Fear of crime: contextual effects on the relation between social integration and fear of crime

A multilevel analysis of context-effects on neighbourhood and district level

Master Thesis Sociology

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Abstract

The research was aimed on explaining mixed evidence for the relation between social integration and fear of crime. The expected relation between social integration and fear of crime is negative: when a person is better socially integrated in his environment, this should lower levels of fear of crime. Possible explanations for mixed results on this model were different operationalisations used by researchers, a possible mediating variable and context-effects. This research focuses on neighbourhood effects as an influence on the relation between social integration and fear of crime. Data from a 2013 survey in the municipality of Tilburg was used combined with objective neighbourhood and district data. Gibson et al. (2002) posed perceived collective efficacy as a mediating variable and a mediator analysis proved the mediating effect of perceived collective efficacy in this data. After this also cultural heterogeneity, conceptualised as ethnic heterogeneity and socio-economic heterogeneity, and district crime rates are added to multilevel models. Both of the context-effects were expected to weaken the negative relation between social integration and fear of crime. The individual-level effect of social integration was significant and negative on fear of crime and significant positive on perceived collective efficacy as was expected. The effect of violent crime only influenced the model through perceived collective efficacy. Noteworthy is the effect of ethnic heterogeneity, which weakens the relation between social integration and fear of crime through perceived collective efficacy but on the other hand strengthens the direct effect of social integration on fear of crime. Suggested is to look in to this effect more thoroughly in future research. Also the clustering of variation within neighbourhoods was less strong than expected, which indicates that most of the variance is still to be found in individual-level effects.

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1. Introduction

Explaining crime has been a popular research topic for many years. The last decades another research field emerged: fear of crime research. The incongruence between actual crime rates and the feelings of safety, or the more often used term 'fear of crime', directed scholars towards explaining fear of crime next to explaining actual crime rates (Clemente & Kleiman, 1977; Taylor, Shumaker & Gottfredson, 1985) . Sociological and criminological research addressed the psychological and demographic characteristics influencing fear of crime, but especially acknowledged the value of contextual characteristics in explaining individual fear of crime. Combined with the interest in studies on neighbourhood effects explaining actual crime rates, started in the 1920's by the Chicago school, fear of crime research focused on the neighbourhood effects on fear of crime.

Multiple models for explaining fear of crime were posed by previous research resulting in three dominant models: the victimization model, the disorganisation model and the social integration model. This last model states that personal integration in a social network negatively influences the amount of fear of crime people experience. In multiple studies this model is tested (Austin, Woolever, & Baba, 1994; McGarrell, Giacomazzi, & Thurman, 1997; Rountree & Land, 1996) and in those studies can be seen, like Gibson, Zhao, Lovrich & Gaffney (2002) also pose, that evidence for the social integration model is mixed: not all empirical evidence supports the above stated negative relation between social integration and fear of crime.

Scholars testing the social integration model assume that social integration always leads to less fear of crime. When a resident is better socially integrated in its social context (the neighbourhood for example), he experiences less fear of crime than residents who reside in their neighbourhoods in a more anonymous way. Some previous research did indeed lead to empirical results support this assumption. The fact that social integration, for example, increases the tendency towards informal social control explains how people experience less fear of crime when socially integrated (Gibson, 2002; Maas-de Waal & Wittebrood, 2002). When people have good social contacts within their neighbourhoods they ‘look after each other’, or at least perceive the other to do so. This lowers the experienced fear.

But contrary to this expectation and the found empirical evidence other research led to weak or no association between social integration and fear of crime.

There are three possible explanations for the mixed results of the social integration mode. The first explanation is posed by Bursick and Grasmick (1993), who claim that variations in results are due to the use of different conceptualisations and operationalisations of the concept social integration. A second explanation is suggested by Gibson et al. (2002): the relation is mediated by collective efficacy, "the linkage of mutual trust and the willingness to intervene for the common good" (Sampson et al., 1997: p.919), which follows on social integration and leads to lower levels of fear of crime. Because social integration first has to 'evolve' into collective efficacy and only then has an effect on fear of crime Gibson et al. (2002) claim that this has to be the explanation of mixed results.

A third explanation is proposed by Taylor(2002), who states that neighbourhood effects could be 'guilty' of creating mixed evidence for the social integration model.

This research has as its goal to assess the possibilities of neighbourhood-, the so called context-, effects influencing the relation between social integration and fear of crime.

1.1 Research question

The goal of this research is to explain the mixed results of the social integration model. As has been mentioned there are factors on a neighbourhood level, so called context-level variables, which could influence the outcomes of the effect of social integration in explaining fear of crime. When the context differs, the model (explaining individual fear of crime from individual experienced social integration and the mediating perceived collective efficacy) could lead to different outcomes. Therefore to address these mixed results of the social integration model in this study the question will be if context effects could explain mixed results of earlier research on the social integration model.

> *Could mixed results of the effect of social integration on fear of crime be explained by context-level effects?*

1.2 Data

Data for this research comes from the Lemon (LeefbaarheidsMonitor) study of the Municipality of Tilburg in 2013. Lemon is a biyearly research conducted to assess the quality of life in neighbourhoods in Tilburg, Berkel-Enschot and Udenhout. Lemon 2013 had 16.592 respondents.

Next to individual data from the Lemon questionnaire context-data is derived from the Municipal Records Administration Database (GBA) and the Police Enforcement Database (BVH) and is aggregated on neighbourhood level on 295 neighbourhoods. For the data on socio-economic heterogeneity in the neighbourhood data from Experian Mosaic is used, which estimates income level and educational level for every household.

1.3 Relevance

1.3.1 Societal relevance

Safety is a buzz-word with high political and societal priority. Combined with the notion that quality of life is more dependent on 'feeling safe' than on actual safety it is important for society and policy to positively influence feelings of safety to improve quality of life. This makes the topic of fear of crime research relevant for society: in which way can policy influence feeling safe. Perkins and Taylor (1996) pose that fear of crime, next to actual crime, is a serious individual- and community level problem. Insights on the indirect effects on fear of crime could help policy makers improve the quality of life in neighbourhoods.

A lot of previous research already gives a fairly good insight in explaining fear of crime, but in the current societal processes of individualisation it is extra important to gain a better understanding of how social integration fits in the picture of fear of crime and therefore quality of life.

Not only does this research contribute to the knowledge on the social integration model, but also points to the possibilities that are already available in the information within the public sector. Systems to monitor quality of life in cities and neighbourhoods focus on individual perceptions of those areas, for example fear of crime. This is also the case for the dataset that will be used in this research. LEMON, short for 'Leefbaarheids Monitor', Quality of life Monitoring, is an instrument to assess quality of life by asking respondents questions about how they feel in their neighbourhood regarding for example disorder, social integration and fear of crime. These kind of monitoring instruments are used to assess quality of life to improve policies. But the instruments used lack indices that measure, and can be used to analyse, underlying factors that influence the creation of the individually experienced problems (Kleinhans, Bolt, Lindeman, van Doveren & van der Land, 2010). Secondly, this information is mostly just used as a monitoring instrument instead as a tool to find new information that can be used in the process of improving quality of life. This research introduces new ways of using this data for policy objectives.

1.3.2 Scientific relevance

For social sciences the untangling of the complex models explaining fear of crime has high relevance. Multiple scholars acknowledged the importance of social integration in explaining (the absence of) fear of crime, but also acknowledged the mixed results in past research.
This research addresses to the need of clarifying the relation between social integration and fear of crime. Next to this, it also will use techniques of analysis that are more precise in controlling for nested data. Multi-level analysis can give a much clearer view on the way that an individual experience is or can be influenced by neighbourhood-level factors.

In time there has been lots of attention for the factors that facilitate fear of crime (McGarrell, Giacomazzi & Thurman, 1997), but less for the inhibiting factors like social integration. Van Steden et al. (2010) show that it's important to look at safety in a positive way: the thought of 'sense of community' being a positive factor in creating a feeling of safety. In science the inhibiting influences on fear of crime get insufficient attention compared to the facilitators of fear and this research will contribute to the knowledge about an important inhibitor of fear of crime. Also for policy this will be valuable: initiating a positive influence can be easier than diminishing negative influences.

1.4 Summary

Following the introduction the second chapter there will give an overview of existing theories on fear of crime. After this there will be attention to the social integration model and past research on the association between social integration and fear of crime. The theory will lead to certain expectations from this data and eventually lead to hypotheses on the association between social integration and fear and the influence of context-effects. In the next chapter the used data will be described, the variables will be operationalized and the data and method will be discussed. The results are discussed in the results section, where the hypotheses will be tested. The last chapters will provide the main conclusions of the research and discusses the results in the context of other research and strengths/weaknesses of the research. The discussion also includes suggestions for future research.

2. Theoretical framework

2.1 Crime research

The differences between objective and subjective measures of crime are bigger than would be expected logically. A few decades ago research on fear of crime began with the assumption that fear of crime reflects the possibility of being a victim of crime. But research led to another conclusion: subjective fear of crime does not reflect the objective crime rates in an area (Clemente & Kleiman, 1977; Taylor, Shumaker & Gottfredson, 1985; Covington & Taylor, 1991)

A concrete example of the incongruence between fear of crime and actual crime is the fact that there is a large amount of fear for terrorism (especially since the 9/11 attacks) but the chances of being a victim of terrorism in the Netherlands are not much bigger than the chances of winning the jackpot (Salman, Steden, Vliet & Boutellier, 2010).

These discoveries revealed that these scholars could not explain fear of crime with the assumptions made from thinking that crime rates and fear of crime have a strong connection. For social policies aimed on improving quality of life fear of crime is an important subject. Fear of crime influences quality of life and therefore has been recognized as a social problem (Franklin, Franklin & Fearn, 2008). And because creating a safer environment doesn't automatically lead to less fear of crime not only scholars but also policy makers are in need of more information on fear of crime. This led to a strong need for research on factors explaining fear of crime.

2.2 Explaining fear of crime

There is a range of analytical models explaining fear of crime. These analytical models co-exist not only because they all have some empirical evidence supporting their relevance, but also because they look at explaining fear of crime from a different point of view. This paragraph summarizes the most well-know explanatory models for explaining fear of crime.

The first model assumes that fear of crime is a rational and correct evaluation of the risk of victimization and is often called the 'victimization model'. This model assumes that fear of crime is triggered by assessing one's own risk of being a victim of crime (Covington & Taylor, 1991). This can be the product of actual (past) victimization or the (perceived) likelihood of being a victim. Franklin, Franklin & Fearn (2008) call this second part of the victimization model, the individual evaluation of victimization risk, the 'vulnerability model'.

Individuals can experience psychical or social vulnerability: psychical vulnerability when the ability to physically avert attacks is low, and social vulnerability when the social environment gives a higher risk of being victimized. Evidence of the effect of physical vulnerability is found in the higher levels of fear experienced by women over men and by the elderly compared to younger people (Clemente & Kleiman, 1977; Ferraro, 1996). Social vulnerability can be seen in the higher levels of fear when individuals are of a lower socio-economic status or are part of a (racial) minority (Joseph, 1996; Covington & Taylor, 1991; Will & McGrath, 1995).

This model is supported by previous research (Clemente & Kleiman, 1977; Covington & Taylor, 1991; Will & McGrath, 1995) but an important downside of this model is the fear-victimization paradox which questions the actual rationality of the individuals risk perception (Hale, 1996). The fear-victimization paradox is apparent when comparing the perceived victimization risk with the actual victimization risk: for example young men are most likely to be victimized, but they report lower levels of fear compared to the elderly and women, who are in fact least likely to be victimized (Garofalo & Laub, 1978).

While the victimization model explains fear by personal characteristics, the disorder model and the social integration model both explain fear of crime by taking into account the ecological factors (on micro- and meso level) influencing individual (in)security. From research of the direct effect of ecological factors on crime rates (for example the broken windows theory by Wilson and Kelling (1982) and the occurrence of violent crime in relation to a neighbourhood's collective efficacy by Sampson, Raudenbush and Earls (2007)) new research emerged on the influence of those factors on fear of crime next to their effect on actual crime.

The disorder model is based on the idea that physical and social disorder in a neighbourhood lead to a perceived deterioration of neighbourhood social control, causing feelings of insecurity and fear of crime (Skogan, 1986). Physical disorder is for example the presence of vandalized cars and abandoned houses. Social disorder is the disorderly behaviour seen in the neighbourhood like littering and public drinking (Franklin, Franklin & Fearn, 2008).

This theory is connected to (and according to Franklin, Franklin & Fearn (2008) is perhaps extra evidence for) the work of Wilson and Kelling (1982), who claim that disorder is norm-setting and leads to more disorder and eventually more crime in their broken windows theory.

A model that has an opposite effect on fear of crime is the social integration model. Where the victimization model and the disorganisation model are based on facilitating feelings of fear of crime, social integration acts as an inhibitor of fear of crime. This model states that better socially integrated residents of a neighbourhood experience lower levels of fear of crime than those with lower social integration (Franklin, Franklin & Fearn, 2008). This model will be discussed in the following paragraphs.

Effects of personal characteristics as stated in the victimization model are proven a significant influence on fear of crime. Also the effect of the disorder model has quite consistent and strong outcomes, which lead to believe that disorder and indeed is an important factor to consider when explaining fear of crime (Franklin, Franklin & Fearn, 2008). But the results of social integration are not consistent and lead to suspect that, especially because this factor is placed in a social context or environment, it can be due to context effects that this model produces these mixed results.

In the next paragraph the social integration model and the mixed results on this model will be explained extensively.

2.3 Social integration model

The origins of crime research on a neighbourhood level are found in the social disorganisation theory by Shaw & McKay (1942). They investigated the characteristics of the neighbourhood in relation to crime, and found that some characteristics (for example a high residential mobility and low socio-economic status) lead to social disorganisation and a lack of cohesion within that neighbourhood. Because of the lowered social control, a product of the social disorganisation, crime flourished in those disorganised neighbourhoods.

A counterargument for this relation is that it can be due to structural factors like for example low income and less migrants that those neighbourhoods experience higher crime rates, but there is evidence that social characteristics of the neighbourhood have a direct connection with crime rates in that neighbourhood, even when there is controlled for structural characteristics (Sampson, Raudenbusch & Earls, 1997; Maas-de Waal & Wittebrood, 2002).

This also suggests that neighbourhoods that are socially organised, neighbourhoods with better social networks and social cohesion, experience less crime because of a higher social control.

The same assumptions are made and tested for the relation between social (dis)organisation and fear of crime: when social cohesion in a neighbourhood is higher this would lead to less fear of crime. For the individual experience of fear of crime this theory therefore assumes that an individual that is (or feels) better socially integrated experiences less fear of crime.
When defining social integration a general definition could be that social integration is the amount of attachment and feelings of belonging to a network, in this case a neighbourhood (Franklin, Franklin & Fearn, 2008).

The expected negative relation between social integration and fear of crime is in fear of crime literature called the social integration model. To test if this basic assumption does or doesn't hold in this data the first hypothesis tests if higher social integration leads to less fear of crime:
H1: Individuals who are better integrated in their neighbourhood experience lower levels of fear of crime

Figure 1: Conceptual model individual level variables

Gibson et al. (2002) state that social integration is the most important predictor of fear of crime, but previous research leads to mixed results on if this relation could be assumed. Rountree and Land (1996) find social integration to lower the perceptions of unsafety in neighbourhoods, but on the other hand Baba and Austin (1989) find no significant effect of social integration on feelings of safety when controlling for other neighbourhood factors. Austin et al. found in 1994 that social integration leads to increased feelings of safety when social integration is measured by the amount of participation in formal organizations, but the association disappears when social integration is measured by the amount of friends one has. Baba and Austin (1989) measured social integration by years of residence and amount of friends in the neighbourhood while others more focused on more subjective feelings and individual perceptions of social integration (Wikström & Dolmén, 2001).
This leads the belief that the mixed results found in previous research could be caused by the different operationalisations used, but also other explanations have been posed.

Gibson et al. (2002) try to further explain the social integration model and the mixed results by adding perceived collective efficacy to the model. To explain their assumptions it's important to go back to the underlying idea of the social integration model: better social integration would lead to better (perceived) informal social control in the neighbourhood and to less fear of crime. Gibson et al. (2002) replace (perceived) informal social control with a more inclusive concept called collective efficacy. This concept was first used by Sampson, Raudenbusch & Earls (1997) and combines informal social control and social trust/cohesion into a new concept measuring "the linkage of mutual trust and the willingness to intervene for the common good" (Sampson et al., 1997: p.919). They hypothesize in their well-known article *Neighbourhoods and Violent Crime: a Multilevel Study of Collective Efficacy* (1997) that collective efficacy leads to a reduction in violent crime and mediates in the relationship between concentrated disadvantage and the occurrence of violent crime.
Gibson et al. (2002) hypothesise that this collective efficacy could be a 'missing link' between social integration and fear of crime. When trustful relations and cohesion between residents are present, collective efficacy is high and residents are willing to intervene for the common good. Evidence states that this leads to less violent crime and therefore there can be expected that this same effect holds for fear of crime.

The research of Sampson et al. (1997) measures collective efficacy as an aggregated measure on neighbourhood-level: when a neighbourhood has collective efficacy the (residents of) the neighbourhood will intervene, leading to lower crime rates. However, in the case of fear of crime it may not be the actual level of collective efficacy in the neighbourhood that influences fear of crime, but the amount of collective efficacy that a resident expects of its neighbours. When neighbours are perceived to be willing to intervene when crime occurs the experienced fear of crime would logically be lower. Gibson et al. (2002) place this concept between social integration and fear of crime by stating that social integration and (perceived) collective efficacy exist on a continuum. Social integration is the initial stage, and it could but not definitely will lead to collective efficacy. They therefore state that social integration in time could lead to perceptions of collective efficacy, but when social integration is present, "the trust [in] and expectations [of neighbours] may or may not be present in the neighbourhood" (Gibson et al, 2002, p.539). Because of this longitudinal effect a socially integrated neighbour could still have low perceptions of the neighbourhoods' collective efficacy, which means that the social integration of that resident does not affect fear of crime in the expected way.

For Gibson et al. (2002) this was a conclusive explanation for the mixed results found in previous research.

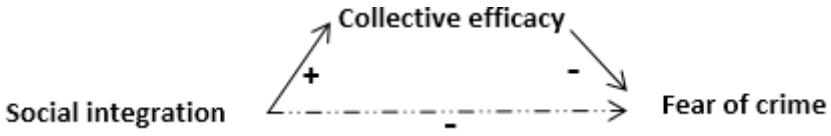
As a starting point the conceptual model of Gibson et al. (2002) is taken. If Gibson et al. (2002) are right, in this data the results of their article should be replicable. The theory on social integration leads to the expectation that when social integration in a neighbourhood is higher, the experienced fear of crime is lower. This relationship is mediated by perceived collective efficacy. When social integration is higher, the perceived collective efficacy is also higher (social integration leads to believing and trusting your neighbours to intervene on behalf of the common good). And when perceived collective efficacy is higher the fear of crime is lower (Gibson et al., 2002).

To test if these hypotheses still hold for this data the following hypotheses will be the same as the hypotheses in the article by Gibson et al.(2002):

H2: Residents who are better socially integrated in the neighbourhood perceive higher collective efficacy

H3: Residents who are better socially integrated in the neighbourhood experience lower levels of fear of crime through perceived collective efficacy

Figure 2: Conceptual model individual level variables



2.4 Context effects

Elchardus, de Groof & Smits (2003) note that mixed results could be a product of ecological fallacy: almost all research done on neighbourhood characteristics and their effect on crime and on fear of crime is based on aggregated measures rather than on multilevel analyses. Because of using the aggregated measures the risk on ecological fallacy increases and effects found using an aggregated measure could easily disappear when using multilevel analyses. Elchardus, de Groof & Smits (2003) therefore state that mixed results are not only a possible effect of using different operationalisations, but could also be due to using a different (and, in the case of using aggregated measures instead of multilevel analysis, inferior) method of analysis.

Following this reasoning Taylor (2002) states in a critical article towards the text of Gibson et al. (2002) that the inclusion of collective efficacy as mediating concept alone will not explain the mixed results of the social integration model. He strongly suggests taking in account neighbourhood characteristics such as neighbourhood heterogeneity. He also confirms that a clustered design taking in account a group of neighbourhoods could lead to a better understanding of the influence of community characteristics on social integration and collective efficacy (Taylor, 2002 p. 789).

In this research therefore two possible interaction effects on neighbourhood level are being taken into account. The first context effect was literally stated by Taylor (2002) in his note to include community characteristics: neighbourhood heterogeneity. A theory from Merry (1981) states that subcultural diversity could lead to fear of crime directly, but it is plausible that also an indirect effect of (sub) cultural diversity influences the here investigated relation between social integration and fear of crime.
The second investigated context effect is the objective crime rate. There is evidence that there is little to no effect of objective crime rates on fear of crime (which is in fact the reason fear of crime research emerged) (Clemente & Kleiman, 1977; Taylor, Shumaker & Gottfredson, 1985). But, as will be explained later on, an interaction effect of crime could be a possibility when taking in account the effect of social integration and collective efficacy.

2.4.1 Subcultural diversity

Feelings of threat and vulnerability could be caused by an interpretation of the world and a range of different experiences in this world which cause feelings of insecurity and are projected on crime, leading to fear of crime (Elchardus, de Groof & Smits, 2003).
This approach in its broadest sense is hypothesized by some researchers by claiming that the process of a changing society and changing societal structures create a general feeling of urban unease (Taylor & Hale, 1986), (ontological) insecurity[1] (Giddens, 1990; Van Steden et al., 2010) and anomie (Elchardus, de Groof & Smits, 2003). This feeling of insecurity is projected on crime, leading to fear of crime.

[1] Ontological insecurity is a state that occurs when an individual is insecure about the possibilities he is going to face and when structure, predictability and social normality are low, leading to the threat of identity (Giddens, 1990, Mitzen, 2006).

This assumption is a starting point to understanding the effect of subcultural diversity and, more so, how the subcultural diversity model perhaps could explain how social integration will not always lead to lower levels of fear.

Merry (1981) states that fear of crime emerges from living in a cultural diverse environment. Behaviour, norms and values of people with different cultural backgrounds are difficult to interpret and lead to feelings of uncertainty and a lack of trust, which then leads to higher levels of fear of crime (Covington & Taylor, 1991). Young (1999) added to this that a culturally diverse environment could lead to lowered perceived predictability of the behaviour of the other and thus that other becomes a target of fear of crime and more general feelings of insecurity, comparable to the 'ontological insecurity' by Giddens (1990). After Merry this model was tested by other scholars, which is now known as the 'subcultural diversity' model (Bursik & Grasmick, 1993; Skogan, 1995).

Around the same time as Merry Hansmann and Quigley in 1982 investigated the influence of cultural heterogeneity of the population in a region on the actual crime rate instead of fear of crime. Past research led to believe that cultural heterogeneity in a state correlates with the amount of serious crimes. One of the mechanisms that could explain this correlation theorizes that group norms and sanctions break down when conflicting cultures are present. High homogeneity leads to high levels of consensus and greater respect for collective mechanisms. And on the opposite: high heterogeneity leads to exposure to norms and sanctions that differ from the own norms and sanctions and therefore leads to weakening the hold of the own system of norms and authority.

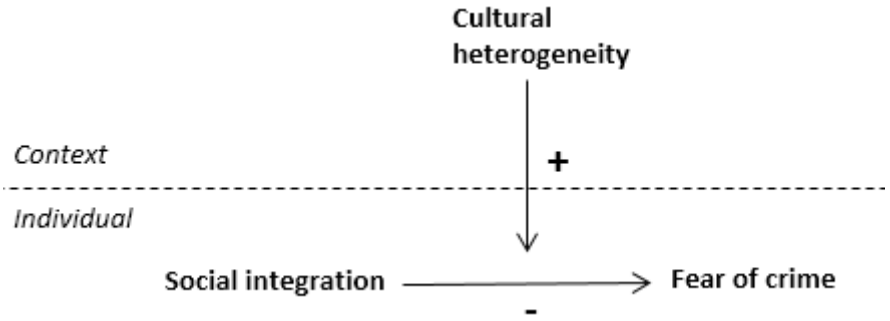
Hansmann and Quigley (1982) conclude from their research on homogeneity and crime rates that ethnic heterogeneity does indeed influence crime rates, but linguistic and religious heterogeneity do not. They pose as a possible explanation for these results that linguistic and religious heterogeneity lower the amount of interaction between different cultures, leading to a lower effect on the breakdown of norms and sanctions.
A significant underlying factor for the effect of heterogeneity on serious crime is the degree of actual interaction. This point is important to understand the effect of cultural heterogeneity in combination with social integration, which for a great part exists of social interactions.

Because of the subcultural diversity model a direct effect of cultural heterogeneity is expected on fear of crime. But also an interaction effect is expected based on the assumptions of insecurity as a result of a culturally heterogeneous environment.

This leads to expecting the following effects: when social integration is high in a culturally heterogeneous environment the interaction with residents with unfamiliar and therefore unpredictable behaviour is high. This could lead to the earlier stated general feelings of insecurity and therefore more fear of crime. The negative effect of social integration on fear of crime will in this case be weaker because of the positive effect of high social integration combined with high cultural heterogeneity on fear of crime. In this case there is expected that cultural heterogeneity moderates the relation between social integration and fear of crime. The following hypothesis will be tested to assess the moderating effect of cultural heterogeneity:

H4: For residents in a high cultural heterogeneous neighbourhood the effect of social integration on fear of crime is weaker than for residents in a cultural homogeneous neighbourhood

Figure 3: Conceptual model with moderator



Research on the effect of cultural heterogeneity on fear of crime has focused for a great part on ethnic heterogeneity (Bennet & Flavin, 1994; Covington & Taylor, 1991; Maas-de Waal & Wittebrood, 2002). To test if cultural heterogeneity in a broader sense has an influence on perceived collective efficacy and fear of crime also the effect of socio-economic heterogeneity has to be taken into account. The stated cultural diversity will therefore be measured by ethnical heterogeneity and socio-economic heterogeneity

To assess both conceptualisations of cultural diversity H3 will be tested in two parts:
H4a: For residents in a high ethnic heterogeneous neighbourhood the effect of social integration on fear of crime is weaker than for residents in an ethnic homogeneous neighbourhood
H4b: For residents in a high socio-economic heterogeneous neighbourhood the effect of social integration on fear of crime is weaker than for residents in a socio-economic homogeneous neighbourhood

For the effect on perceived collective efficacy the earlier stated notion of Hansmann and Quigley (1982) can be taken into account: the degree of social interaction combined with the degree of heterogeneity leads to a different effect on the breakdown of norms and sanctions. More social interaction led to a stronger effect of cultural heterogeneity on the breakdown of norms and sanctions in the community. Hence there can be expected that community heterogeneity has an effect on the breakdown of norms and sanctions within that community when interaction is high.
Also, considering the subcultural diversity model, when interaction with a cultural diverse environment is high the amount of uncertainty and lack of trust against the community will also be high (because of the difficulty of interpreting behaviour that is unfamiliar in the own culture). When this is the case, a high social integration could lead to a lack of trust, uncertainty and a feeling of lowered norms and values. It could also lead to actual lowered norms and values in the community. Both of the trends could influence the perceived collective efficacy negatively, eventually leading to fear of crime.

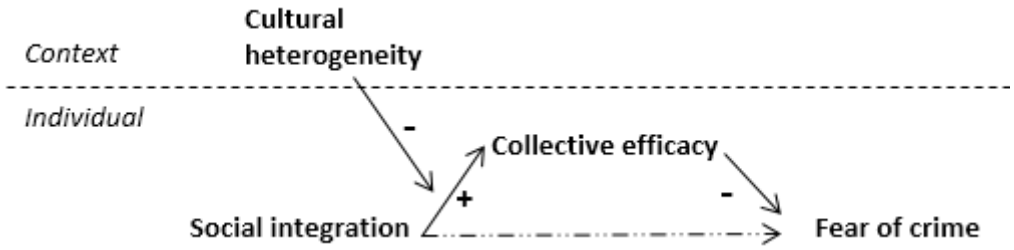
There is reason to assume these mechanisms could take place, but evidence to prove this is necessary. Multilevel research on the effect of cultural heterogeneity on collective efficacy and fear of crime is scarce and existing research doesn't include individual perceptions of social integration and cohesion in the neighbourhood (Elchardus, De Groof & Smits, 2005). To add to existing research in this study the model will include the individual experienced social integration and perceived collective efficacy together with the effect of the objective cultural heterogeneity on neighbourhood-level. This will answer to the need of a clustered design study which untangles the relationship between social integration, collective efficacy and fear of crime by adding neighbourhood composition.

Social integration in a heterogeneous environment can lead to less perceived collective efficacy and when perceived collective efficacy is lower, fear of crime will be higher.
In this way, this context-effect could explain the mixed results found by other scholars

If this is the case for a cultural diverse neighbourhood, we can expect that:
H5: For residents in a high cultural heterogeneous neighbourhood the effect of social integration on perceived collective efficacy is weaker than for residents in a cultural homogeneous neighbourhood
This hypothesis will be tested in two parts:
H5a: For residents in a high ethnic heterogeneous neighbourhood the effect of social integration on perceived collective efficacy is weaker than for residents in an ethnic homogeneous neighbourhood
H5b: For residents in a high socio-economic heterogeneous neighbourhood the effect of social integration on perceived collective efficacy is weaker than for residents in a socio-economic homogeneous neighbourhood

When the effect of social integration on perceived collective efficacy is moderated by cultural heterogeneity the total effect of social integration on fear of crime would change, which is reflected in hypothesis 6:
H6: For residents in a high cultural heterogeneous neighbourhood the effect of social integration on perceived collective efficacy is weaker than for residents in a cultural homogeneous neighbourhood, which in turn weakens the negative influence of social integration on fear of crime
This hypothesis will also be tested in two parts:
H6a: For residents in a high ethnic heterogeneous neighbourhood the effect of social integration on perceived collective efficacy is weaker than for residents in an ethnic homogeneous neighbourhood, which in turn weakens the negative influence of social integration on fear of crime
H6b: For residents in a high socio-economic heterogeneous neighbourhood the effect of social integration on perceived collective efficacy is weaker than for residents in a socio-economic homogeneous neighbourhood, which in turn weakens the negative influence of social integration on fear of crime

Figure 4: Conceptual model with moderator



2.4.2 Crime rates

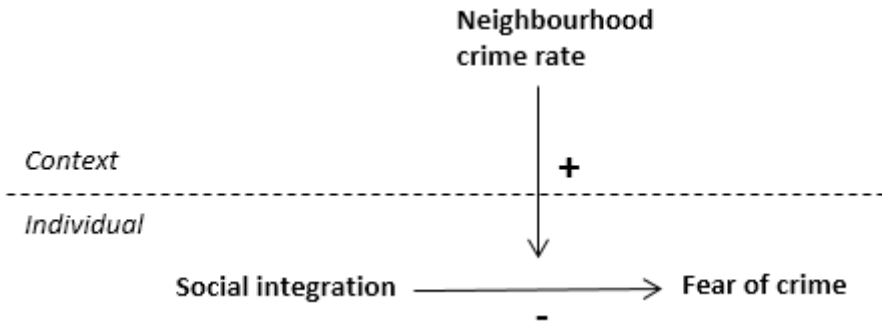
The other effect that on a context-level could influence the relation between social integration and fear of crime is the effect of crime rates. This could be seen as a part of the earlier mentioned victimisation model and is called 'indirect victimisation'. Skogan (1986) also mentions this by referring to secondary victimisation. This theory implies that secondary encounters with crime, such as hearing about others who were direct victims of crime, could also lead to fear of crime. Hale (1996) even goes as far as stating that this indirect victimisation could have a stronger impact on feelings of fear of crime than earlier direct victimisation. Note here that there are also some similarities with the disorganisation model, because crime rates could also be perceived in the light of a disorganised neighbourhood.
Combined with the knowledge about social integration this process could lead to social integration having a positive (rather than a negative) effect on fear of crime posed by De Hart (2002).

When crime rates in a neighbourhood are high, social integration could lead to more encounters with crime: when socially integrated, there could be expected that criminality is one of the main topics in conversation with other residents. Higher social integration thus will lead to more encounters with criminality in conversation. Because of this the resident would feel less secure and levels of fear will be higher. Taylor and Hale (1986) call this the multiplying effect of crime: neighbourhood characteristics could affect the way crime 'spreads' through the neighbourhood. Skogan (1986) also poses that messages about crime spread faster in a tight-knit community.

Therefore we could expect an effect of crime rates as moderator:

H7: For residents in a neighbourhood with high crime rates the effect of social integration on fear of crime is weaker than for residents in a neighbourhood with low crime rates

Figure 5: Conceptual model with moderator



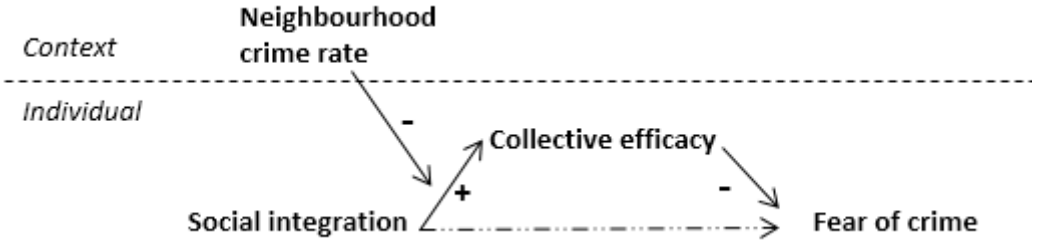
There could be argued that, like cultural heterogeneity, crime rates could also have an effect on fear of crime through collective efficacy. When a resident encounters high crime rates in conversations, he could assume that this is caused by lower informal social control and a lower collective efficacy in the neighbourhood. Therefore he could perceive the collective efficacy of the neighbourhood as low:

H8: For residents in a neighbourhood with high crime rates the effect of social integration on perceived collective efficacy is weaker than for residents in a neighbourhood with low crime-rates

Which in turn leads to an effect of crime rates on the relation between social integration and fear of crime through perceived collective efficacy.

H9: For residents in a neighbourhood with high crime rates the effect of social integration on perceived collective efficacy is weaker than for residents in a neighbourhood with low crime rates, which in turn weakens the negative influence of social integration on fear of crime

Figure 6: Conceptual model with moderator



In earlier research the effect of property crime on fear of crime differs from the effect of personal crime on fear of crime (Kanan & Pruitt, 2002; Bennet & Flavin, 1994). Also Skogan (1986) notes that people tend to talk more about violent crime than about less serious property crime, which could influence the effect of different types of crime on the relation between social integration and fear of crime. Therefore in this research the effects of crime rates will be divided into violent crime and property crime.

3. Research question, hypotheses and conceptual model

The mixed results of research on the effect of social integration on fear of crime and the notion by Taylor (2002) that contextual effects should be taken into account lead to the following research question:

> *Could mixed results of the effect of social integration on fear of crime be explained by context-level effects?*

After reviewing past literature on (predictors of) fear of crime and especially the social integration model and neighbourhood effects the following eight hypotheses were formulated:

- *H1: Residents who are better integrated in their neighbourhood experience lower levels of fear of crime*
- *H2: Residents who are better socially integrated in the neighbourhood perceive higher collective efficacy*
- *H3: Residents who are better socially integrated in the neighbourhood experience lower levels of fear of crime through perceived collective efficacy*
- *H4: For residents in a high cultural heterogeneous neighbourhood the effect of social integration on fear of crime is weaker than for residents in a cultural homogeneous neighbourhood*
- *H5: For residents in a high cultural heterogeneous neighbourhood the effect of social integration on perceived collective efficacy is weaker than for residents in a cultural homogeneous neighbourhood*
- *H6: For residents in a high cultural heterogeneous neighbourhood the effect of social integration on perceived collective efficacy is weaker than for residents in a cultural homogeneous neighbourhood, which in turn weakens the negative influence of social integration on fear of crime*
- *H7: For residents in a neighbourhood with high crime rates the effect of social integration on fear of crime is weaker than for residents in a neighbourhood with low crime rates*
- *H8: For residents in a neighbourhood with high crime rates the effect of social integration on perceived collective efficacy is weaker than for residents in a neighbourhood with low crime-rates*

- *H9: For residents in a neighbourhood with high crime rates the effect of social integration on perceived collective efficacy is weaker than for residents in a neighbourhood with low crime rates, which in turn weakens the negative influence of social integration on fear of crime*

In the conceptual models the expected relations are graphically presented.

Figure 7: Conceptual model hypotheses 4 and 7

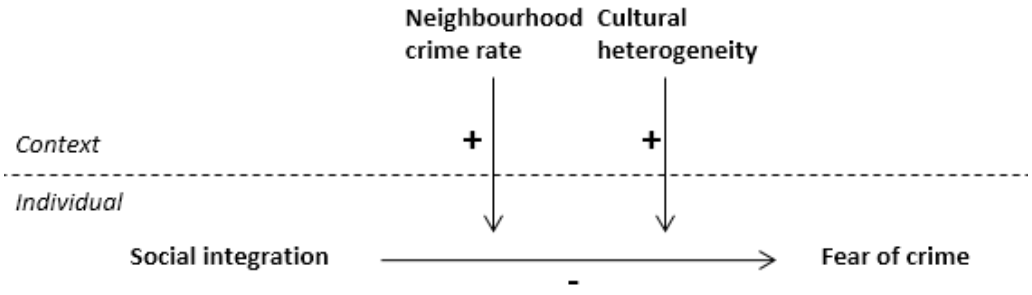
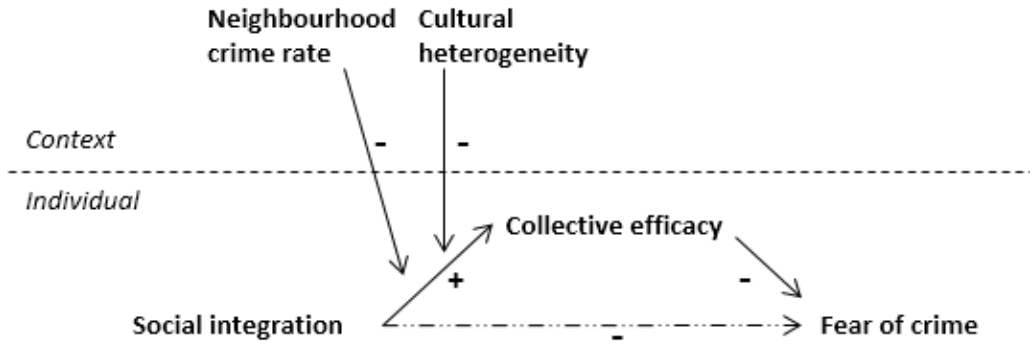


Figure 8: Conceptual model hypotheses 1-3, 5-6 & 8-9



4. Data and methods

This section concerns the data and analytical procedures used in this research. Possibilities and restrictions in the used set of data will be discussed and operationalisations for the used concepts will be presented. The final dataset which will be used for analysis will be described. In the end there will be elaborated on the use of analytical procedures to test the theorized hypotheses.

4.1 Data

The analyses will be carried out on a constructed dataset based on 4 different datasets belonging to the municipality of Tilburg. The individual data comes from the Lemon (LeefbaarheidsMonitor) study of the Municipality of Tilburg in 2013. Next to individual data from the Lemon questionnaire context-data is derived from the Municipal Records Administration Database (GBA) and the Police Enforcement Database (BVH) and is aggregated on neighbourhood level. For the data on socio-economic heterogeneity in the neighbourhood data from the commercial dataset Experian Mosaic is used, which estimates income level and educational level for every household.

Lemon

Lemon is a biyearly research conducted to assess the quality of life in neighbourhoods in the municipality of Tilburg, consisting of Tilburg, Berkel-Enschot and Udenhout. The questionnaire was developed by Rigo Research and Advice and is also used by other municipalities. The questionnaire determines quality of life per neighbourhood by asking respondents to rate a range of indicators on the neighbourhood well-being on a scale from zero to ten. Respondents were selected by taking a random sample from the Municipal Records Administration Database from inhabitants of the municipality of Tilburg within the ages of 18 and 85 and with a maximum of one respondent per address, resulting in a sample of 48,581 respondents. With a response rate of 34% there are 16,592 respondents in the final data set. [2]

[2] The population of Tilburg in 2013 was 208,537. Of those 161,199 inhabitants were within the ages of 18 and 85.

Municipal Records Administration Database

An extract from the Municipal Records Administration Database was made which shows the amount of inhabitants per neighbourhood with a non-Western foreign background. The extract is made on January the first 2013.

Police Enforcement Database

The Police Enforcement Database collects all reports the police receives and classifies the reports and notifications in 24 categories. The data in the database are the cumulative amounts of reports and notifications of the year 2012.

Experian Mosaic Household

The Experian Mosaic database is a commercial database, or a so called commercial geodemographic profiling system, which estimates different characteristics on a household-level based on a black-box full of information, including consuming behaviour and research data (Experian, 2012). The dataset uses these characteristics to deliver a classification into different lifestyles for use in marketing. The used dataset was the 2013 version of Experian Mosaic Household and estimates demographics and lifestyles for 90,040 households in the municipality of Tilburg.

Inclusion/exclusion

The contextual data was available on the neighbourhood-level. Tilburg consists of 295 neighbourhoods. 236 neighbourhoods are included in the analysis. One neighbourhood was excluded from the analysis because it had less than 50 inhabitants, which led to extreme values within especially the crime rates. Therefore 9 respondents are excluded from the analysis. The other neighbourhoods are excluded because there was no individual data available from those neighbourhoods.

The smallest amount of individual cases in a neighbourhood was five. The average cluster sizes of the clusters are approximately 70 for neighbourhoods and 4.4 for districts. Based on the article of Snijders (2005) the average cluster size is not very important for the power of the test. Snijders claims that that "the sample size at the highest level is the main limiting characteristic of the design" (2005, p.2). This means that excluding clusters with low cluster size will not improve the statistical power of the test, but will limit the design. Therefore no clusters are excluded from the analysis on the base of having a low amount of cases.

For the contextual and interaction effects a choice had to be made on which level to include the variables. This is because the district-level variables are aggregated from the neighbourhood-level variables (bivariate analysis showed that the correlations between neighbourhood- and district-level variables were all higher than R=.580 and were all significant) and this would cause too much multicollinearity.

Cultural heterogeneity is added on a neighbourhood-level because there can be assumed that social contact is mainly present on the neighbourhood-level. The crime rates are added to the analysis on a district level, because on a neighbourhood-level really extreme values were present. Also it stands to reason that crime rates influence the effects more on a district-level.

4.2 Measures

4.2.1 Dependent variables

Measuring fear of crime

There is no consensus on how to measure fear of crime. Measuring fear of crime started out with one question asked in the National Crime Victimization Survey (NCVS)[3]: "How safe do you feel or would you feel walking alone in your neighbourhood at night?" Even though quite a few researchers in the early days of fear of crime research operationalised fear of crime using this question, methodologically it's not preferable to measure a concept by only using one item. Like Elchardus, de Groof & Smits (2003) state: the answers are strongly influenced by the construction of the sentence and connotations on the one item. Ferraro & LaGrange (1987) listed a few limitations on this way of operationalising fear of crime. These limitations are for example the absence of the word 'crime', making it impossible to measure fear of crime, 'do you feel' and 'would you feel' are two different things and the item only addresses one specific kind of fear (being alone in the neighbourhood). They state that a scale of multiple items should be used on fear of specific crimes, from various gradations. These notions did not lead to a final consensus on measuring fear of crime. Some researchers state that fear of crime has to measure the emotional state of fear on crime specifically, where others state that the 'emotional' fear of crime, which is more specific towards possible situations, has to be measured separately from the general 'fear' or perceived risk. (Rountree & Land, 1996; Elchardus, de Groof & Smits, 2003).

The fact that the concept of fear of crime is still debated makes it difficult to compare research on fear of crime and to find a correct way of measuring the concept.

This research takes in account the criticism of abovementioned scholars by creating a scale consisting of eight items regarding fear of crime. The scale combines the most well-known questions regarding fear of crime, 'How safe do you feel in your neighbourhood during the day/at night?' with five items asking the respondent how often he 'doesn't open the door because it's not safe', 'takes a detour to avoid unsafe places', 'feels unsafe when walking in the neighbourhood at night', 'feels unsafe when home alone at night' and 'is afraid of becoming a victim of criminal behaviour'. The first more general questions take in account the more general feelings of fear, while the other questions measure more specific possible situations.

[3] The NCVS is a national survey in the United States held by the Bureau of Justice Statistics which monitors crime and victimization twice a year and started in 1972. (BJS, 1995)

Because these seven items are mainly focused on feelings of safety in the neighbourhood one extra item is added asking the question 'How often do you feel unsafe in Tilburg?'. The questions 'How safe do you feel in your neighbourhood during the day/at night' are answered with a grade from 1 (unsafe) to 10 (very safe). The other six items are answered with a grade from 1 (always) to 10 (never). The answers are recoded so that higher scores measure higher fear of crime. The scale is unidimensional (one-factor solution with an Eigenvalue of 5.01) as can be seen in table 1. This also means no difference between general fear and specific fear of criminal situations can be found and the scale measures the broad concept of fear of crime.
With the eight items a very reliable (Cronbach's $\alpha = .91$) mean-scale was constructed for every case with at least six values on the eight items. Calculating the mean when a maximum of two items are missing is an appropriate method because factor loadings and item means are quite similar. Cases with less than six items scored on the scale for fear of crime are removed from the analysis.

Table 1: Factor Analysis Fear of crime

Item	**Factor loading**
How often do you..	
..don't open the door because it's not safe?	*.74*
..take a detour to avoid unsafe places?	*.81*
..feel unsafe when walking in the neighbourhood at night?	*.89*
..feel unsafe when being home alone at night?	*.84*
..do you feel unsafe in Tilburg?	*.68*
How often are you afraid of becoming a victim of criminal behaviour?	*.83*
How safe do you feel in the neighbourhood during the day?	*.69*
How safe do you feel in the neighbourhood during the night?	*.82*
Eigenvalue	*5.01*
Explained variance	*62.6%*

Source: LEMON 2013

Collective efficacy

Perceived collective efficacy was added in the LEMON questionnaire using a validated set of questions by Völker and Flap (2002).

The scale is constructed out of five items asking if the respondent expects people in the neighbourhood to intervene when 'youngsters that skip class hang around', 'youngsters spray graffiti on the walls', 'a fairly violent argument takes place', 'a house is burgled in the neighbourhood' and 'someone is doing things on the parked car of one of the residents'? with grades from 1(not at all) to 10 (definitely).

The scale is very reliable with a Cronbach's α of .89 and is unidimensional (one-factor solution with an Eigenvalue of 3.45). A mean-scale was constructed when at least five of the six items were scored. This is an appropriate method because factor loadings and item means are quite similar. Other cases are removed from the analysis.

Table 2: Factor Analysis Collective efficacy

Item	**Factor loading**
Do you expect people in the neighbourhood to intervene when..	
..youngsters that skip class hang around?	*.72*
..youngsters spray graffiti on the walls?	*.87*
..a fairly violent argument takes place?	*.84*
..a house is burgled in the neighbourhood	*.86*
..someone is doing things on the parked car of one of the residents	*.86*
Eigenvalue	*3.45*
Explained variance	*68.9%*

Source: LEMON 2013

4.2.2 Independent variable

Social integration

Social integration a broad concept which results in a broad range of possible operationalisations. Strongly debated is the ideal way to measure neighbourhood social integration. Some scholars claim that it should be measured by looking at the individual investment in the neighbourhood, like residential mobility and formal membership of a neighbourhood community (Austin, Woolever & Baba, 1994). Also measuring the quantity and frequency of informal neighbourhood contact could indicate social integration in a neighbourhood, while other scholars insist on using the quality of social contacts, neighbourhood satisfaction or feeling part of the neighbourhood (Ferguson & Mindel, 2007; De Donder, De Witte, Buffel, Dury & Verté, 2012).

In this research the emphasis is on the social aspect of neighbourhood integration. Some of the mentioned options like residential mobility and neighbourhood satisfaction don't really capture the concept of social contacts and being socially integrated in the neighbourhood. Therefore the most straightforward way to assess neighbourhood social integration is to look at the question 'Do you have (social) contacts in the neighbourhood'. This question is answered with a score from 1 (not at all) to 10 (much). 149 cases had a missing value for social integration and were therefore excluded from the analysis.

4.2.3 Control variables

In the analysis is controlled for the influence of age, gender, ethnicity and education. The vulnerability (or victimization) model produced convincing evidence for some personal characteristics leading to a higher perceived vulnerability and therefore more fear of crime: the elderly, women, racial minorities and lower socio-economic status all experience higher levels of fear of crime (Clemente & Kleiman, 1977; Covington & Taylor, 1991; Franklin, Franklin & Fearn, 2008).

Assuming from this theory that a higher age leads to higher levels of fear of crime, age is added as a continuous variable. Gender is added as a dummy with man (1) and woman (0). Ethnicity is divided in dummies for the categories Western European immigrant and Non-Western European immigrant with Dutch nationality as reference category. Education is added to the analysis as continuous variable. Although it is in fact an ordinal variable, the mean values for collective efficacy and fear of crime for the level of education make it possible to assume linearity (Appendix A). To improve readability of the analysis education is therefore kept continuous. Cases with missing values are excluded from the analysis.

4.2.4 Context-level (independent/interaction) variables

Context-data for cultural heterogeneity and crime rates were available on neighbourhood level. Neighbourhoods are (in Tilburg) the lowest level of clustering. Based on the neighbourhood layout the districts are formed out of a group of neighbourhoods.

Data on district-level was therefore aggregated from the neighbourhood data. The data represent 68 districts from which 54 are included in the analysis.

Cultural heterogeneity

To assess cultural heterogeneity, different types of heterogeneity with expected culture differences will be measured. Cultural heterogeneity is therefore divided in two measures: ethnic heterogeneity and socio-economic heterogeneity.

To assess population heterogeneity the inverse Herfindahl Fractionalization Index is the most common used measure (Dohse & Gold, 2013). The index sums the squared proportions of groups in the population, which measures concentration of one group. Deducting this from 1 leads to a measure of heterogeneity, with a minimum of 1-1=0 and a maximum of 1-1/N (number of groups in the population). This means that higher scores reflect high heterogeneity.

$$herf_r = 1 - \sum_{n=1}^{N} (S_{nr})^2$$

Ethnic heterogeneity is measured by using the percentage of people with a non-western foreign background on the first of January 2013 in a neighbourhood. This is because the expected cultural differences will be the highest between western and non-western cultures. The data is derived from the Municipal Records Administration Database (GBA). Non-western foreign background is defined by the CBS definition: non-western countries are Africa, Latin-America, Asia (excluding Indonesia and Japan) and Turkey. Having a foreign background means that one of the parents was born in a foreign country. The Herfindahl Fractionalization Index will have a minimum of 0 and a maximum of 0.5.

Socio-economic heterogeneity will be measured by income heterogeneity and educational heterogeneity. Income is divided in five levels of gross household income. Education is measured in four educational levels. The proportions of educational level and proportions of gross household income per neighbourhood/district are aggregated from household educational level and gross household income in the Mosaic Experian Household database. The Herfindahl Fractionalization Index for education heterogeneity will have a minimum of 0 and a maximum of 0.75. Income heterogeneity will have a minimum of 0 and a maximum of 0.80.

Crime rates

Crime rates are derived from the Police Enforcement Database (BVH) and are cumulative over 2012. Crime rates will be divided into two categories: violent crime and property crime.

Violent crime is composed out of rates for sexual assault, violence, threats, abuse and (street) robbery. Property crime is composed out of rates for breaking and entering of a house of garage, theft from or of a (motor) vehicle, pickpocketing, theft from companies and stores and other property theft. Crime rates are calculated per capita.

Table 3: Descriptive statistics

	Mean	**Std. dev.**	**Min.**	**Max.**	**N**
Individual-level variables					
Fear of crime	*3.81*	*1.89*	*1*	*10*	*16,130*
Collective efficacy	*5.86*	*2.16*	*1*	*10*	*15,835*
Social integration	*6.63*	*2.02*	*1*	*10*	*16,434*
Individual-level control variables					
Age	*53.14*	*16.97*	*17*	*90*	*16,498*
Gender					*16,438*
Male	*(41%)*				
Female	*(59%)*				
Ethnicity					*16,583*
Dutch	*(93.1%)*				
Western immigrant	*(1.1%)*				
Non-western immigrant	*(4.9%)*				
Missing	*(0.9%)*				
Education					*16,583*
Primary	*(7.3%)*				
Secondary	*(19.7%)*				
Low Tertiary	*(34.4%)*				
High Tertiary	*(36.9%)*				
Missing	*(1.7%)*				
Neighbourhood-level variables					*237*
Ethnic heterogeneity	*0.20*	*0.14*	*0*	*0.50*	
Income heterogeneity	*0.63*	*0.14*	*0.04*	*0.79*	
Education heterogeneity	*0.59*	*0.10*	*0.06*	*0.74*	
District-level variables					*54*
Violent crime per capita	*0.01*	*0.01*	*0*	*0.04*	
Property crime per capita	*0.04*	*0.04*	*0.01*	*0.22*	

Source: LEMON 2013, GBA 2013, BHV 2012, Experian Mosaic 2013 (own calculations).

4.3 Methods

Previous research states that fear of crime and collective efficacy are influenced by neighbourhood characteristics. The conceptual model tries to explain the moderating power of cultural heterogeneity and crime rates on the relation between social integration and collective efficacy and social integration and fear of crime. In the conceptual model can be seen that the moderating variables are measured on a different level (neighbourhood/district) than the individual variables. The only way to properly analyze this is to use multilevel modelling. Multilevel models take in account the possibility that the data has a hierarchical structure: individual observations are nested within clusters (which in turn could also be nested within a higher level cluster) (Hox, 1998). Multilevel modelling is a more appropriate way to treat clustered data than standard OLS regression.

To determine the strength of the mediating effect of collective efficacy on the relation between social integration and fear of crime 95% confidence intervals, bias-corrected, is calculated by using bootstrapping. This procedure is done by using the PROCESS macro by Hayes (2013). This macro doesn't take in account the clustering of the data. The other hypotheses are tested using multilevel modelling. First the so called "null" model will give insight in the variance partitioning coefficients, necessary to calculate the intra-class correlation. The intra-class correlation is a measure for the amount of variability that can be explained by clustering. Also the design effect is calculated, to assess the suitability of multilevel modelling. Next seven multilevel models are estimated to explain fear of crime and five models to explain perceived collective efficacy.

First the individual-level variables are added to the models. After that context-level variables and finally cross-level interactions are added. Two separate models with only cross-level interactions on neighbourhood-level and only cross-level interactions on district-level are included to account for the multicollinearity between the cross-level interactions, which all interact with social integration. To better assess the cross-level interactions they are plotted with their 95% confidence intervals using a formula by Golder (2003).

Multilevel modelling is done by using maximum likelihood estimation. The analyses only contain random intercepts. Random slopes are less plausible because of the respondents all being inhabitants of the same city. Snijders (2005) mentions the fact that small clusters sizes are not problematic when testing fixed regression coefficients, but it will be when testing random slope variances.

Because the cluster sizes on level two are in a few cases low, the analyses won't include models with random slopes and only focus on random intercept models.

Relative model fits are assessed with the -2 log likelihood and summarized in a table. For the calculation of effects the software package IBM SPSS Statistics is used.

5. Results

Multilevel models take in account the clustering of the data. To assess if clustering is present the variance partitioning coefficients show the residual variance (individual –level) and the intercept variance for level 2 (neighbourhood) and level 3 (district). This model only assesses individual and cluster variation in the dependent variable and is called the "null" model (table 4). At first the Wald Z tests if there is between-neighbourhood and between-district variation. For both fear of crime and perceived collective efficacy the Wald Z is significant, which indicates that the intercepts vary significant across neighbourhoods and districts. Scholars however have some criticism on the Wald Z statistic because it is based on a normal distribution (Heck, Thomas & Tabata 2013) and this is why other methods are used to assess the suitability of multilevel models. The variance partitioning coefficients can be used to calculate the intraclass correlation, the ICC, which is a measure for the amount of variability in the dependent variable that can be explained by clustering.

Table 4: Variance partitioning coefficients in "null"model

Items	*Perceived Collective Efficacy*	*Wald Z*	*Fear of crime*	*Wald Z*
Residual variance	*4.25****	88.33	*3.33****	89.18
Intercept variance district	*.31****	3.87	*.21****	4.17
Intercept variance neighbourhood	*.17****	6.45	*.07****	5.16

*Source: LEMON 2013, GBA 2013, BHV 2012, Experian Mosaic 2013 (own calculations). ***p<.001*

The intraclass correlation for fear of crime on district level is .058. The amount of variability in fear of crime can be explained for 5.8% by district clustering. The intraclass correlation for fear of crime on neighbourhood level is .019. The amount of variability in fear of crime can be explained for 1.9% by neighbourhood clustering.

The intraclass correlation for perceived collective efficacy on district level is .065. This means the amount of variability in perceived collective efficacy can be explained for 6.5% by district clustering. The intraclass correlation for perceived collective efficacy on neighbourhood level is .034. The amount of variability in perceived collective efficacy can be explained for 3.4% by neighbourhood clustering.

The intraclass correlations are low for both fear of crime and perceived collective efficacy. A third way to assess the need for multilevel modelling is to calculate the design effect, which assesses the effect on the standard error of a multilevel model compared with a non-multilevel model (Hox, 2002). Scholars believe that if the design effect is higher than 2.0 there is a need for multilevel modelling (Peugh, 2010). Using the formula for calculating the design effect for three-level data the design effect for the model of fear of crime is 15.97 and the design effect for the model of perceived collective efficacy is 18.65[4] (Heo & Leon, 2008). The intraclass correlations show that neighbourhood clustering is very low, but the design effect still proves that multilevel modelling is useful. Next to that the moderator hypotheses demand a multilevel model because of cross-level interactions.

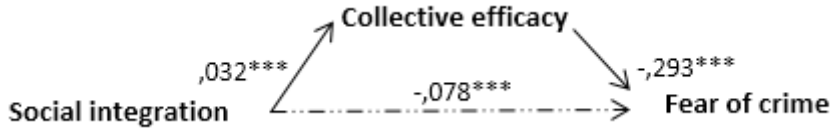
Table 5 shows the multilevel multiple regression for explaining fear of crime. In model 1 the individual-level predictors for fear of crime are added to the model, but without collective efficacy. Social integration shows a significant negative effect on fear of crime which leads to accepting hypothesis 1: higher social integration leads to lower levels of fear of crime. The relation between social integration and fear of crime is controlled for age, educational level, gender and ethnicity. As theoretically assumed in the vulnerability model the individual characteristics age and gender have a significant effect on fear of crime. Age has a strong significant positive effect and a higher age therefore leads to higher levels of fear of crime. Also educational levels influence fear of crime, but negative: higher educational level leads to less fear of crime. Fear of crime for males seems to be .61 lower than fear of crime for females. There was no effect for ethnicity found.

For hypothesis 3 in table 5 can be seen that when collective efficacy is added to the model, the effect of social integration is lower (the effect drops from -.16 to -.08). The effect of social integration stays strongly significant, as does the effect of collective efficacy (both with $p<.001$). This indicates a partial mediation of the effect. The mediating effect of collective efficacy is also tested by bootstrapping with 1000 bootstrap samples. The mediating effect of collective efficacy is -.09($p<.01$) and is significant. The path model for this effect can be found in figure 9.

This test doesn't take in account the fact that the data is nested, but this is not problematic because the intraclass correlation is low, which indicates that there is little clustering in the data. This leads to accepting hypothesis 3.

[4] Deff = 1+n(J-1)ρ3 +(n-1) ρ2b = 1+individuals per neighbourhood(neighbourhoods per district-1)districtICC+(J-1)neighbourhoodICC

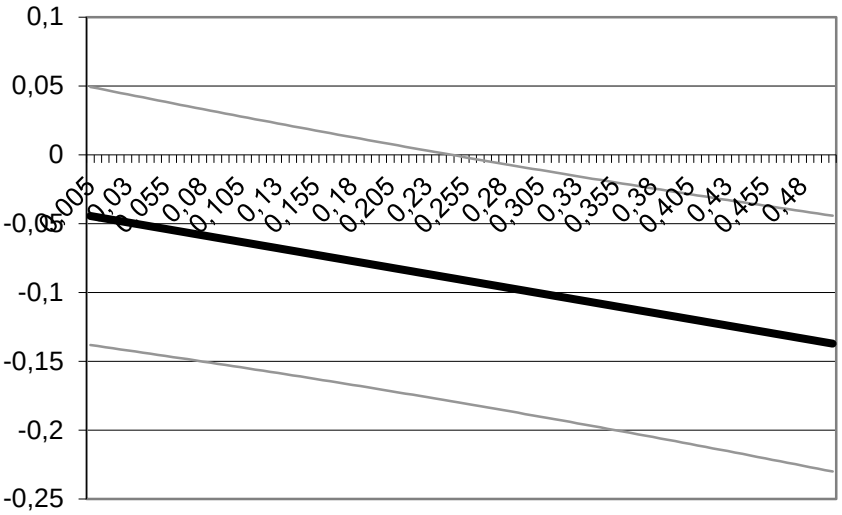
Figure 9: Path model for the mediating effect of collective efficacy. OLS regression.



Model 2 continues from model 1 with the context-variables added to the model. The effect of ethnic heterogeneity on fear of crime is strong. When the neighbourhood is more ethnic heterogeneous, individual fear of crime rises significantly. Socio-economic heterogeneity doesn't have a significant effect on fear of crime, and the crime rates on district level also don't contribute to fear of crime.

In model 3 the cross-level interactions on neighbourhood-level are added. The cross-level interactions for socio-economic heterogeneity both are non-significant, leading to rejecting hypothesis 4b. The cross-level interaction between social integration and ethnic heterogeneity has a significant effect. This effect is however negative, which is the reversed of what is expected in hypothesis 4a. In an ethnic heterogeneous neighbourhood the negative effect of social integration on fear of crime is stronger than in an ethnic homogeneous neighbourhood. This means that high social integration in an ethnic heterogeneous neighbourhood leads to lower levels of fear of crime than high social integration in an ethnic homogeneous neighbourhood. In figure 10 the effect of ethnic heterogeneity on the effect of social integration on fear of crime is visualized with its 95% confidence interval (using the values of the final model 6). This image shows that around approximately at an ethnic heterogeneity of .270 the effect of social integration becomes negative on the 95% CI. This confirms the statement that a high ethnic heterogeneous neighbourhood strengthens the effect of social integration on fear of crime, but it's from an ethnic heterogeneity of .270 that we can be certain that the effect is negative. Before that point however, the fact that social integration has an (negative) effect on fear of crime is not proven. Hypothesis 4a has to be rejected, but the implications of this effect have to be discussed.

Figure 10: The effect of social integration on fear of crime moderated by ethnic heterogeneity with 95%CI



In model 4 only the district-level cross-level interactions are added to the model. For the cross-level interaction of social integration and crime rates no significant effects are found. Based on the results hypothesis 7 has to be rejected.

In model 5 all the cross-level interactions are added. The moderating effect of ethnic heterogeneity is still significant, although its significance dropped (which can be explained by the high amount of cross-level interactions with social integration in this model). Model 6 is the most complete model which also included collective efficacy. When collective efficacy is added to the model, the significance of social integration disappears. This also confirms the mediating effect of collective efficacy in hypothesis 3.

For the models also the R2 is given at the bottom of table 10. The R2 is a measure for the explained variance of the model. Model 1 explains 7.5% of the individual variance in fear of crime. More than 90% of the variance in fear of crime therefore can be explained by other individual effects. On district-level 37.4% and on neighbourhood-level 34.8% of the variance is explained by the individual variables. In model 1b only collective efficacy is added to the model. Its significance can also be seen in the explained variance: the explained variance on the individual level doubles to 16.3%, on the district-level it gains 30% to 67.3% and on neighbourhood-level it rises to 63.8%.

Model 2 continues on model 1 with the context-level variables added to it.

There can be seen that especially the explained variance on district-level rises to 77.3% and on neighbourhood-level to 37.7%. In model 6 the cross-level interactions lead to a small rise in individual and neighbourhood explained variance. The final model 7, with all the context-variables and including collective efficacy, explains 16.4% of the variance on individual-level, 81.5% of the variance on district-level and 62.3% of the variance in fear of crime on neighbourhood-level.

Table 5: Multilevel multiple regression analysis for explaining fear of crime

Independent variables	**"Null" model**	**Model 1**	**Model 1b**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
Intercept	*3.75*** (.07)*	*5.32*** (.11)*	*6.38*** (.10)*	*4.91*** (.19)*	*4.80*** (.37)*	*4.97*** (.19)*	*4.94*** (.40)*	*5.87*** (.38)*
Individual								
Social integration		*-.16*** (.01)*	*-.08*** (.01)*	*-.15*** (.01)*	*-.14** (.05)*	*-.16*** (.01)*	*-.16** (.05)*	*-.04 (.05)*
Collective efficacy			*-.27*** (.01)*					*-.27*** (.007)*
Age		*.01*** (.001)*	*.01*** (.001)*	*.01*** (.001)*	*.01*** (.001)*	*.01*** (.001)*	*.01*** (.001)*	*.01*** (.001)*
Educational level		*-.15*** (.01)*	*-.14*** (.01)*	*-.15*** (.01)*	*-.15*** (.01)*	*-.15*** (.01)*	*-.15*** (.01)*	*-.14*** (.01)*
Male		*-.61*** (.03)*	*-.63*** (.03)*	*-.61*** (.03)*	*-.61*** (.03)*	*-.61*** (.03)*	*-.61*** (.03)*	*-.63*** (.03)*
Western immigrant (ref=Dutch)		*-.03 (.13)*	*.07 (.13)*	*-.04 (.13)*	*-.04 (.13)*	*-.04 (.13)*	*-.04 (.13)*	*.06 (.13)*
Non-western immigrant (ref=Dutch)		*.11 (.07)*	*.11 (.06)*	*.09 (.07)*	*.09 (.07)*	*.09 (.06)*	*.09 (.07)*	*.10 (.06)*
Neighbourhood (N=237)								
Ethnic heterogeneity				*1.44*** (.22)*	*2.44*** (.41)*	*1.44*** (.22)*	*2.35*** (.43)*	*1.99*** (.41)*
Income heterogeneity				*-.07 (.18)*	*.51 (.43)*	*-.06 (.18)*	*.50 (.43)*	*.64 (.41)*
Education heterogeneity				*.04 (.26)*	*-.79 (.62)*	*.05 (.26)*	*-.89 (.63)*	*-.79 (.61)*
SI*Ethnic heterogeneity					*-.16** (.05)*		*-.14* (.06)*	*-.19*** (.06)*
SI*Income heterogeneity					*-.09 (.06)*		*-.08 (.06)*	*-.10 (.06)*
SI*Educational heterogeneity					*.13 (.08)*		*.14 (.09)*	*.12 (.08)*
District (N=54)								
Violent crime				*6.829 (9.538)*	*7.15 (9.68)*	*28.92 (18.43)*	*12.05 (19.56)*	*16.91 (18.63)*
Property crime				*2.047 (1.599)*	*2.08 (1.62)*	*-3.24 (3.41)*	*-.16 (3.656)*	*.03 (3.51)*
SI*Violent crime						*-3.21 (2.31)*	*-.70 (2.50)*	*-2.05 (2.43)*
SI*Property crime						*.76 (.44)*	*.32 (.47)*	*.25 (.46)*
-2loglikelihood	*65496.54*	*62410.32*	*59366.78*	*62370.87*	*62360.45*	*62367.69*	*62359.40*	*59330.87*
R^2		*.075*	*.163*	*.075*	*.076*	*.075*	*.076*	*.164*
R^2 district		*.374*	*.673*	*.773*	*.754*	*.773*	*.758*	*.815*
R^2 neighbourhood		*.348*	*.638*	*.377*	*.391*	*.377*	*.391*	*.623*

*Source: LEMON 2013, GBA 2013, BHV 2012, Experian Mosaic 2013 (own calculations). * p<0.05 **p<0.01*

****p<0.001, two-tailed test. N= 15,318. Parameter estimate standard errors are in parentheses.*

The deviance, or -2loglikelihood, is a way to measure the relative model fit. Adding parameters to the model always leads to a lower -2loglikelihood and therefore a better model fit. To test if the model fit is significantly better than the previous model the Chi-square distribution is used. The probability of the -2loglikelihood is approximately Chi-square distributed. The amount of parameters added to the model are the degrees of freedom. Using the degrees of freedom, the deviance of the -2loglikelihood and the Chi-square distribution the significance of the relative model fit can be calculated. In table 6 the model fit for the models explaining fear of crime is reported.

The model fit of all models is significant and all the models provide a better fit than the previous model. In table 7 the difference between model 1 (individual-level variables without collective efficacy) is compared to model 1b (with collective efficacy included). There can be seen that the deviance is high compared to the other models, which could indicate how important the addition of collective efficacy to explaining fear of crime is to the model fit.

Table 6: Model fit for multilevel multiple regression models explaining fear of crime

	"Null" model	Model 1	Model 2	Model 5	Model 6
		+ individual-level variables	+ context variables	+ cross-level interactions	+ collective efficacy
-2loglikelihood	*65496.54*	*62410.32*	*62370.87*	*62359.40*	*59330.87*
Degrees of freedom		6	5	5	1
Significance χ^2		.000	.000	.043	.000

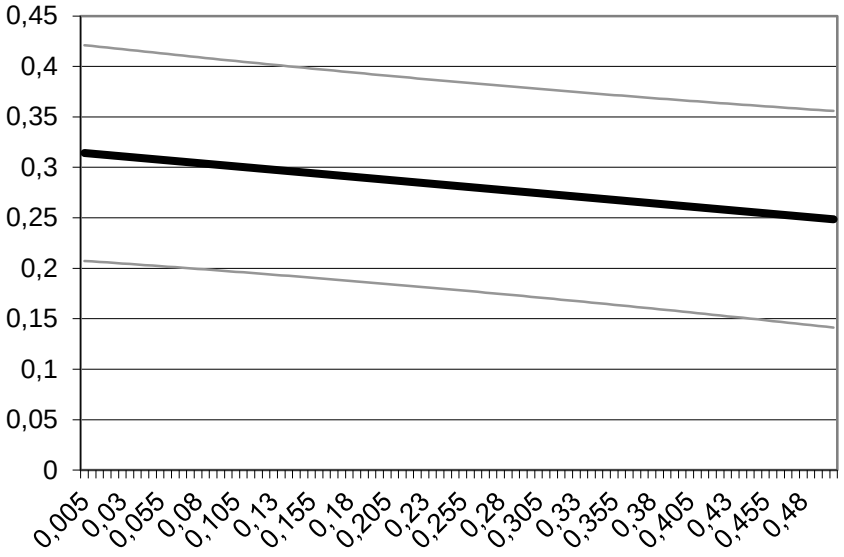
Table 7: Additional table model fit for multilevel multiple regression models ` explaining fear of crime

	Model 1	Model 1b
	+ individual-level variables	+ collective efficacy
-2loglikelihood	*62410.32*	*59366.78*
Degrees of freedom		1
Significance χ^2	.000	.000

Table 8 shows the multilevel multiple regression analysis explaining perceived collective efficacy. Model 1 is the model with only the individual-level variables. Social integration has the expected strong significant effect on perceived collective efficacy which means hypothesis 2 can be accepted: social integration leads to higher perceived collective efficacy. The control variables age and educational level also have a strong positive effect on perceived collective efficacy. There is a slight significant effect of ethnicity: western-European immigrants have higher perceived collective efficacy than Dutch citizens. In model 2 the context-variables are added. Ethnic heterogeneity has a significant negative effect: higher ethnic heterogeneity leads to lower perceived collective efficacy. The significance of the effect of education is lower in this model.

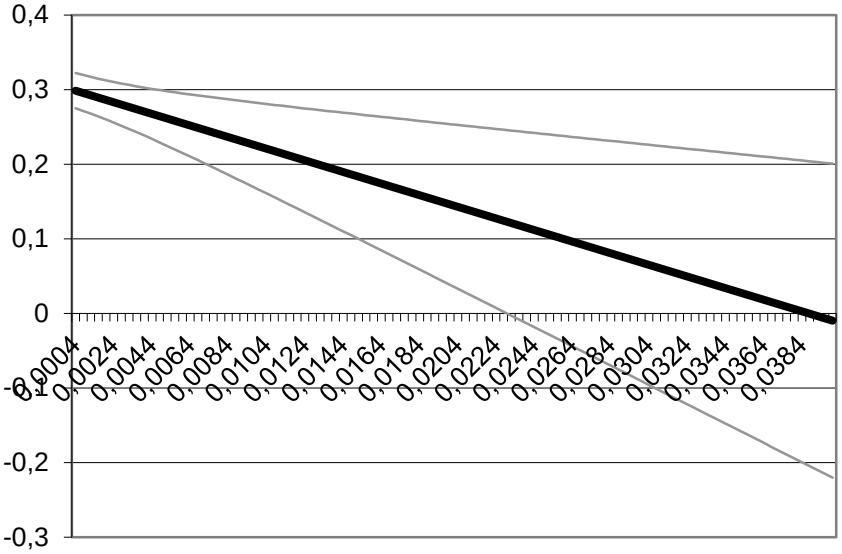
Model 3 includes the interaction effects on neighbourhood-level. There is a significant negative cross-level interaction of social integration and ethnic heterogeneity. In neighbourhoods that are ethnic heterogeneous, the effect of social integration on perceived collective efficacy is weaker than in ethnic homogeneous neighbourhoods. This can also be seen in figure 11: the plotted effect of social integration on collective efficacy moderated by ethnic heterogeneity, including the 95% confidence interval (based on the values in model 3). Ethnic heterogeneity weakens the effect of social integration on perceived collective efficacy. Witch this effect hypothesis 5a can be accepted: a high social integration in an ethnic heterogeneous neighbourhood leads to lower perceived collective efficacy than high social integration in an ethnic homogeneous neighbourhood. This could also be evidence for hypothesis 6a : the effect of social integration on collective efficacy weakens in ethnic heterogeneous neighbourhoods, which leads to lower perceived collective efficacy in those neighbourhoods, in turn leading to higher levels of fear of crime. Therefore we can also accept hypothesis 6a. The effects of socio-economic heterogeneity on the relation between social integration and perceived collective efficacy is not significant and hypotheses 5b and 6b have to be rejected.

Figure 11: The effect of social integration on perceived collective efficacy moderated by ethnic heterogeneity with 95%CI



Model 4 includes the district-level cross-level interactions. The interaction of social integration with violent crime is significant and negative. This means violent crime on district-level weakens the positive effect of social integration on perceived collective efficacy (high social integration in a district with more violent crime leads to lower levels of collective efficacy than high social integration in a district with lower levels of violent crime). In figure 12 the effect of social integration on perceived collective efficacy is plotted against ethnic heterogeneity. It shows the effect of social integration on perceived collective efficacy getting weaker with higher crime rates and eventually even poses the possibility that the effect could become negative in districts with high violent crime rates (with a note that the interaction is not significant past a violent crime rate per capita above approximately .0230). Therefore hypothesis 8 can (partly) be accepted. This also means that there also is some evidence for hypothesis 9: in neighbourhoods with higher violent crime rates the effect of social integration on perceived collective efficacy weakens, which results in lower collective efficacy and higher levels of fear of crime.

Figure 12: The effect of social integration on perceived collective efficacy moderated by violent crime with 95%CI



In the final model (5) both the cross-level interaction effects have a lower significance, but are still (almost) significant. The interaction effect of social integration and ethnic heterogeneity is near to significant (b=-.12, P=.061) and the effect of social integration and violent crime is still significant.

Model 1 explains 7.6% of the individual variance in perceived collective efficacy, 34.8% of variance on district-level and 33.9% of variance on neighbourhood-level. In model 2 the context-variables are added and the district-level explained variance rises to 84.3%. Also the neighbourhood-level explained variance rises to 54.6%. In model 5 the cross-level interactions are included in the model. The individual-level explained variance goes to 7.7%, the district-level explained variance to 85.9% and the neighbourhood-level explained variance is 55.2% in the final model.

Table 8: Multilevel multiple regression analysis for explaining perceived collective efficacy

Independent variables	**"Null" model**	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Intercept	*5.97*** (.09)*	*3.80*** (.13)*	*4.47*** (.22)*	*4.16*** (.43)*	*4.25 (.23)*	*3.62*** (.46)*
Individual						
Social integration		*.27*** (.01)*	*.27*** (.01)*	*.32*** (.055)*	*.30*** (.01)*	*.39*** (.06)*
Age		*.004*** (.001)*	*.004*** (.001)*	*.004*** (.001)*	*.004*** (.001)*	*.004*** (.001)*
Educational level		*.03*** (.01)*	*.07* (.01)*	*.03* (.01)*	*.03* (.01)*	*.03* (.01)*
Male		*-.02 (.03)*	*-.02 (.03)*	*-.02 (.03)*	*-.01 (.03)*	*-.01 (.03)*
Western immigrant (Dutch ref.)		*.32* (.15)*	*.32* (.15)*	*.33* (.15)*	*.33* (.15)*	*.33* (.15)*
Non-western immigrant (Dutch ref.)		*.01 (.07)*	*.04 (.08)*	*.04 (.07)*	*.04 (.08)*	*.04 (.08)*
Neighbourhood (N=237)						
Ethnic heterogeneity			*-2.51*** (.25)*	*-1.64*** (.47)*	*-2.51*** (.25)*	*-1.75*** (.50)*
Income heterogeneity			*-.02 (.22)*	*.36 (.50)*	*-.02 (.22)*	*.27 (.50)*
Education heterogeneity			*-.05 (.32)*	*-.28 (.73)*	*-.05 (.32)*	*.35 (.74)*
SI*Ethnic heterog.				*-.13* (.06)*		*-.12 (.07)*
SI*Income heterog.				*-.06 (.07)*		*-.04 (.07)*
SI*Educational heterog.				*.04 (.10)*		*-.058 (.10)*
District (N=54)						
Violent crime			*-17.15 (10.60)*	*-16.65 (10.47)*	*35.36 (20.91)*	*23.29 (22.13)*
Property crime			*-1.29 (1.82)*	*-1.35 (1.81)*	*-4.37 (3.93)*	*-1.58 (4.18)*
SI*Violent crime					*-7.79** (2.66)*	*-5.97* (2.87)*
SI*Property crime					*.46 (.50)*	*.039 (.55)*
-2loglikelihood	*68217.58*	*65115.44*	*65030.60*	*65025.52*	*65008.10*	*65003.83*
R^2 individual		*.076*	*.076*	*.076*	*.077*	*.077*
R^2 district		*.348*	*.843*	*.852*	*.856*	*.859*
R^2 neighbourhood		*.339*	*.546*	*.546*	*.546*	*.552*

*Source: LEMON 2013, GBA 2013, BHV 2012, Experian Mosaic 2013 (own calculations). * p<0.05 **p<0.01*

****p<0.001, two-tailed test. N= 15,412. Parameter estimate standard errors are in parentheses.*

Table 9 shows the model fit for the multilevel multiple regression models explaining collective efficacy. As can be seen all models are a better fit than the previous model and there is no need to exclude a model from the analysis.

Table 9: Model fit for multilevel multiple regression models explaining collective efficacy

	"Null" model	Model 1	Model 2	Model 5
		+ individual-level variables	+ context variables	+ cross-level interactions
-2loglikelihood	*68217.58*	*65115.44*	*65030.60*	*65003.83*
Degrees of freedom		6	5	5
Significance χ^2		.000	.000	.000

6. Conclusion and discussion

In this chapter the expectations of the research and the results from the analyses will be summarized. In the discussion will be elaborated on the strengths and weaknesses of this research and suggestions for future research will be done.

6.1 Conclusion

The research was aimed on explaining mixed evidence for the relation between social integration and fear of crime. The expected relation between social integration and fear of crime is negative: when a person is better socially integrated in his environment, this should lower levels of fear of crime. To explain mixed evidence for this model (perceived) collective efficacy was first added by Gibson et al. (2002) as a mediating variable. Theory states that a higher social integration also leads to more informal social control and/or better perceptions of informal social control, which combined with the notion of social trust is also called collective efficacy. This then would lead to lower levels of fear of crime. But to fully explain the mixed evidence context effects have to be accounted for: neighbourhood effects could change the way the social integration model works in different neighbourhoods. This led to the following research question:

> *Could mixed results of the effect of social integration on fear of crime be explained by context-level effects?*

This research therefore added two context-effects to the model as moderating variables: cultural heterogeneity and crime rates. Research already presented evidence for the direct effect of subcultural diversity, operationalised as ethnic heterogeneity, on fear of crime. To broaden the scope on the effect of subcultural diversity also socio-economic heterogeneity (operationalised by using income heterogeneity and educational heterogeneity) was added to the model. This research expected a moderating effect of cultural heterogeneity on the relation between social integration and fear of crime. Cultural heterogeneity was expected to weaken the negative effect of social integration on fear of crime. This would lead to accepting that the negative effect of social integration on fear of crime would get smaller when the neighbourhood is more cultural heterogeneous.

The effect of social integration on fear of crime was indeed tested negative with strong significant results. In the analysis is controlled for personal characteristics that in previous work on fear of crime already had a significant effect on fear of crime. Like was expected from theory the effects of the control variables age, gender and educational level were significant. The expected effect of being a non-western immigrant was not significant. Social integration and the effects posed in the vulnerability model (the control-variables) only account for 7,5% in the individual variance of fear of crime. When collective efficacy is added to the model explained variance increases to 16,3%. Still 80% is left unaccounted for.

The direct effect of ethnic heterogeneity was, like the subcultural diversity theory already suggested, positive: ethnic heterogeneity leads to higher levels of fear of crime. The direct effects of educational and income heterogeneity were not significant. Most important for this research however are the cross-class interactions. In the model explaining fear of crime one effect was significant, but with a surprising outcome. The moderating effect of cultural heterogeneity on the effect of social integration on fear of crime was significant, but not in the direction that was expected. Hypothesized was that cultural heterogeneity would lower the effect of social integration on fear of crime. The moderating effects of educational and income heterogeneity are not significant. The effect of ethnic heterogeneity however is significant, but in a reversed direction: ethnic heterogeneity strengthens the effect of social integration on fear of crime. This means that better social integration in an ethnic heterogeneous neighbourhood results in a greater decrease in fear of crime than better social integration in an ethnic homogeneous neighbourhood. To explain this effect it maybe should be looked at from a different perspective. If the interaction effect is explained from an ethnic heterogeneity point of view the effect may be easier to interpret: for better socially integrated people, the positive effect of ethnic heterogeneity on fear of crime is lower than for residents with low social integration. A possible explanation for this effect comes from Putnam. He explains that the ‘contact hypothesis’ states that more social contact within a ethnically diverse context strengthens interethnic tolerance and trust (2007). Putnam placed this hypothesis against the so called ‘conflict theory’, which claims that higher physical proximity to other cultures leads to more distrust in ‘the other’ and more connection with ‘our own’ group. The expectation of the effect of ethnic heterogeneity was in line with the conflict theory, but the results point in the direction of the contact hypothesis. A key problem with this explanation for the results is the fact that the effect in Putnams’ work is directed to tolerance and trust. The analyses in this research however already controlled for

and took in account the mediating power of social trust in the shape of perceived collective efficacy.

When looking at the results of the model explaining perceived collective efficacy there can be seen that the expected effect of social integration on collective efficacy was indeed significant. A mediator analysis then confirmed that the effect of social integration on fear of crime was (partially) mediated by perceived collective efficacy. This means that higher social integration had a direct effect in lowering fear of crime, but also had a positive effect on perceived collective efficacy which in turn lowered fear of crime. When collective efficacy is added to the model also the context-level explained variance increased considerably.

Ethnic heterogeneity lowered perceived collective efficacy and the cross-level interaction between social integration and ethnic heterogeneity was also in the direction that was expected: the positive effect of social integration on ethnic heterogeneity was weakened by ethnic heterogeneity. When taking in account the mediating effect of collective efficacy on the relation between social integration and fear of crime ethnic heterogeneity indeed moderates this effect by altering the way social integration influences perceived collective efficacy, which then also influences fear of crime indirectly.

The effects for crime rates were also added to the models explaining fear of crime and explaining perceived collective efficacy. The effects of crime rates were added on a district-level. There are no direct effects of crime rates on perceived collective efficacy and, perhaps more important, on fear of crime. This supports statements from earlier research that there is no effect of objective crime rates on fear of crime. For property crime in both models no significant effects were found. For violent crime only a moderating effect was found on social integration explaining perceived collective efficacy: higher violent crime rates in a district lead to weakening the positive effect of social integration on perceived collective efficacy. Residents are indirect more confronted (for example in small-talk with neighbours) with crime when better socially integrated, influencing their perceptions of collective efficacy: there is a lot of crime around, maybe it’s because nobody intervenes when something criminal happens here.

Higher violent crime rates in a district then could lead to higher levels of fear of crime when people are socially integrated: perceived collective efficacy lowers and because of that fear of crime is higher.

The most difficult effects to interpret are the two interaction effects with ethnic heterogeneity. Moderating the through collective efficacy mediated effect of social integration on fear of crime ethnic heterogeneity seems to lower perceived collective efficacy resulting in higher fear of crime. But when the moderator influences the direct effect between social integration and fear of crime the moderating effect is completely the opposite: ethnic heterogeneity strengthens the effect of social integration which would lead to lower fear of crime.

Implications of these research findings for fear of crime research and suggestions for further research on the social integration model are discussed in the next paragraph.

Table 10: Hypotheses and results

	Expected effect	*Observed effect*	*Notes*
H1	-	-	
H2	-	-	
H3	-	-	
H4a	+	-	
H4b	+	**NS**	
H5a	-	-	
H5b	-	**NS**	
H6a	-	-	
H6b	-	**NS**	
H7	+	**NS**	
H8	-	-	Only for violent crime
H9	-	-	Only for violent crime

NS: Non-significant

6.2 Discussion

The strong and unexpected moderating effect of ethnic heterogeneity needs some discussing. Moderating the effect of social integration through collective efficacy ethnic heterogeneity causes higher levels of fear of crime, but when moderating the direct effect it leads to lower levels of fear of crime. More research on this relations is necessary to provide answers and a path model could improve knowledge on how the moderator influences the complete model. Also a side note has to be made on the construction of the ethnic heterogeneity variable.

Because none of the neighbourhoods has a non-western immigrant population that exceeds 50%, the ethnic heterogeneity variable actually measures the amount of non-western immigrants in the neighbourhood. Because of privacy issues it was not possible to have information on the exact amount of people within different ethnicities, which caused ethnic heterogeneity to take only non-western immigrants and Dutch residents into account. Further research has to provide answers on if the effect has to do with actual ethnical heterogeneity or on the presence of non-western immigrants.

Also the assumption was made that subcultural diversity is broader than ethnic differences. This research however hasn't been able to prove the fact that income en educational heterogeneity produce the same effects as ethnic heterogeneity does. This is not a conclusive result though, because the used measurements for socio-economic heterogeneity are based on the Experian Mosaic dataset. This dataset uses a diverse (and unknown) combination of data to produce an estimation of the characteristics of a household. Little is known about the precision of the data on the specific characteristics such as income and education. Educational heterogeneity will always be difficult to measure, but maybe there is the possibility to produce a measure of income heterogeneity with information from the National Tax Service. Next to this the educational heterogeneity in this research is measured by four levels of education, which means heterogeneity is highest when every group is equally represented in the neighbourhood. It is also possible that the biggest cultural differences however exist between the low and high educated. When educational heterogeneity would be measured using this division other results are to be expected.

This research uses a cross-sectional analysis, but considering the theory on the mediating effect of collective efficacy a longitudinal analysis might give better insight in how the effects work. Gibson et al. (2002) claim that the effect of social integration needs time to result in (perceived) collective efficacy, which only then leads to lower levels of fear of crime. The mediating effect is in this case a longitudinal effect and should be analysed as such. [5] The LEMON 2013 survey used for this research was the first wave including the set of items measuring collective efficacy. This research led to evidence for the mediating effect of perceived collective efficacy, but longitudinal research would provide a better understanding of the effect and with the inclusion of the set of items in the LEMON 2013 survey this might be possible when the next wave of data is available in 2015/2016.

[5] This suggestion was also made earlier by Taylor, who suggests a panel study to cover this effect (2002, p. 789)

Another note on collective efficacy is the operationalisation of the concept in this research. This research uses the individually perceived collective efficacy, but the increase in explained variance on context-level indicates that collective efficacy explains an important part of the variance in fear of crime on a context level and maybe should be taken in consideration in the form of an aggregated collective efficacy.

The intra-class correlation had unexpected low values in this research. Claims had been made that neighbourhood effects were to explain variation in fear of crime, but the intraclass correlation showed that only just above 5% of variation in fear of crime (and perceived collective efficacy) could be explained by neighbourhood/district clustering.
One explanation could be that context-effects on fear of crime are indeed fairly small and multilevel modelling does not help to explain variations in fear of crime. Another explanation could lie in the used allocation of neighbourhoods. The neighbourhoods as they are organised by the municipality are possibly not in line with the subjective neighbourhoods of the residents. Kaal, Vanderveen & McConnell (2008) tested neighbourhood perceptions against the administrative neighbourhoods and found that the perceived neighbourhood often is much smaller than the administrative neighbourhoods. This could affect the analysis because some of the questions are pointed towards experiences within the neighbourhood. Kaal, Vanderveen & McConnel (2008) therefore suggest future research to add a definition of the neighbourhood to surveys.

In the theoretical section the proposed explanations for the mixed results on the social integration model were a mediating effect, a moderating effect and differences in operationalising social integration. Because of restrictions in the data this research was not able to investigate the effect of differences in operationalisations of social integration on fear of crime. Fact is that a lot of research has been done on the subject and meta-analysis could give a more concise answer on the total effect of social integration on fear of crime.

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Data

Rigo (2013) *LEMON 2013 Tilburg* [Data file] Gemeente Tilburg

Experian (2013) *Experian Mosaic Household Tilburg* [Data file and codebook]

Appendix

Appendix A: Mean values and standard deviation of collective efficacy and fear of crime for gender, ethnicity and education

	Collective efficacy			**Fear of crime**		
	Mean	Std. dev.	N	Mean	Std. dev.	N
Gender						
Male	5.83	2.15	6424	3.47	1.83	6541
Female	5.88	2.17	9285	4.05	1.91	9458
Ethnicity						
Dutch	5.88	2.15	14736	3.79	1.87	15014
Western European	5.82	2.29	182	3.85	2.15	187
Non-western European	5.47	2.29	787	4.14	2.11	798
Education						
Primary	5.61	2.36	1045	4.32	2.10	1095
Secondary	5.89	2.23	3079	4.08	1.91	3154
Low Tertiary	5.77	2.19	5501	4.01	1.91	5580
High Tertiary	5.98	2.03	5986	3.38	1.73	6066