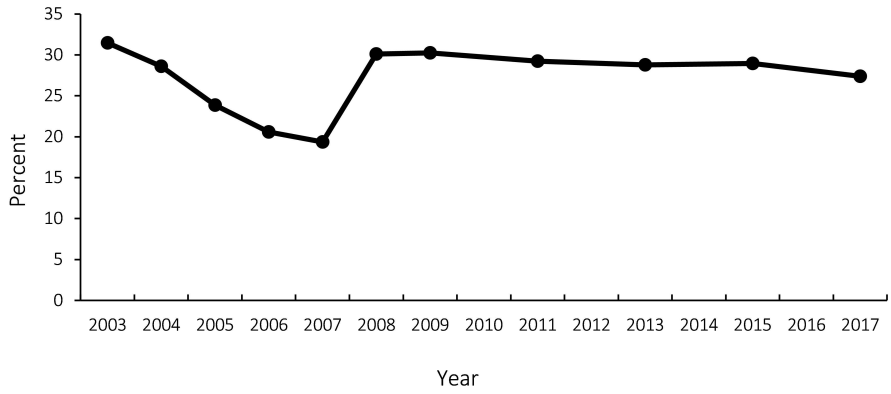
I added splines to the multilevel analyses to model the time dimension. In this way, I took into account that that the trend line of perceived neighbourhood unsafety is not linear. Figure 5.2 shows the trend in the percentage of inhabitants that sometimes feel unsafe in their neighbourhood. In the years up to 2008, the level of fear consistently declined. Between 2007 and 2008, there was a sudden increase and after 2008 the trend once more saw a slight decrease. The abrupt increase is perhaps the most remarkable; I expect that changes in survey mode played a role here. Using splines enabled me to estimate a model with different slopes in order to analyze changes in the observed trend.[44] In the models, three separate slopes are estimated: one for the period up to 2007 (Period 1), another for the period between 2007 and 2008 (Period 2) and a final one for the remaining years up until 2017 (Period 3).[45]

[43] Same structure as Model F as reported by Schmidt-Catran and Fairbrother (2016: p.25). For a recent application of this model, see Custers, Engbersen and Snel (2019).

[44] For other applications of using splines in regressions, see Hout and Fischer, 2002; Lim and Laurence, 2015; and Schnabel, 2016.

[45] The first period in the spline function, 2003-2007, is coded as zero for 2003 and increases by one for each year until 2007, which is four. Four is then the value for 2007 and all following years. The second interval, 2007-2008, is zero until 2007 and then increases by one for 2008. One is then the value for 2008 and the following years. The third interval, 2008-2017, is coded zero for all years until 2008 and then increases by one for each year until the final year in the sample 2017, which has the value of nine.

Figure 5.2. Percentage of respondants who sometimes feel unsafe in the neighbourhood.



Source: Rotterdam Safety Index

5.4 Results

Spatial patterns of changing neighbourhood perceptions

Before presenting the results of the multilevel analyses, I first examine in more detail the trends in perceived neighbourhood unsafety at the spatial level of the neighbourhood. The in Figure 5.3 are aimed at improving our understanding of how changes in neighbourhood unsafety scores are spatially distributed across Rotterdam's neighbourhoods, and, more specifically, the extent to which the fear drops observed previously (in Figure 5.2) can be found within the different neighbourhoods. I examine the relative change in the years 2003-2007 and 2008-2017. The left-hand map in Figure 5.3a shows that all neighbourhoods – except for two – witnessed a drop in average fear levels in the period 2003-2007: there is almost a citywide decline in fear. The size of the decline differs slightly from neighbourhood to neighbourhood. The relative change in neighbourhood unsafety levels between 2008 and 2017 is visualized in the right-hand map (Figure 5.3b). The decline in fear levels is smaller in this period and observed only in approximately 70% of the neighbourhoods. In the remaining 17 neighbourhoods, fear levels have increased slightly.

Figure 5.3. Relative change in neighbourhood unsafety scores.

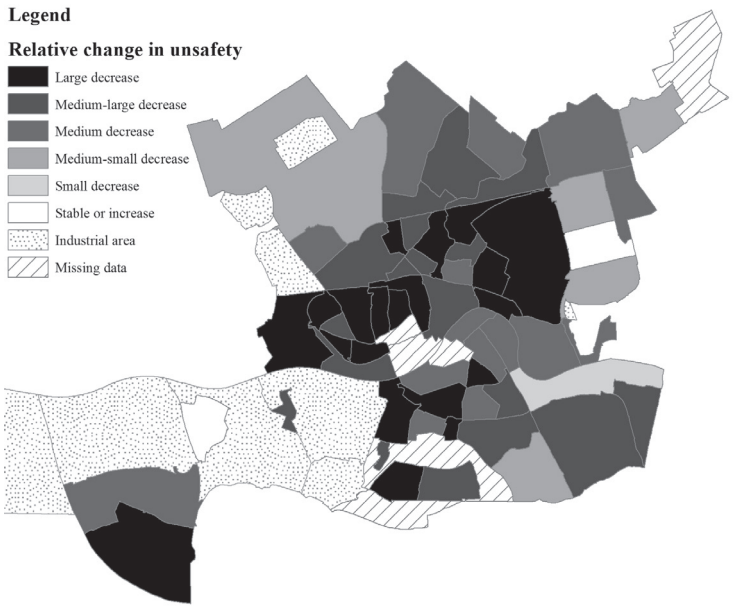


Figure 5.3a. Period 2003-2007.

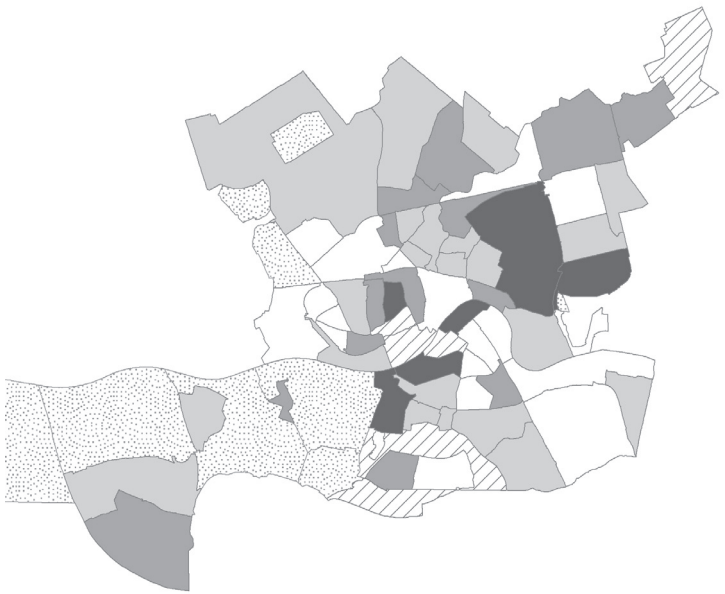


Figure 5.3b. Period 2008-2017.

Multilevel model results

Next, I estimated three multilevel models to explain the previously observed shifts in perceived neighbourhood unsafety. The results of these models are shown in Table 5.2. The first model only includes the splines. The spline coefficients can be interpreted as the linear change in the level of perceived neighbourhood unsafety during a given period (1, 2 or 3). The coefficient of Period 1 (*b* = -0.066) shows a statistically significant decrease in feelings of unsafety in the years between 2003 and 2007. The positive coefficient of Period 2 (*b* = 0.214) is also significant, confirming that the level of perceived unsafety suddenly increased between 2007 and 2008. In Period 3, a small, non-significant decrease was detected. This means that despite falling crime rates, fear levels stabilized in the period 2008-2017.

To determine whether the significant period effects of Period 1 and Period 2 are not driven by demographic changes in the sample or by changes in survey mode, a second model was estimated. Model 2 includes the individual-level controls and a set of dummies to control for variations in survey mode across the years. In this model, the spline coefficient of Period 2 is no longer significant. Additional analyses showed that this is primarily the result of controlling for changes in survey mode, demonstrating that the observed increase during Period 2 is most likely a mode effect.[46] From 2008 on, surveys were no longer only conducted by phone or face-to-face but were also collected through internet and mail. This shift towards self-administered questionnaires explains why unsafety levels increased rapidly after 2007. The results regarding the splines coefficients of Period 1 and Period 3 remain unchanged in Model 2.

Table 5.2. Multilevel regressions of perceived neighbourhood unsafety.

	Model 1 B SE	Model 2 B SE	Model 3 B SE
Intercept	1.646 (0.028)	1.832 (0.417)	1.194
Period 1 spline (2003-2007)	-0.066 (0.006) ***	-0.066 (0.010) **	-0.047 (0.013) *
Period 2 spline (2007-2008)	0.214 (0.020) ***	0.338 (0.396)	0.117 (0.495)
Period 3 spline (2008-2017)	-0.004 (0.002)	-0.008 (0.004)	-0.009 (0.004)
Gender (ref. = male)		0.254 (0.005) ***	0.254 (0.005) ***
Education level (ref. = low)			
Middle		0.026 (0.006) ***	0.027 (0.006) ***
High		-0.002 (0.007)	-0.002 (0.007)
Age		0.112 (0.008) ***	0.112 (0.007) ***
Age squared		-0.127 (0.007) ***	-0.126 (0.007) ***

[46] Two additional models were estimated: a model with only splines and individual controls (model 1) and a model with only splines and survey mode dummies (model 2). Only in the second model, the spline coefficient of Period 2 was no longer significant. These results are available upon request.

Table 5.2. Continued.

	Model 1 B SE	Model 2 B SE	Model 3 B SE
Employment status (ref. = unemployed)		-0.055 (0.006) **	-0.055 (0.006) ***
Background (ref. = migration background)		-0.074 (0.006) ***	-0.075 (0.006) ***
Victim of burglary (ref. = not)		0.455 (0.011) ***	0.451 (0.011) ***
Victim of violence (ref. = not)		0.661 (0.010) ***	0.659 (0.011) ***
Survey mode % per year (ref. = internet)			
Face-to-face		-0.004 (0.004)	-0.002 (0.005)
Phone		-0.006 (0.004)	-0.002 (0.005)
Post		0.017 (0.013)	-0.002 (0.016)
Registered crime			0.005 (0.001) ***
Victimization rate burglaries			0.006 (0.002) ***
Victimization rate violent crimes			0.006 (0.002) **
Ethnic diversity			0.656 (0.081) ***
Economic status			-0.058 (0.014) ***
Residential length (ref. = less than 3 years)			
Less than 11 years			0.0001 (0.001)
Less than 16 years			0.001 (0.001)
More than 16 years			0.001 (0.001)
Absence of disorder			-0.046 (0.022) *
N	144,779	144,779	144,779

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$
Notes: the variables age and age squared were recoded for purposes of interpretation. Age was divided by 10 and age squared by 1000.

In addition, Model 2 shows that fear is significantly higher among women, the unemployed and inhabitants with a migration background. These findings are largely in line with existing research (e.g. Brunton-Smith and Sturgis, 2011; Covington and Taylor, 1991). Fear levels are also higher among middle-educated respondents (when compared to the lower-educated reference group). The effect of age seems to be non-linear: fear levels rise when age increases but decrease at a certain age. Victimization experiences also relate to increased levels of unsafety. The separate coefficients indicate that becoming a victim of violent crime has a slightly larger impact on feelings of unsafety than experiencing a burglary.

In Model 3, the role of neighbourhood factors is further explored. First, I examine more closely how the neighbourhood characteristics relate to the spline coefficient of Period 1: the only spline that is still significant. I have already established that changes

observed in the other two periods are better explained by the survey mode (Period 2) or were non-significant from the beginning (Period 3). The third model is intended to explain the declining trend during the years 2003-2008 (Period 1). I do so by adding the neighbourhood-level characteristics. If changes in these characteristics account for the observed decline, the spline coefficient of Period 1 reduces in size. Model 3 shows that adding these neighbourhood variables reduces the size of the coefficient by almost 30% (from b = -0.066 to b = -0.047). Additional analyses indicated that this reduction is mainly the result of increases in economic status and decreases in victimization rates and disorder.[47] Approximately 70% of the change remains unexplained; the neighbourhood characteristics considered here only account for a limited part of the fear drop observed in Period 1. There are apparently other factors at play. I will return to this point in the discussion.

Model 3 also provides an overview of neighbourhood-level characteristics that significantly predict lower or higher levels of unsafety. Except for residential mobility, all neighbourhood factors are significantly related to levels of unsafety. The findings are in line with the expectations and most previous studies. Fear is more widespread in neighbourhoods with more registered crime and higher victimization rates. In addition, higher levels of fear are observed within neighbourhoods that are more ethnically diverse. The last finding is that inhabitants living in neighbourhoods with a higher economic status and less disorder feel safer.

5.5 Discussion and conclusion

Criminologists consider the crime drop as one of the most important criminological developments of modern times (Farrell et al., 2014). The potential societal consequences of this drop have not been extensively studied yet. The current study examined the trend in perceived neighbourhood unsafety over a period of 15 years and analyzed to what extent changes in unsafety could be attributed to various neighbourhood characteristics, including crime. I first considered the changes in unsafety levels over time, and found that the trend in perceived unsafety can be divided into three periods. In the first period (2003-2007), unsafety levels steadily declined. A 'fear drop' (Smeets and Foekens, 2018) emerged during these years. This decrease was followed by a sudden increase in feelings of unsafety in the second period (2007-2008), which was explained by the shift towards using more self-administrated questionnaires. The last period (2008-2017) experienced a small and non-significant decrease; in these years, unsafety levels more or less stabilized. These findings are line with Skogan's (2011) observation that 'fear of crime does not inevitably ratchet up; it also can go down, and dramatically so' (p.120). However, the figures also show that fear

[47] I estimated models for each neighbourhood variable separately to determine which neighbourhood factors had most explanatory power. Afterwards, I compared which variables reduced the spline coefficient of Period 1 the most. Results are available upon request.

levels may stabilize, despite falling crime rates. The results therefore demonstrate that fear levels can be both instable and stable, depending on the period under study.

I will now look more closely at the main results for each period separately. It was found that the fear drop observed in Period 1 was present in almost all Rotterdam neighbourhoods. This decrease in unsafety levels is best explained by changes in the economic status, victimization rates and disorder level of neighbourhoods. The role of registered crime levels turned out to be rather small. The findings also showed that the multilevel model and neighbourhood factors that had been included were only partially successful in explaining the decline in perceived unsafety: approximately 70% of the drop in fear is still unaccounted for. An additional explanation may be that changing priorities in local politics and policies also helped to reduce fear. From the early 2000s, considerable effort was put into enhancing safety and security in Rotterdam. A coordinated and structured policy approach was implemented, and considerable resources were directed towards local safety policy. Most scholars agree that these efforts contributed to a safer and more liveable Rotterdam (Noordegraaf, 2008; Van Ostaijen and Hendriks, 2006; Van Ostaijen, 2010). The figures suggest that, at least in the years 2003-2007, a growing number of inhabitants share this conclusion. Unfortunately, I was unable to empirically assess the role of local policy in the analyses.

In Period 2, I observed a relatively large increase in feelings of unsafety. The analyses suggest that this is most likely an effect of switching survey modes and using more self-administered surveys. Previous studies have shown that self-administrated questionnaires (i.e. web and mail) result in less social desirability and more honest answers compared to interview-administrated questionnaires (i.e. phone and face-to-face, De Leeuw, 2018; Heerwegh, 2009; Kreuter et al,. 2008). In the current study, this increased honesty seems to translate into higher average unsafety scores (see Table 5.3). Note that selection processes may also have played a role here. Overall, the findings illustrate how changes in survey mode may impact research results.

Another relevant finding of this study is the stabilization of unsafety levels observed in Period 3. Based on previous research, different explanations can be proposed which may help us to understand why fear levels did not continue to decrease in the years 2008-2017. I will briefly explore two sets of explanations. The first relates to the economic conditions in the

Table 5.3. Average perceived neighbourhood unsafety scores. Years and modes.

	2003	2004	2005	2006	2007	2008	2009	2011	2013	2015	2017
Phone	1.69	1.62	1.51	1.45	1.42	1.46	1.43	1.43	1.43	1.50	1.45
Face-to-face	1.53	1.44	1.44	1.38	1.41	1.41	1.45				
Web						1.68	1.66	1.67	1.64	1.58	1.56
Mail						1.80	1.76	1.75	1.80	1.72	1.65

neighbourhoods. In the years following the 2008-2009 recession, the unemployment rate in Rotterdam more than doubled, from 5.8% in 2008 to 12.6% in 2014 (Custers et al., 2019: p.1951). This worsening of the economic situation may have had various negative side effects. Research has shown that residents across all Rotterdam neighbourhoods began to perceive more problems in their neighbourhood during this period (Custers et al., 2019). Such developments may have prevented a further decrease in the unsafety scores.

The second set of explanations centres on the idea that over time, Rotterdam's safety policy has become less successful in bringing down residents' unsafety levels. There might be various reasons for this. In the first place, a reduced sense of urgency may have slowed down the decrease in unsafety rates. From 2006 onwards, the issue of unsafety became less of a priority within the municipality as policymakers increasingly felt that the largest safety problems were now under control (Van Ostaijen, 2010). It is also possible that parts of Rotterdam's tough approach towards unsafety had negative side effects, which became increasingly visible over time. Blokland and Binken (2012), for instance, argue that more repressive safety policies do not necessarily make streets safer, but rather result in more feelings of unsafety, especially among inhabitants living in disadvantaged neighbourhoods. The last explanation is derived from the literature on unintended consequences of policy (Engbersen, 2009). Here, the idea is that Rotterdam's successful safety policy has made inhabitants more critical about unsafety in their neighbourhood. Now that the worst problems have been solved, residents have set the bar higher and are less easily satisfied than they were previously. Policy has not only reduced the problem, but has also gives rise to new ones by creating new and unmanageable demands. It is 'doing better, feeling worse' (Wildavsky, 1997 cited in Engbersen, 2009: p.39).

The current study also provides more general insights into the factors that explain fear differences between neighbourhoods. The results confirm most previous research by showing that the level of registered crime is just one of the neighbourhood characteristics that can explain these differences. Other relevant factors are a neighbourhood's victimizations rates, economic status, level of ethnic diversity and level of order (or disorder). I used both police-recorded crimes and self-reported victimization data to better capture the role of

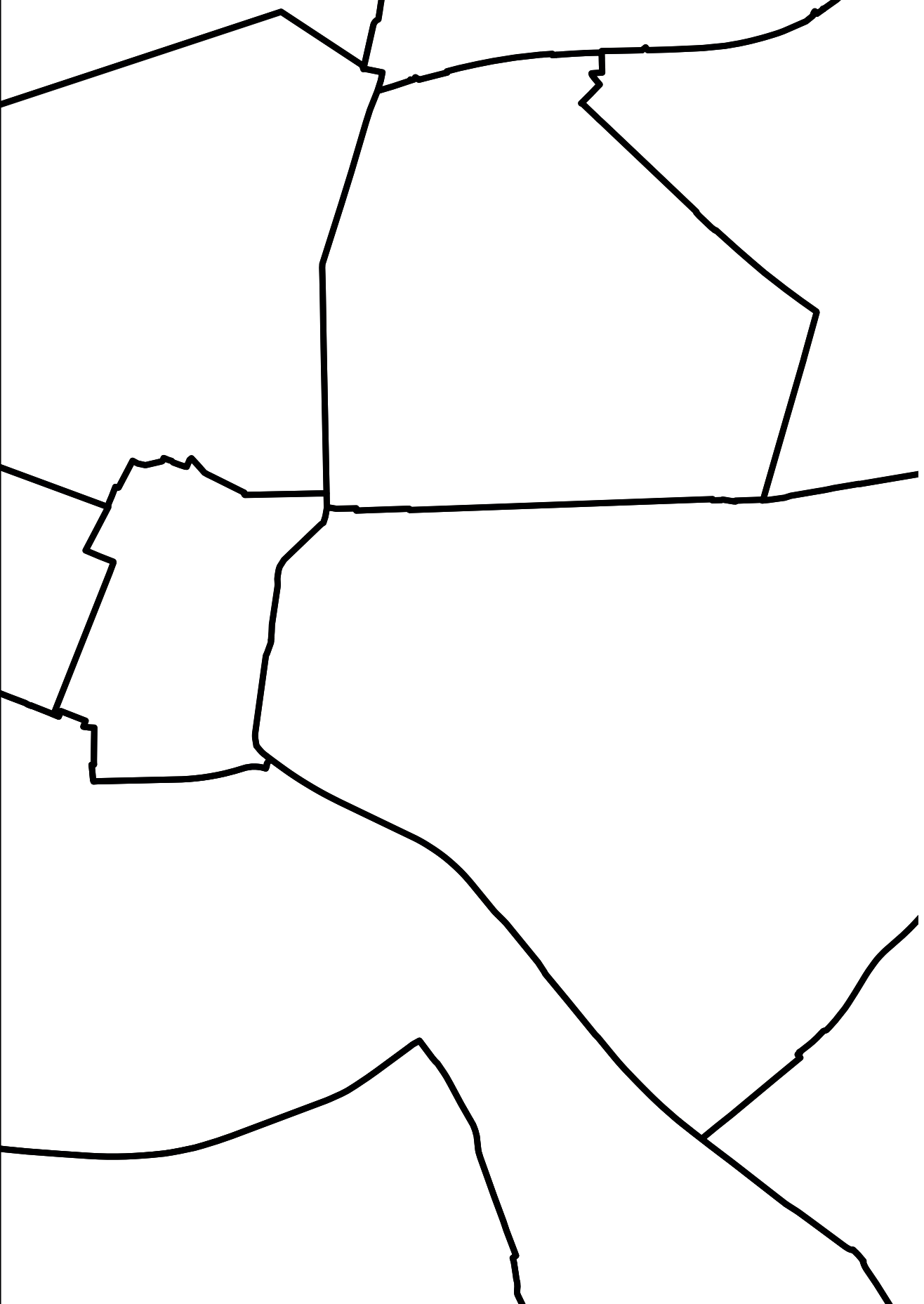
crime, as it is well-known that both measures have their shortcomings (Brunton-Smith and Allen, 2010). The found effects regarding economic status and ethnic diversity are in line with existing research (Brunton-Smith and Sturgis, 2011; Covington and Taylor, 1991; Hooghe and De Vroome, 2016). Another important finding is that I found evidence that inhabitants feel less unsafe in less disorderly neighbourhoods (Brunton-Smith and Sturgis, 2011). I am certain that this effect is not 'an artefact of research design' (O'Brien et al., 2019) as the measure of disorder (or the absence thereof) relied on independently collected data, not the perceptions of respondents. Lastly, the expectation that feelings of unsafety are higher in neighbourhoods with more residential mobility was not supported (see also Brunton-Smith and Sturgis, 2011).

Despite the contributions of the current study, its limitations should also be addressed. First, the measure of perceived neighbourhood unsafety relies on only one item. Unfortunately, there were no other survey items available to measure perceived unsafety in a more robust way. A second shortcoming is that this study only examined feelings of unsafety within one municipality. It therefore remains the question to what extent the findings and conclusions apply to other cities beyond Rotterdam. Future research could expand the scope by focusing on more cities or on cities other than Rotterdam.

Appendix

Table A5.1. Average scores mode and neighbourhood variables.

Year	2003	2004	2005	2006	2007	2008	2009	2011	2013	2015	2017
Survey mode in % (ref. = online)	0	0	0	0	0	51.87	60.19	50.31	50.23	53.53	54.84
Face-to-face	8.32	8.19	10.55	12.02	22.52	14.51	4.11	0	0	0	0
Mail	0	0	0	0	0	12.14	11.46	14.56	13.43	14.13	12.89
Phone	91.68	91.81	89.45	87.98	77.48	21.47	24.24	35.13	36.35	32.35	32.28
Registered crime	5.32	4.87	5.12	4.82	4.59	4.54	3.67	3.51	3.06	2.61	2.01
Victimization rate burglary in %	7.02	6.66	6.41	4.93	4.82	2.51	3.42	4.10	5.78	5.99	4.65
Victimization rate violence in %	7.04	6.92	5.68	4.55	4.31	4.69	3.72	4.50	5.00	5.27	5.57
Ethnic diversity	0.59	0.60	0.61	0.61	0.61	0.62	0.62	0.67	0.58	0.65	0.65
Economic status	-0.47	-0.47	-0.18	-0.12	0.03	0.08	0.18	0.17	0.11	0.15	0.39
Residential length (ref. = % less than 3 years)	27.53	26.73	26.44	25.97	27.02	28.03	28.42	25.77	24.56	24.84	25.80
Less than 11 years	36.73	36.89	36.11	35.64	34.38	33.24	32.10	33.34	33.88	33.36	30.29
Less than 16 years	15.91	16.02	16.15	16.11	15.92	16.05	16.30	16.07	15.77	15.04	15.57
More than 16 years	19.82	20.36	21.30	22.29	22.69	22.69	23.18	24.81	25.79	26.77	28.33
Absence of disorder	3.72	3.79	3.84	3.92	3.95	4.01	4.16	4.30	4.20	4.24	4.23



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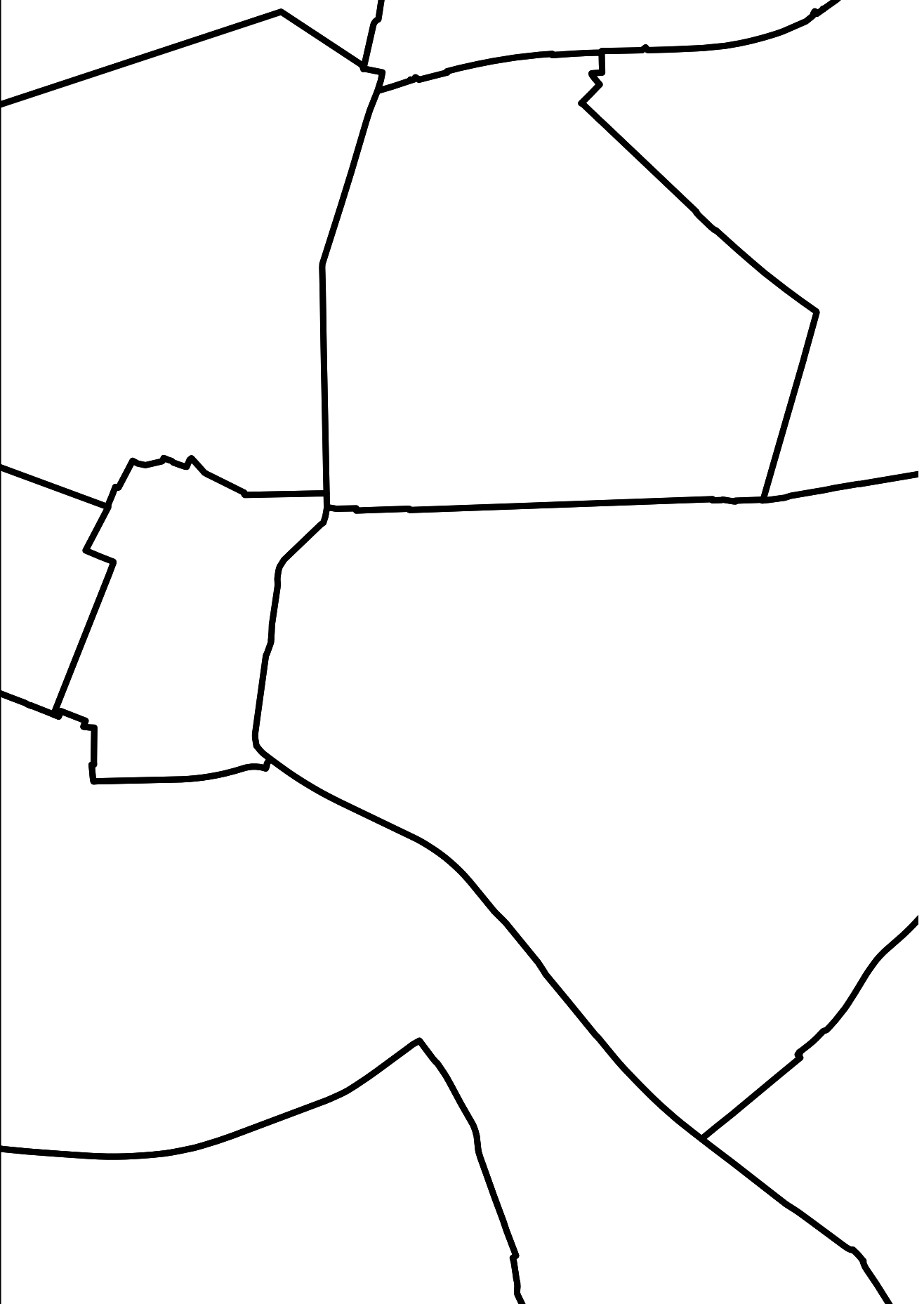


Dutch summary samenvatting

Samenvatting

In welke mate de buurt waarin iemand woont bepalend is voor iemands leven en zijn of haar kansen is een veel voorkomend onderzoeksthema. Het is een van de primaire thema's in de literatuur over buurteffecten. De buurt wordt daarnaast door verschillende wetenschappers gezien als een belangrijke context om bepaalde sociale processen en uitkomsten daarvan, zoals criminaliteit en ongelijkheid, te onderzoeken en beter te begrijpen (Sampson, 2012; Sharkey, 2013). Ook beleidsmakers hechten waarde aan de buurt. Voor hen fungeert het als een relevante interventieschaal om bepaalde sociale problemen te adresseren (Van Steenbergen et al., 2017; Van Gent, Musterd en Ostendorf, 2009). In dit proefschrift is de rol van de buurt nader onderzocht, en meer specifiek in relatie tot individuele verschillen in ervaren angst (*fear of crime*) en buurtcohesie. Angst en buurtcohesie zijn de centrale begrippen in het huidige onderzoek. Angst heeft betrekking op alle gevoelens, gedachten en gedragingen van mensen die te maken hebben met hoe zij het risico inschatten dat zij slachtoffer worden van criminaliteit (Jackson en Gouseti, 2014). Studies binnen dit onderzoeksthema richten zich hoofzakelijk op de angst die mensen ervaren in hun eigen buurt. Onder buurtcohesie verstaan we de mate waarin bewoners van een buurt in staat zijn om met elkaar samen te leven. Belangrijke elementen hierbij zijn wederzijds vertrouwen, solidariteit en saamhorigheid (Chan, To en Chan, 2006; Forrest en Kearns, 2001). Een groot verschil met voorgaande studies is dat in het huidige onderzoek kritischer is gekeken of de buurt, een veelal administratief gedefinieerde eenheid, het meest geschikt is de rol van de woonomgeving te analyseren met betrekking tot ervaren angst en cohesie. Deze kritische benadering vormt een van de drie manieren waarop dit proefschrift tracht bij te dragen aan bestaande kennis en literatuur. De drie manieren zijn:

1. door te analyseren welke contextuele determinanten een rol spelen in relatie tot hoeveel angst en buurtcohesie inwoners in hun woonomgeving ervaren en, waar mogelijk, op innovatievere wijze;
2. door daarbij verschillende schaalniveaus te hanteren (en niet alleen het niveau van de administratieve buurt);
3. door te analyseren hoe onveiligheidsgevoelens zich over tijd ontwikkelen.

Voor de eerste bijdrage is onderzocht welke kenmerken van de woonomgeving verband houden met hoe angstig iemand zich voelt en hoeveel buurtcohesie een persoon ervaart. In **hoofdstuk 2** en **hoofdstuk** 3 is in het bijzonder aandacht geschonken aan rol van etnische diversiteit. Er is al veel onderzoek gedaan naar de mogelijke (negatieve) gevolgen van wonen in diverse omgeving. Geïnspireerd door Putnams *constrict* hypothese (2007) hebben wetenschappers zich voornamelijk gericht op de vraag of wonen in een etnisch

diverse buurt gepaard gaat minder sociale cohesie tussen bewoners onderling. Ondanks de vele studies blijven er op een aantal punten onduidelijkheden, die te maken hebben met hoe diversiteit het beste gemeten kan worden, met de timing van diversiteitseffecten en of het effect van diversiteit hetzelfde uitpakt voor verschillende groepen mensen. De twee laatst genoemde elementen zijn onderzocht in **hoofdstuk 2**. In **hoofdstuk 3** is nader stilgestaan bij het gegeven dat op basis van bestaande diversiteitsmaten het vaak niet goed mogelijk is om het effect van diversiteit (op ervaren angst of cohesie) op te sporen en te isoleren. Om dit te ondervangen, is een aangepaste diversiteitsmaat geïntroduceerd waardoor dit wel mogelijk wordt. Naast etnische diversiteit zijn ook andere determinanten van angst aan bod gekomen in de verschillende hoofstukken. Zo is gekeken of bewoners zich onveiliger voelen in woonomgevingen met meer criminaliteit en grotere wanorde (*disorder*) en of inwoners zich veiliger voelen op plekken met meer cohesie en in de aanwezigheid van faciliteiten. In alle empirische analyses is ook rekening gehouden met de economische status van een wooncontext en, indien beschikbaar, de mate van residentiële mobiliteit.

Om beter vast te stellen welke contextuele kenmerken van belang zijn om verschillen in angst en cohesie te verklaren, zijn deze mogelijke verbanden in dit proefschrift op verschillende schaalniveaus geanalyseerd. In eerder onderzoek vormt de administratieve buurt veelal het uitgangspunt (Brunton-Smith and Sturgis, 2011; Gijsberts et al., 2012; Scarborough et al., 2010). Dit terwijl het geen uitgemaakte zaak is dat de administratieve buurt de meeste geschikte manier is om iemands woonomgeving in kaart te brengen. Daarom zijn in **hoofdstuk 2** en **hoofdstuk 4** van dit proefschrift ook andere schaalniveaus gebruikt. Ten eerste is het effect van etnische diversiteit onderzocht op zowel het niveau van de straat, buurt als wijk. Daarnaast heb ik in een van de studies naar onveiligheidsgevoelens zogeheten persoonlijke wooncirkels (*egohoods*) gecreëerd om op een innovatievere wijze de invloed van de woonomgeving in relatie tot ervaren angst vast te stellen. Onderdeel van deze aanpak is dat rondom elke persoon een cirkel wordt getrokken waarbij de persoon zelf het middelpunt vormt (Hipp en Boessen, 2013). De grootte van de cirkel (en daarmee iemands wooncontext) kan de onderzoeker zelf bepalen.

Voor de laatste bijdrage is in onderzocht hoe de onveiligheidsbeleving van bewoners zich door de tijd heeft ontwikkelt, en hoe mogelijke veranderingen verklaard kunnen worden. Dit is tot op heden nog weinig gedaan (zie voor een uitzondering Skogan, 2011). Een longitudinaal perspectief is echter vereist als we beter willen begrijpen wat kan bijdragen aan groter gevoel van veiligheid. In **hoofdstuk 5** is daarom bekeken of Rotterdammers zich in de jaren 2003 tot 2017 veiliger of onveiliger zijn gaan voelen, en welke ontwikkelingen hiermee samenhangen. Om de verschillende verbanden te onderzoeken, zijn in dit proefschrift meervoudige regressiemodellen geschat om op deze manier te bepalen welke

contextuele kenmerken (en in welke mate) een rol spelen bij het verklaren van verschillen in ervaren angst en buurtcohesie. Uiteraard is daarbij ook gecontroleerd voor relevante kenmerken op individueel niveau. Er is gebruik gemaakt van grootschalige enquêtedata, in combinatie met administratieve data. De enquêtedata is afkomstig van de landelijke Veiligheidsmonitor en de Rotterdamse Veiligheidsindex.

Belangrijkste conclusies en beleidsimplicaties

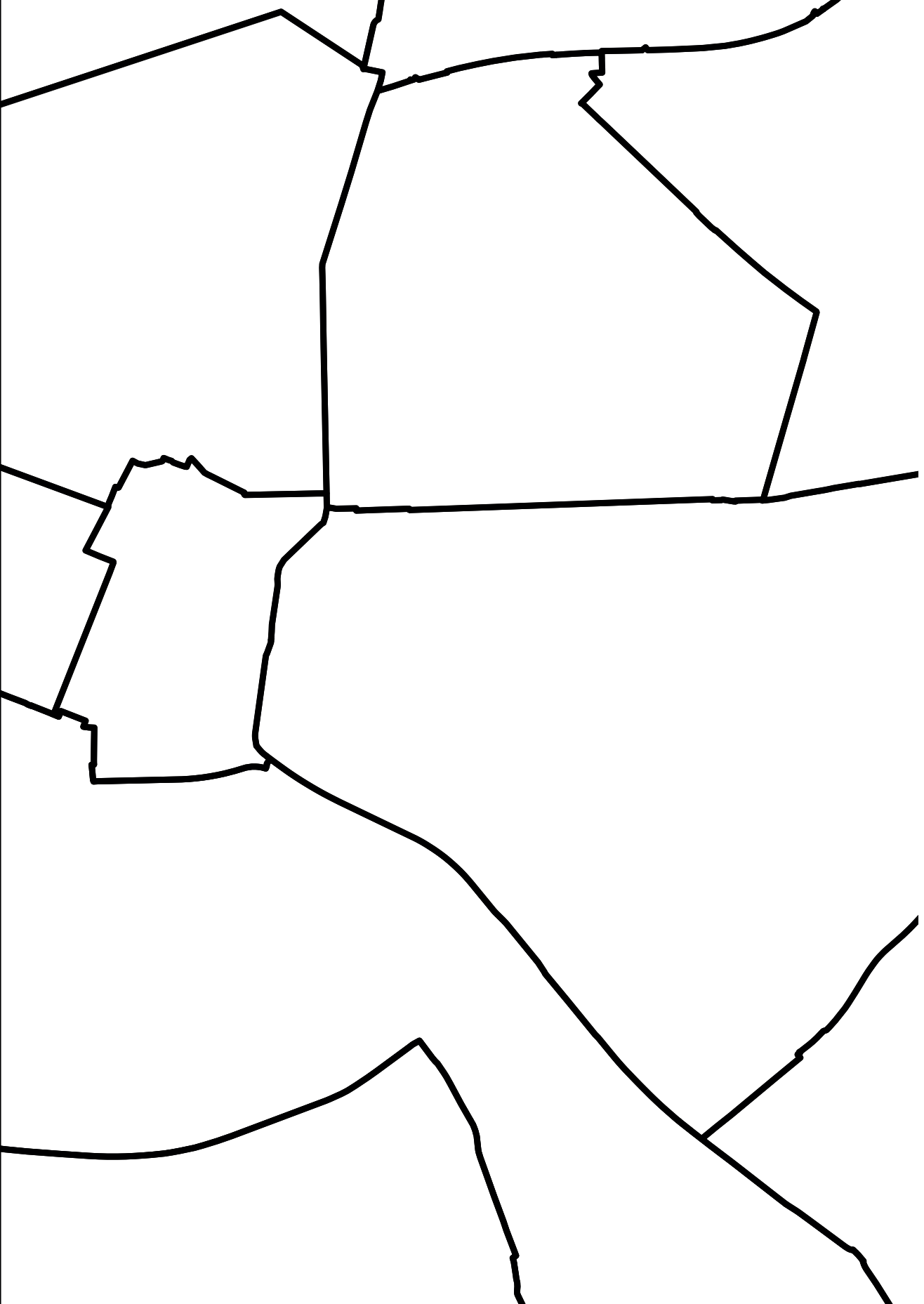
Op basis van de empirische analyses uitgevoerd in de hoofstukken 2 tot en met 5 zijn de volgende vier bevindingen het meest relevant. **Hoofstuk 2** en **hoofdstuk 3** hebben beter inzichtelijk gemaakt wat mogelijke gevolgen zijn van wonen in een omgeving waarin steeds minder mensen dezelfde afkomst delen. De analyses toonden aan dat deze ontwikkeling consequenties kan hebben voor hoeveel angst bewoners ervaren en hoeveel buurtcohesie. Het is daarbij van belang om vast te stellen of deze (negatieve) gevolgen het beste verklaard kunnen worden aan de hand van hoe divers de bevolking is, of toch andere aspecten. In het geval van onveiligheidsgevoelens bleek namelijk dat een groter gevoel van onveiligheid niet zozeer verband houdt met de hoeveelheid diversiteit, maar in plaats daarvan met wonen in een omgeving waar een grotere *out-group* aanwezig is. Het gaat er hierbij dus niet om divers deze groep is. Voor een beter begrip is het belangrijk om deze aspecten van elkaar te onderscheiden.

Ten tweede draagt dit proefschrift bij aan de kennis over welke kenmerken van de woonomgeving een rol spelen ten aanzien van individuele verschillen in angst. Tot voor kort was nog redelijk veel onduidelijk over de rol van context in relatie tot onveiligheidsgevoelens (Barton et al., 2016; Brunton-Smith en Sturgis, 2011). Dit proefschrift heeft laten zien dat er verschillende contextkenmerken zijn die verband houden met hoeveel angst bewoners ervaren. Relevante determinanten zijn de hoeveelheid criminaliteit, de etnische samenstelling van de bevolking, de economische status, de hoeveelheid wanorde, de aanwezigheid van faciliteiten en hoeveel cohesie bewoners gemiddeld ervaren. Dit betekent dus het ervaren van onveiligheid het gevolg is van een complexe optelsom van allerlei factoren. Het is belangrijk om op te merken dat individuele kenmerken hierbij ook een rol spelen.

De derde hoofbevinding is dat de relevantie van de wooncontext medeafhankelijk is van op welk schaalniveau een bepaald verband wordt geanalyseerd. Dit is inzichtelijk gemaakt door in **hoofdstuk 2** en **hoofdstuk 4** de directe leefomgeving op verschillende manieren te meten: op basis van een aantal administratieve eenheden (straten, buurten en wijken) en door persoonlijke wooncirkels te construeren. Hieruit bleek dat de administratieve buurt niet altijd de meest relevant eenheid is om bepaalde contextuele effecten op te sporen. Om

beter te begrijpen hoe de context waarin iemand woont doorwerkt in zijn of haar leven, is het aan te raden om kritischer te kijken naar de conceptualisering en operationalisering van 'context' (Lupton en Kneale, 2012). Het creëren van persoonlijke wooncirkels (*egohoods*) is hierbij een aan te bevelen aanpak. De laatste relevante bevinding is dat **hoofdstuk 5** beter inzichtelijk heeft gemaakt hoe gevoelens van onveiligheid – onder Rotterdammers – zich hebben ontwikkeld door de tijd heen. Ook is bekeken hoe de trends het beste verklaard kunnen worden. De empirische analyses lieten zien dat deze ontwikkeling in verschillende periodes verschillend verloopt. Er was zowel een periode waarin mensen zich veiliger zijn gaan voelen, als een periode van relatieve stabiliteit. Dit is tot heden onderbelicht gebleven in de literatuur over onveiligheidsgevoelens. Eerdere onderzoekers observeerden bijvoorbeeld dat onveiligheidsgevoelens vaak blijven stijgen, ondanks dat de hoeveelheid criminaliteit daalt (Lub en De Leeuw, 2017; Valente, Valera en Guàrdia Olmos, 2020).

De inzichten opgedaan in dit proefschrift kunnen beleid op ten minste drie manieren informeren. Ten eerste doordat is aangetoond dat het in bepaalde woonomgevingen lastiger is voor bewoners om sociale relaties te vormen. Ik heb hierbij voornamelijk gekeken naar hoe dat zich verhoudt tot de veranderende etnische samenstelling. Het is belangrijk dat beleidsmakers zich bewust zijn van deze ontwikkelingen. Op plekken waar cohesie en de veiligheidsbeleving onder druk komen te staan, is het aan te raden dat beleidsmakers meer investeren in de sociale infrastructuur om ervoor te zorgen dat er vanzelfsprekende ontmoetingsplekken ontstaan zodat mensen elkaar blijven ontmoeten (Blokland, 2009). Ten tweede laat dit proefschrift duidelijk zien dat de hoeveelheid criminaliteit niet allesbepalend is voor hoe veilig of onveilig mensen zich voelen. Beleid dat gericht is om de veiligheidsbeleving onder bewoners te verbeteren, moet zich dus niet alleen op dat aspect richten. Zulk beleid moet zich ook richten op de economische status, de mate van wanorde en de mate waarin bewoners buurtcohesie ervaren. Het bestaande 'schoon, heel en veilig' beleid van de gemeente Rotterdam sluit hier al gedeeltelijk bij aan. Tot slot heeft dit proefschrift mogelijke implicaties voor het hanteren van de (administratieve) buurt als relevante interventieschaal. De uitgevoerde analyses ondersteunen het idee dat niet alle problemen die je in de buurt tegenkomt, ook het beste op dit schaalniveau kunnen worden opgelost. Om beter te begrijpen waarom sommige inwoners zich op bepaalde plekken onveiliger voelen of minder cohesie ervaren, zijn andere niveaus dus soms nodig.



Acknowledgements dankwoord

Dankwoord

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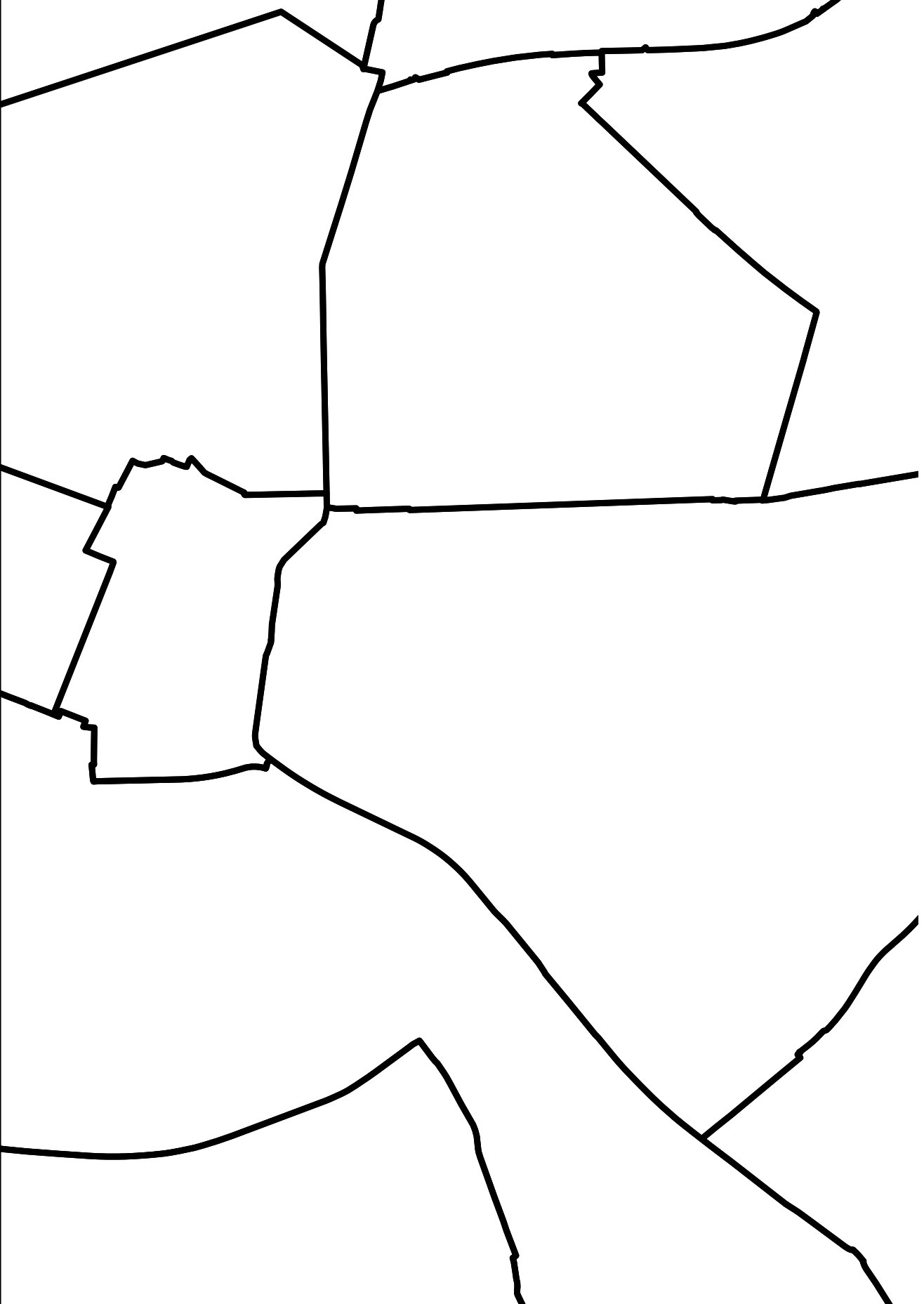
Rotterdam, 18 november 2020



Curriculum Vitea

Curriculum Vitea

Iris Glas (1991) holds a Bachelor's degree and Research Master's degree in Political Science, both obtained from Leiden University. During her studies, she interned with ProDemos and the Netherlands Institute for Social Research (SCP). In 2016, Iris started her PhD project at the Erasmus University Rotterdam (EUR). During her PhD trajectory, Iris published several (peer-reviewed) articles. She currently works as a researcher at the Rathenau Institute and the National Committee for 4 and 5 May.

Working experience

2020 –	Researcher, Rathenau Institute
2019 –	Researcher, National Committee for 4 and 5 May
2016 – 2020	PhD Candidate, Erasmus University Rotterdam

Education

2013 – 2015	Research master political science, Leiden University
2009 – 2013	Bachelor political science, Leiden University
2009 – 2012	Honours college science and society, Leiden University

Additional training

2019	Causal interference: estimating causal effects, Pompeu Fabra University
2019	Large-scale register data for quantitative social research, Erasmus University Rotterdam
2018	Summer school social data science, University of Copenhagen
2018	Data analysis with R, Erasmus University Rotterdam
2017	Big data analysis and visualization, Erasmus University Rotterdam
2017	Introduction to GIS and Advanced GIS, University of Amsterdam

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