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Size is in the eye of the beholder: How differences between neighbourhoods and individuals explain variation in estimations of the ethnic out-group size in the neighbourhood

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ABSTRACT

In this paper we shed light on the various ways in which native Dutch estimate the size of the ethnic minority population in their neighbourhood. We formulate hypotheses on how characteristics of the neighbourhood (i.e. objective group sizes, ethnic segregation, economic deprivation and crime), of surrounding neighbourhoods and experiences of interethnic contact and feelings of ethnic threat shape perceptions of the ethnic outgroup size. We employ individual-level data from the 1Vandaag Opinion Panel enriched with contextual-level data from Statistics Netherlands (24,538 respondents in 3113 neighbourhoods). Great variation in residents' perceptions of the ethnic outgroup size exists both between neighbourhoods and within neighbourhoods. We demonstrate that native Dutch are more likely to overestimate the size of the non-Western minority population than the size of the Western minority population. Larger ethnic outgroup sizes in surrounding neighbourhoods are associated with the sense that one's own neighbourhood also contains more minority residents. In economically deprived and high crime neighbourhoods, residents are more likely to overestimate the size of the ethnic outgroup. Furthermore, people with more interethnic contact and people who experience more ethnic threat provide higher estimations and are more likely to overestimate the ethnic outgroup size in their neighbourhood.

Introduction

As a consequence of ongoing immigration over recent decades, Western societies have become increasingly diverse in terms of people's ethnic background. This process of diversification has triggered a heated political debate in many Western countries about the possible threats posed by ethnic heterogeneity to the wellbeing of their societies (Wickes et al. 2013). In the last few years this debate has also become a central theme in academic research. Social scientists have investigated whether, and under what conditions, high numbers of ethnic minorities in a given environment have negative consequences for social cohesion. There is, however, still little consensus on the impact of the actual (objective) ethnic outgroup size (Van der Meer and Tolsma, 2014). Researchers have explained the limited impact of objective neighbourhood characteristics by contending that they can only be consequential if

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individuals are aware of them (Harding, Gennetian, Winship, Sanbonmatsu, & Kling, 2011; Wickes, Hipp, Zahnow,. & Mazerolle, 2013). In line with this contention, research focusing on the impact of the perceived (subjective) ethnic outgroup size on social cohesion has consistently demonstrated a negative relationship (e.g. Schaeffer, 2013; Hooghe and Vroome, 2015; Piekut and Valentine, 2016; Hipp and Wickes, 2016). Accordingly, it is important to find a better understanding of how perceptions of the ethnic outgroup size are constructed. We asked native Dutch people (N = 24,538) to make an estimation of the size of the total ethnic minority population in their neighbourhood and we set out to answer under which circumstances people perceive more ethnic minorities in their neighbourhood and under which circumstances people are more likely to overestimate the size of the ethnic outgroup in their neighbourhood.

A widely accepted conceptual definition of the Dutch foreign population originates from Statistics Netherlands (Alders, 2001, pp.2; italics in original): "The *first generation* [foreign population] consists of persons who are born abroad and have at least one parent who is also born abroad. The *second generation* consists of persons who are born in the Netherlands and have at least one parent who belongs to the first generation.". A common classification is subsequently being made between Western and non-Western ethnic minorities, according to country of birth.[3] Countries in Europe (with the exception of Turkey) and North America are, for example, considered to be 'Western countries'. Although it might be counterintuitive, by the Dutch definition, Eastern Europeans are thus considered Western minorities. But the category 'Western' also includes persons from Oceania, Japan and Indonesia (including the former Dutch East Indies). Countries in Africa, and Latin America are, for example, considered to be 'non-Western countries'.

About 10% of the Dutch population has a Western background and about 12% has a non-Western background (Statistics Netherlands, 2014a). The largest groups with a non-Western background are Moroccan-Dutch (19%), Turkish-Dutch (20%), Surinamese-Dutch and Antillean-Dutch (25%). People with roots in Germany and Belgium are traditionally among the largest groups with a Western background (together they constitute 30% of the population with a Western background). From 2004 onwards, migration from Eastern European countries has increased rapidly. Nowadays, people with roots in Poland, former Yugoslavia, former Soviet Union, Bulgaria and Romania make up about 20% of the population with a Western background (Statistics Netherlands, 2014a). There is considerable ethnic segregation between municipalities, and within municipalities between neighbourhoods (Tolsma and Van der Meer, 2016). The question is whether this is also perceived as such.

Existing studies focussing on the perceived ethnic outgroup size examined individuals' estimations of the ethnic outgroup size either at the national level (e.g. Sigelman and Niemi, 2001; Alba et al., 2005; Semyonov, Raijman and Gorodzeisky 2008; Herda, 2010; Strabac, 2011) or at the large regional level (e.g. Semyonov et al., 2004). Even though individuals' perceptions of the ethnic outgroup size are not totally disjoined from reality, these studies consistently showed that people tend to overestimate the ethnic outgroup size at both the national and large regional level. Researchers have explained this finding by contending that estimations of the ethnic outgroup size at the country level, or at the large regional level, are often based on people's everyday experience (Nadeau, Niemi and Levine 1993). Individuals tend to generalize the situation in their local social context, when asked to make an assessment of the sizes of different ethnic groups at the national or large regional level. Given the presumed importance of the local context, we turn in this contribution to explaining perceptions of the neighbourhood ethnic outgroup size.

In line with the above mentioned previous studies, we expect that native Dutch people will, on average, be capable of making fairly realistic estimations of the size of the ethnic outgroup in their own local residential environment. However, they are likely to be more aware of non-Western minorities than of Western minorities in their living environment, because they can be more easily distinguished by skin colour and cultural behaviours. In this contribution it is our aim to explain why average perceptions and the likelihood to overestimate the ethnic outgroup size differ between neighbourhoods and why residents of the same neighbourhood differ in how ethnic minorities are perceived and why some residents are more likely to overestimate the ethnic outgroup size than others. Furthermore, we will investigate whether actual (objective) sizes of Western and non-Western minorities contribute equally to the (over)estimations of the ethnic outgroup size as a whole.

With respect to between-neighbourhood variations, we argue that, besides the actual ethnic outgroup size in a neighbourhood, ethnic segregation, economic deprivation and the prevalence of crime may affect perceptions of ethnic outgroup size. Furthermore, neighbourhoods are no islands and are inevitably related to surrounding areas and form part of larger municipalities (Sampson, 2012). Differences in perceptions of the outgroup size between neighbourhoods may therefore stem partly from variations in the ethnic, economic and crime composition of surrounding areas. But even people living in the same neighbourhood may perceive their residential environment differently (Harding et al., 2011), because perceptions are shaped by social position (Sampson, 2012). We argue that interethnic contact and feelings of ethnic threat are also likely to be related to how the ethnic outgroup size is perceived.

In sum, the general purpose of this study is to shed light on how individuals' perceptions of the ethnic make-up of their residential neighbourhood are shaped by the characteristics of that neighbourhood, of their surrounding neighbourhoods, and by their inter-ethnic contact experiences and feelings of ethnic threat. To test our expectations we employ contextual-level data from Statistics Netherlands and individual-level data for native Dutch individuals extracted from the 1Vandaag Opinion Panel, a unique survey carried out among 24,538 respondents. With this dataset, we are able to investigate perceptions of the ethnic outgroup size across the country, covering all municipalities and more than 75% of all neighbourhoods in the Netherlands.

[3] We use the term ethnic minorities and foreign population interchangeably. For persons of the second generation, the classification is based on mother's country of birth. If she is also born in the Netherlands, the background is determined by the father's country of birth.

Theoretical expectations

Neighbourhood context and perceptions of the ethnic outgroup size

We focus on three neighbourhood characteristics that – after taking into account the actual ethnic outgroup sizes – may affect native Dutch' perceptions of the ethnic outgroup size: ethnic segregation, economic deprivation and the prevalence of crime.

First, ethnic segregation – the spatial component of a neighbourhood's ethnic composition – could 'markedly enhance the visibility of a group, it makes them seem larger' (Allport, 1954:269). If native Dutch individuals live close to, but separated from members of ethnic outgroups, the awareness of differences between themselves and ethnic minorities may increase (Gallagher 2003; Kaplan and Douzet 2011; Van der Waal, De Koster and Achterberg 2013). This increased awareness of the ethnic outgroup results in the expectation that the perceptions of the ethnic outgroup size are higher in ethnically segregated neighbourhoods than in ethnically integrated neighbourhoods. Following this reasoning further, one would expect that people are more likely to overestimate the number of ethnic minorities in ethnically segregated neighbourhoods than in ethnically integrated neighbourhoods.

Historically and structurally induced inequality in affluence exists between native Dutch and non-Western ethnic minorities, with native Dutch being, on average, more affluent (Statistics Netherlands, 2014b). Of the Western minorities, only the Western minorities who recently migrated from Eastern Europe are less affluent than native Dutch but economic inequality runs less deep between Western minorities and native Dutch than between non-Western minorities and native Dutch (Statistics Netherlands, 2014b). We assume that this pattern of economic inequality along ethnic lines has given rise to ethnic stereotypes among native Dutch linking ethnic minorities – especially non-Western minorities – to poverty. Evidence for the existence of such stereotypes is found in the USA, where studies have shown not only that people perceive the poor as predominantly black (Farley, Steeh, Krysan, Jackson, & Reeves, 1994; Gilens, 1996), but also that media outlets portray poor people more often as black than is the case in reality (Gilens, 1996; Gilens, 2004). Similarly, research in Sweden and Denmark provides some indication to the overrepresentation of non-whites as being poor in the media in Europe as well (Larsen and Dejgaard, 2013). We expect that economic neighbourhood deprivation may make such stereotypes linking ethnic minorities to poverty more salient and therefore that estimations of the ethnic outgroup size – and especially of non-Western minorities – are higher in economically deprived neighbourhoods than in affluent neighbourhoods (cf. Quillian, 1995; Quillian and Pager, 2001). Additionally, we expect that people are more likely to overestimate the number of ethnic minorities in economically deprived neighbourhoods.

Research in the USA shows that a strong perceptual association between race and crime exists, beyond any actual association between the two (Quillian and Pager, 2001; Quillian and Pager, 2010). The presence of Black Americans in a neighbourhood is, for example, positively associated with individuals' overestimations of crime rates (e.g. Quillian and Pager 2001; Pickett et al., 2012; Skogan 1995). Research conducted in Europe also indicates to the existence of a persistent cognitive association between ethnic minorities and crime. In the media, ethnic minorities are, for example, more likely to be connected to crime than natives (e.g. Jacobs, 2016; El Refaie, 2001). Hooghe and De Vroome (2016) further show for Belgium that fear of crime is related to the presence of non-EU nationals, whereas it is unrelated to the actual crime rates. In the Netherlands, public opinion surveys also demonstrate that people not only associate the presence of non-Western ethnic minorities, but also the presence of Western ethnic minorities with crime (Junger-Tas, 1997; Dagevos and Gijsberts, 2013). In part these stereotypes may stem from official crime statistics in which non-Western ethnic minorities are overrepresented (Blom, Oudhof, Bijl, & Bakker, 2005) and which show that the number of crime suspects from Eastern Europe has increased over the last decade (Statistics Netherlands, 2015). We assume, however, that ethnic stereotypes linking ethnic minorities to crime among native Dutch will exist beyond any factual association between the two, as they do in the US and other European countries. Because of these ethnic stereotypes, we expect that in high crime neighbourhoods perceptions of the ethnic outgroup size are higher than in neighbourhoods with less crime. Relatedly, we expect that people are more likely to overestimate the number of ethnic minorities in high crime neighbourhoods.

Adjacent neighbourhoods and perceptions of the ethnic outgroup size

Neighbourhoods are both connected and related to those surrounding them (Sampson, 2012). People not only notice ethnic minorities in their own neighbourhood, but also in adjacent neighbourhoods when they go shopping, run errands, or commute to work and school. What they observe in surrounding areas is likely to affect perceptions of group sizes in their own neighbourhood. So far, research has only demonstrated the converse effect – namely, that people use their local day-to-day experiences to estimate ethnic group sizes at the national level (e.g. Alba, Rumbaut, and Marotz 2005; Herda, 2010; Strabac, 2011). Contrarily, we expect that people use their experiences in the broader residential environment to estimate the ethnic outgroup size in their own neighbourhood. Such a spill-over effect may lead to a relationship between the presence of ethnic minorities in adjacent neighbourhoods and people's perceptions of the ethnic outgroup size in their own neighbourhood.

We expect that people will not only be aware of the presence of ethnic minorities in adjacent neighbourhoods, but also of other conditions of these neighbourhoods. Similar to the presence of ethnic minorities in adjacent neighbourhoods, we therefore expect that spill-over effects may lead to an association between segregation, deprivation and crime in adjacent neighbourhoods and people's perceptions of the ethnic outgroup size in their own residential neighbourhood.

Threat, contact and perceptions of the ethnic outgroup size

Existing research shows that higher-educated and older people are more likely to perceive fewer ethnic minorities and are less likely to overestimate the ethnic outgroup size than lower-educated and younger people, because they possess, on average, more political and societal knowledge (Sigelman and Niemi, 2001; Wong, Bowers, Williams, & Drake, 2012). Unemployed people and people with children are more likely to perceive more ethnic minorities and are more likely to overestimate the ethnic outgroup size in the neighbourhood than those in employment or without children, because they spend, on average, more time in the neighbourhood (Henning and Lieberg, 1996; Forrest, 2008). We expand this knowledge of individual features by examining two under-investigated factors: interethnic contact experiences and ethnic threat.

Previous research has demonstrated that people are likely to estimate higher frequencies of events when their recollections of them are vivid (Reber, 2004). We assume that recollections of ethnic minorities in a neighbourhood are more salient when native Dutch individuals have contact with them more frequently (cf. Herda, 2010). Therefore, we expect that people who interact with ethnic minorities in their neighbourhood are likely to be more aware of the presence of ethnic minorities and consequently are likely to perceive more ethnic minorities and are more likely to overestimate the size of the ethnic outgroup than people who do not interact with them.

Native Dutch who view ethnic minorities as competitors for economic resources or as a threat to Dutch culture are likely to be more sensitive to the presence of ethnic minorities in their neighbourhood than people who do not feel ethnically threatened (Bobo, 1988; Sears, 1988). Feelings of ethnic threat and higher estimations of the size of the outgroup – and consequently overestimating the outgroup size − are therefore likely to be related.

Methods

Data

This study employs one wave of individual-level data from the 1Vandaag Opinion Panel (1VOP) in the Netherlands. Respondents sign up for this panel voluntarily, after which they are invited to participate in web surveys by email. The used wave of data was collected in February 2015.[4] Participating in survey studies voluntarily often reflects an inherent bias in respondents (Bethlehem, 2010). In our sample we indeed found that some groups were overrepresented. There were more men (than women), more older people (than younger people) and more higher-educated (than lower-educated people). To account for the unequal selection probabilities for these groups and consequently obtain unbiased standard errors, we included individual-level sampling weights for these characteristics in our analyses.

We defined neighbourhoods as areas distinguished by the four-digit part of the postcodes, because the geographical identifiers at the individual level are provided at that level.[5] The median surface area of neighbourhoods is 5.3 km^2 and they are, on average, inhabited by 4000 people. As Statistics Netherlands does not offer contextual information for these neighbourhoods directly, we constructed neighbourhood characteristics on the basis of grid data (0.01km2 grid cells; Statistics Netherlands, 2014c). We aggregated this grid data to construct neighbourhood-level measures. The prevalence of crime in the neighbourhood was based on official police reports (HKS) obtained from the Dutch National Police Services (KLPD).

Our final sample consists of 24,538 respondents living in 3,113 neighbourhoods of all 4,044 neighbourhoods in the Netherlands. This gives us a uniquely high coverage of neighbourhood diversity. In total, 25,774 respondents participated in the used web survey. As the focus of our study is on native Dutch individuals, we however deleted 984 respondents with a non-native Dutch background list-wisely.[6] Furthermore, we had to disregard 252 respondents (1% of our sample), because they either did not provide a correct postcode, or because there was no information available about the contextual characteristics of their 4-digit postcode area, or in the adjacent 4-digit postcode areas.

Measures

Dependent variables

To measure *perceptions of the ethnic outgroup size* in a neighbourhood – the first dependent variable in this study – we used individuals' estimations of the ethnic outgroup size, asking: 'What percentage of the people living in your neighbourhood belong to an ethnic minority group?' If respondents did not know the exact percentage, they were asked to provide an estimation (between 0% and 100%). We thus asked our respondents about ethnic minorities in general, without making a distinction between Western and non-Western ethnic minorities.[7] We prefer this raw measure of estimations of the ethnic outgroup size over a difference score between the perceived outgroup size and the actual outgroup size, because it allows us to disentangle the possibly differential influence of the presence of Western and non-Western minorities in shaping the perceptions of the ethnic outgroup size as a whole.

[4] As the core variables were only included in a single wave, we can unfortunately not exploit the panel design of the 1VOP.

[5] In the Netherlands, complete postcodes are combinations of four digits and two letters (e.g. 1011AB), resembling small parts of a specific street.

[6] We define being native Dutch as those respondents whose parents were Dutch, or respondents who identified with the Netherlands in case one parent was non-Dutch.

[7] We did not provide our respondents with a definition of ethnic minorities, because this term is commonly used and known to refer to the Dutch population with a foreign background; people with a (recent) migration background.

To measure *overestimation of the ethnic outgroup size* in the neighbourhood – the second dependent variable in this study – we assigned the score '1′ to all overestimations and the score '0′ to all other estimations.[8] We measured the overestimations of the ethnic outgroup size by subtracting the summed objective percentage of the non-Western and Western minorities from individuals' estimations of the ethnic outgroup size.

To reduce individual variation in understanding of what constitutes a neighbourhood, we supplied respondents with the following definition: a neighbourhood is the area that can be reached on foot in fifteen minutes from your own house. This corresponds roughly to a surface area of 4.5 km^2 (an area with a radius of 1.2 km).

Contextual variables

Ethnic outgroup size refers to the ethnic outgroup sizes of Western and non-Western minorities for all 4-digit postcode areas. Following the definition of Statistics Netherlands, we consider people to be part of the Western or non-Western foreign population when at least one of their parents was born in either a Western, or a non-Western country. As already stated above, about 10% of the Dutch population is of Western descent, whereas about 12% is of non-Western descent (Statistics Netherlands, 2014a). In our study, percentages of non-Western minorities at the local level range from 0% to 67.6% (unweighted mean = 9.6%). The percentages of Western minorities range from 0% to 48.3% in the neighbourhoods in which our respondents reside (unweighted mean = 9.2%).

Ethnic segregation is measured using a multi-group dissimilarity index. This index may be seen as an indication of how the ethnic composition of subunits of the neighbourhood differ (on average) from the ethnic composition of the whole neighbourhood (Reardon and Firebaugh, 2002). We differentiate between native Dutch, Western minorities and non-Western minorities, and use 100m^2 areas as subunits of a neighbourhood. Constructed intra-neighbourhood ethnic segregation scores range from 0 to 96 (mean = 33.31, median = 32.34). In the US, scores below 30 on this dissimilarity index are considered to be low, scores between 30 and 60 moderate, and scores above 60 high (Logan and Stults, 2011). So, most neighbourhoods in our sample are, according to this rule of thumb, moderate in their ethnic segregation.

Economic deprivation was measured using average house values (so-called *WOZ* values) in the area (per 10,000 Euros). This measure ranges in our sample from 3.27 to 94.29 (mean = 20.77, median = 20.08). We multiplied this measure by −1 so that a higher score corresponded to a higher degree of economic deprivation. At the neighbourhood level (i.e. 4-digit postcode area), we do not have other indicators of economic deprivation at our disposal. Average housing value is theoretically a good indicator of neighbourhood deprivation, because it is not only a direct expression of the condition of the built environment, but also an indirect expression of the socio-economic composition of its residents. Moreover, empirically, the correlation at the municipality level between the average house value and residents' average income, an often used indicator of economic deprivation, is high (Pearson's correlation = 0.74).

We used the *number of criminal suspects* living in the neighbourhood per 1000 inhabitants, averaged over the years 2009, 2010 and 2011, as a proxy of the prevalence of crime in the neighbourhood. This information was based on official police reports (HKS) obtained from the Dutch National Police Services (KLPD). About 90% of all suspects registered in the HKS are prosecuted, or have their cases settled out of court by the public prosecutor. Crime rates range in our sample from 0.18 to 68.35 (mean = 10.80). Unfortunately, we do not have access to actual neighbourhood crime rates (e.g. burglaries/robberies). But, as previous research has established that most offenders commit crimes not far from their homes (e.g. Brantingham and Brantingham, 1982), we argue that the number of offenders in the neighbourhood in combination with the number of offender in adjacent neighbourhoods serves as a fair equivalent for the local crime rate. Moreover, the correlation at the municipality level between our measure of crime and the rate of visible and geographically bounded crime types (i.e. thefts, burglaries, vandalism, destruction of property and violation of public order) is high (Pearson's correlation = 0.76). If anything, with our measure we are likely to underestimate the impact of crime on perceptions of the ethnic outgroup size.

An adjacent area is defined as a neighbourhood that shares at least one (part of a) boundary with a respondents' residential neighbourhood (i.e. queen contiguity). For these adjacent areas, we determined the size of the non-Western and Western minority population, the degree of ethnic segregation, the degree of economic deprivation and the number of criminal suspects in a similar fashion as we measured these characteristics for people's residential neighbourhood.

Individual-level variables

Contact with ethnic minorities was measured by the two following questions: 'How often do you have personal contact in your neighbourhood with (1) people of non-Western descent and (2) people of Eastern European descent?' Answer categories for these items were: 'never/not applicable' (0), 'about once a year' (1), 'several times a year' (2), 'about once a month' (3), 'several times a month' (4), 'several times a week' (5), '(almost) every day' (6). *Ethnic threat* was measured with the statement: 'I sometimes worry that my neighbourhood is deteriorating because of the arrival of ethnic minorities.' Answer categories are: 'totally disagree' (0), 'disagree' (1), 'agree/nor disagree'/'I don't know/no opinion' (2), 'agree' (3), 'totally agree' (4), and 'I don't know/no opinion'.

We further include respondents' age and educational level. *Age* was calculated on the basis of date of birth. *Education* was

[8] We also analysed the likelihood of overestimation by assigning a '1′ to respondents who overestimated the actual size of the ethnic outgroup by more than 2% and by more than 5%. There was only one noticeable difference: for the model using a cut-off point of overestimating with more than 5%, the coefficient for crime was not significant.

Table 1
Descriptive statistics.

	Mean	SD	Min	Max
Dependent variables				
Perceived ethnic outgroup size	13.34	16.01	0	100
Overestimations of the ethnic outgroup size	0.23		0	1
Independent variables				
% non-Western minorities	9.64	9.76	0	67.62
% Western minorities	9.21	4.27	0	48.31
Ethnic segregation	33.31	8.44	0	95.98
Economic deprivation (housing value*10,000)	20.77	6.36	3.27	94.29
Crime rate (per 1000 inhabitants)	10.80	5.78	0.18	68.35
% non-Western minorities (adj.nbs)	9.97	8.72	0	63.30
% Western minorities (adj.nbs)	9.05	3.69	0.27	37.46
Ethnic segregation (adj.nbs)	19.46	8.36	1.10	85.54
Economic deprivation (adj.nbs)	20.28	5.34	4.45	56.05
Crime rate (adj.nbs)	11.42	7.63	1.93	166.69
Contact non-Western minorities	2.51	2.12	0	6
Contact Western minorities	1.43	1.88	0	6
Ethnic threat	1.85	1.36	0	5

Note: $N_{individual}$ = 24,538; $N_{neighbourhood}$ = 3113; these are raw descriptive statistics (i.e. unweighted).
Sources: 1VOP (2015); Statistics Netherlands (2014a, 2014b, 2014c).

measured in years. Furthermore, we include a measure for people's main *daily activity* via the following categories: 'employee/self-employed', 'looking for work', 'unable to work', 'student', 'housewife/house-husband', 'pensioner', 'other' and a measure for *having children* via dummy variable with being a parent coded as 1 and having no children as 0. We additionally control for *gender* with males coded as 1 and females as 0.

The descriptive statistics for our main variables can be found in Table 1.[9]

Statistical analyses

This first dependent variable, perceptions of the ethnic outgroup size, may be interpreted as a count variable, namely individuals' counts of how many of 100 random neighbourhood residents belong to an ethnic minority group. We assume these counts are drawn from a negative binomial distribution.[10] Negative binomial models describe the probabilities of the occurrence of counts greater than or equal to 0, while accounting for overdispersion in the variance of these counts. The form of our model equation is:

$$\boldsymbol{Ln}(\boldsymbol{dep}1_i) = \boldsymbol{x'}_i\boldsymbol{\beta}, \tag{1}$$

where *dep1* is (the estimation of) our observed dependent variable, perceptions of the ethnic outgroup size, β the vector of estimated parameters and x′ the observed predictors. To test our hypotheses with respect to our second dependent variable, the overestimation of the ethnic outgroup size, we estimate logistic regression models (assuming a standard logistic distribution of errors), with the following model equation form:

$$\mathrm{L}\boldsymbol{n}\left(\frac{\boldsymbol{P}(\boldsymbol{dep}2_i = 1)}{1 - \boldsymbol{P}(\boldsymbol{dep}2_i = 1)}\right) = \boldsymbol{x'}_i\boldsymbol{\beta}. \tag{2}$$

The predictors referring to the objective proportions of Western and non-Western ethnic minorities are first logged before they enter the model Eqs. (1) and (2) to increase model fit and to ease interpretation of the results.[11]

Because our respondents are nested in neighbourhoods, we employ multilevel analyses (Snijders and Bosker, 1999). Following the recommendations of Carle (2009), we scaled our individual-level sampling weights so that the new weights summed to the level-2 cluster (neighbourhood) sample size.

Table 2 displays the results, both the beta-coefficients and the incidence rate ratio (IRR), for the first dependent variable: perceptions of the ethnic outgroup size. Figs. 1 through 5 show the predicted values for this first dependent variable at different levels of the percentages of non-Western and Western minorities, of economic deprivation, of crime and of interethnic contact and perceived

[9] The descriptive statistics of our control variables will not be publically disclosed at the request of the owners of the 1VOP panel, but have been send to the editor and reviewers before publication.

[10] Preliminary analyses demonstrated that the negative binomial model fits our data better than a Poisson model or a linear model assuming a standard normal distribution of errors.

[11] As log(0) is undefined, we added 0.5 to all percentage of non-Western and Western minorities.

threat. Table 3 displays the results, both the beta-coefficients and the odds ratios (OR), for the second dependent variable: overestimations of the ethnic outgroup size.[12]

Results

In Model 1 in Table 2 we only included the actual percentages of non-Western and Western minorities to assess the relative importance of these groups in explaining the perceived ethnic outgroup size. The inclusion of these percentages decreases the variance on the neighborhood level by 71% (from 0.939 to 0.274) relative to the empty model. A large share of the (between-level) variation in the perceived ethnic outgroup size is thus explained by the actual percentages of non-Western and Western minorities. The presence of non-Western minorities in the neighbourhood is more strongly related to the perceived ethnic outgroup size than the presence of Western minorities in the neighbourhood. The incidence rate ratio indicates that the (expected) perceived size of the ethnic outgroup is multiplied by a factor of 2.108 when the natural logarithm of the percentage of non-Western minorities increases by one unit, whereas it is multiplied by only 1.133 when the natural logarithm of the percentage of non-Western minorities increases by one unit.

The left panel of Fig. 1 in which we plotted predicted values based on the estimates of Model 1 in Table 1 shows that, assuming the size of the Western population to be zero, native Dutch are quite well able to register the number of non-Western minorities. Before the percentage of non-Western minorities reaches twenty percent, people only slightly overestimate the size of the minority population. In neighbourhoods where the percentage of non-Western minorities is higher than twenty percent, people underestimate the size of the minority population somewhat. The right panel of Fig. 1 shows that native Dutch are less able to register Western minorities. Regardless of the actual percentage of Western minorities, native Dutch' perceptions of the ethnic outgroup size do not exceed the three percent in neighbourhoods without non-Western minorities. Thus, native Dutch are more perceptive of non-Western minorities than of Western minorities.

This is further corroborated by our second set of analyses, in which we explain overestimation of the ethnic outgroup size (Model 1, Table 3). The presence of non-Western minorities is positively associated with the likelihood of overestimating the total ethnic outgroup size, whereas the presence of Western minorities is negatively associated with the likelihood of overestimating the total ethnic outgroup size. More specifically, we observe that each one unit increase in the (natural logarithm of) the actual percentage of non-Western minorities increases the odds of overestimating the total ethnic outgroup size by 200% (OR = 2.000, se = 0.084). The odds to overestimate the total ethnic outgroup size becomes approximately 3 times smaller with each one unit increase in the (natural logarithm of) the actual percentage of Western minorities (OR = 0.305, se = 0.027). The presence of non-Western minorities − and not the presence of Western minorities – in the neighbourhood is thus a decisive factor in explaining overestimation of the ethnic minority population.

Impact of neighbourhood characteristics

In Model 2 (Table 2) we include all characteristics of people's own neighbourhoods. The inclusion of these other neighbourhood characteristics decreases the variance on the neighbourhood level by 3% (from 0.274 to 0.266) relative to Model 1. Only a small share of the (between-level) variation in the perceived ethnic outgroup size is thus explained by the these other neighbourhood characteristics. Our results show that ethnic segregation within residential neighbourhoods is unrelated to the perceived ethnic outgroup size. Similarly, the likelihood of overestimating the size of the ethnic minority population is not related to ethnic segregation within residential neighbourhoods (Model 2, Table 3). Uncontrolled for economic deprivation and number of criminal suspects, the same results are found.

The left panel of Fig. 2 illustrates the role of neighbourhood deprivation. It not only shows that in more economically disadvantaged neighbourhoods, native Dutch make higher estimation of the ethnic outgroup size than in less economically disadvantaged neighbourhoods (b = 0.006, se = 0.002; Model 2, Table 2), it also demonstrates that increases in the actual number of non-Western minorities lead to a somewhat stronger increase in the perceived ethnic outgroup size in more economically deprived neighbourhoods than in less deprived neighbourhoods. This pattern is less clear for Western minorities (right panel of Fig. 2). These findings are in line with our idea that prevailing ethnic stereotypes especially link non-Western minorities to poverty. Model 2 in Table 3 shows that economic deprivation is also positively related to the likelihood of overestimating the total ethnic outgroup size. The odds of overestimating is 113% larger if the degree of economic deprivation in the neighbourhood is one standard deviation higher (exp(6.36*0.019) *100%)).

Further in line with the idea that ethnic stereotypes affect perceptions of reality is the result that the number of criminal suspects is positively associated with the perceived ethnic outgroup size. People perceive, on average, more ethnic minorities in neighbourhoods with a higher number of criminal suspects than in neighbourhoods with a lower number of criminal suspects (bn = 0.011,

[12] We thank an anonymous reviewer for the valid remark that our results based on our logistic regression models could, in theory, also reflect misestimation instead of overestimation. To assess the degree to which this is the case, we therefore ran additional multinomial models, in which we divided our dependent variable into three categories: underestimation, correct estimation (less than 5% off the actual number), and overestimation. For this robustness analysis, it is necessary to selected neighbourhoods with more than 5% ethnic minorities to deal with floor effects − it is impossible to underestimate the group size in neighbourhoods when minorities make up less than 5% of the total neighbourhood population. The results demonstrate that covariates that are related to a higher chance to overestimate are related to a lower chance to underestimate (results upon request). We are therefore confident that the presented logistic regression analyses explain overestimation instead of misestimation.

Table 2
Multi-level negative binomial regression models explaining individuals' perceptions of the ethnic outgroup size.

	Model 1		Model 2		Model 3		Model 4	
	B (se)	IRR (se)	B (se)	IRR (se)	B (se)	IRR (se)	B (se)	IRR (se)
Ln (% non-West)	0.746***	2.108***	0.685***	1.984***	0.624***	1.866***	0.550***	1.733***
	(0.016)	(0.033)	(0.020)	(0.039)	(0.027)	(0.050)	(0.025)	(0.043)
Ln (% West)	0.125**	1.133**	0.098*	1.103*	0.015	1.015	0.011	1.011
	(0.039)	(0.044)	(0.050)	(0.055)	(0.076)	(0.077)	(0.072)	(0.072)
Ethnic segregation			−0.003	0.997	−0.002	0.998	−0.000	1.000
			(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Economic deprivation			0.006**	1.006**	0.011***	1.011***	0.007**	1.007**
			(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)
Crime rate			0.011***	1.011***	0.009**	1.009**	0.007**	1.007**
			(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)
Ln (% non−West adjacent nbs)					0.103***	1.109***	0.088**	1.091**
					(0.031)	(0.034)	(0.028)	(0.031)
Ln (% West adjacent nbs)					0.149	1.161	0.151*	1.164*
					(0.079)	(0.092)	(0.074)	(0.086)
Ethnic segregation (adjacent nbs)					0.001	1.001	−0.000	1.000
					(0.002)	(0.002)	(0.001)	(0.001)
Economic deprivation (adjacent nbs)					−0.006	0.994	−0.004	0.996
					(0.003)	(0.003)	(0.003)	(0.003)
Crime rate (adjacent nbs)					−0.000	1.000	−0.000	1.000
					(0.001)	(0.001)	(0.001)	(0.001)
Contact non-Western							0.091***	1.095***
							(0.005)	(0.006)
Contact Western							0.022***	1.022***
							(0.006)	(0.006)
Ethnic Threat							0.212***	1.236***
							(0.007)	(0.009)
Gender (REF: Female)							−0.062**	0.940**
							(0.020)	(0.019)
Age (in years)							−0.009***	0.991***
							(0.001)	(0.001)
Education (in years)							−0.014***	0.986***
							(0.003)	(0.003)
Kids (REF: no kids)							−0.043	0.958
							(0.026)	(0.024)
Daily activity (REF = Working)								
Daily activity (Looking for work)							0.068	1.070
							(0.049)	(0.053)
Daily activity (unable to work)							0.119**	1.126**
							(0.036)	(0.041)
Daily activity (Student)							−0.028	0.972
							(0.071)	(0.069)
Daily activity (House wife/husband)							−0.008	0.992
							(0.049)	(0.049)
Daily activity (Retired)							−0.001	0.999
							(0.028)	(0.028)
Daily activity (Other)							0.138*	1.148*
							(0.055)	(0.063)
Constant	0.679***		0.851***		0.612***		0.668***	
	(0.076)		(0.108)		(0.097)		(0.092)	
Ln (alpha)	−0.465***		−0.465***		−0.465***		−0.648***	
	(0.021)		(0.021)		(0.021)		(0.021)	
Variance (neighbourhood)	0.274***		0.266***		0.261***		0.209***	
	(0.015)		(0.015)		(0.014)		(0.012)	
Number of respondents	24,538		24,538		24,538		24,538	
Number of neighbourhoods	3113		3113		3113		3113	

Notes: Regression coefficients with standard errors in parentheses. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$ (two-tailed test). Ethnic segregation, economic deprivation, crime rate, contact, threat, age and education are grand mean centred. The variance of the null model is 0.939 (0.033).
Sources: 1VOP (2015); Statistics Netherlands (2014a, 2014b, 2014c).

Table 3
Multi−level logistic regression models explaining overestimation of the ethnic outgroup size.

	Model 1		Model 2		Model 3		Model 4	
	B (se)	OR (se)	B (se)	OR (se)	B (se)	OR (se)	B (se)	OR (se)
Ln (% non-West)	0.693***	2.000***	0.591***	1.806***	0.430***	1.537***	0.253***	1.288***
	(0.042)	(0.084)	(0.049)	(0.089)	(0.065)	(0.099)	(0.072)	(0.093)
Ln (% West)	−1.189***	0.305***	−1.123***	0.325***	−1.161***	0.313***	−1.330***	0.265***
	(0.088)	(0.027)	(0.097)	(0.032)	(0.128)	(0.040)	(0.140)	(0.037)
Ethnic segregation			−0.000	1.000	0.003	1.003	0.009*	1.009*
			(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Economic deprivation			0.019**	1.019**	0.029***	1.029***	0.020*	1.020*
			(0.006)	(0.006)	(0.008)	(0.008)	(0.009)	(0.009)
Crime rate			0.014	1.014	0.010	1.011	0.007	1.007
			(0.007)	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)
Ln (% non−West adjacent nbs)					0.309***	1.362***	0.318***	1.375***
					(0.079)	(0.107)	(0.086)	(0.119)
Ln (% West adjacent nbs)					0.027	1.027	0.106	1.111
					(0.162)	(0.166)	(0.177)	(0.196)
Ethnic segregation (adjacent nbs)					−0.002	0.998	−0.004	0.996
					(0.004)	(0.004)	(0.005)	(0.004)
Economic deprivation (adjacent nbs)					−0.009	0.991	−0.004	0.996
					(0.009)	(0.009)	(0.010)	(0.010)
Crime rate (adjacent nbs)					−0.005	0.995	−0.004	0.996
					(0.003)	(0.003)	(0.004)	(0.004)
Contact non-Western							0.189***	1.208***
							(0.016)	(0.020)
Contact Western							0.066***	1.069***
							(0.019)	(0.020)
Ethnic Threat							0.516***	1.676***
							(0.026)	(0.043)
Gender (REF: Female)							−0.390***	0.677***
							(0.065)	(0.044)
Age (in years)							−0.032***	0.969***
							(0.004)	(0.003)
Education (in years)							−0.080***	0.923***
							(0.012)	(0.011)
Kids (REF: no kids)							−0.011	0.989
							(0.083)	(0.082)
Daily activity (REF = Working)								
Daily activity (Looking for work)							0.004	1.004
							(0.156)	(0.157)
Daily activity (unable to work)							0.325**	1.383**
							(0.120)	(0.166)
Daily activity (Student)							−0.305	0.737
							(0.262)	(0.193)
Daily activity (House wife/husband)							−0.019	0.981
							(0.150)	(0.147)
Daily activity (Retired)							0.091	1.095
							(0.091)	(0.099)
Daily activity (Other)							0.359*	1.432*
							(0.160)	(0.229)
Constant	−0.023		0.019		−0.282		−0.154	
	(0.151)		(0.190)		(0.246)		(0.277)	
Variance (neighbourhood)	1.574***		1.544***		1.537***		1.790***	
	(0.082)		(0.081)		(0.081)		(0.101)	
Number of respondents	24,538		24,538		24,538		24,538	
Number of neighbourhoods	3113		3113		3113		3113	

Notes: Regression coefficients with standard errors in parentheses. + p < 0.10; * p < 0.05; ** p < 0.01; *** p < 0.001 (two-tailed test). Ethnic segregation, economic deprivation, crime rate, contact, threat, age and education are grand mean centred. The variance of the null model 1.832 (0.092).
Sources: 1VOP (2015); Statistics Netherlands (2014a, 2014b, 2014c).

se = 0.003; Model 2, Table 2). The incidence rate ratio indicates that the (expected) perceived size of the ethnic outgroup is multiplied by a factor of 1.011 when the number of criminal suspects increases by one unit. Moreover, the left panel of Fig. 3 shows that increases in the actual number of non-Western minorities lead to a somewhat stronger increase in the perceived ethnic outgroup size in more crime prone neighbourhoods than in less crime prone neighbourhoods. This pattern is also visible, albeit less clear, for

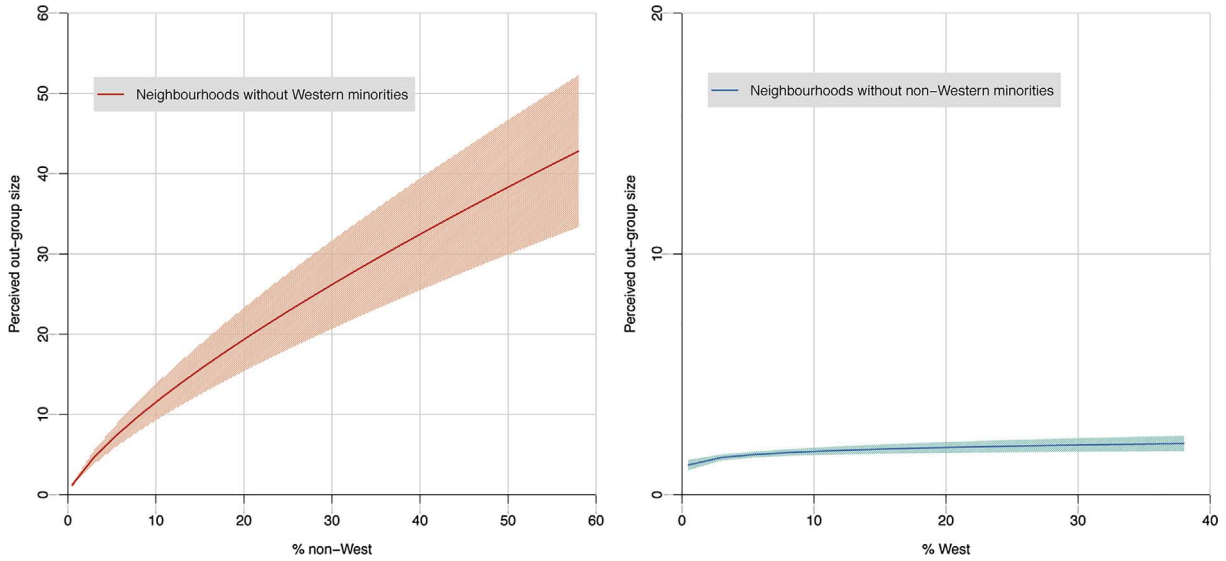

Fig. 1. Predicted values of perceived outgroup size for different values of the actual percentage of non-Western and Western minorities.
Notes: Predicted values (and the uncertainties therein; 90% CI) are based on estimates of both fixed and random effects.

Western minorities (right panel of Fig. 3). The likelihood of overestimating the size of the ethnic minority population is unrelated to the number of criminal suspects (b = 0.014 se = 0.007; Model 2, Table 3).

Impact of characteristics of adjacent neighbourhoods

The inclusion of the characteristics of adjacent neighbourhoods in Model 3 decreases the variance on the neighbourhood level by 2% (from 0.266 to 0.261) relative to Model 2. Only a small share of the (between-level) variation in the perceived ethnic outgroup size is thus explained by the characteristics of adjacent neighbourhoods. A high percentage of non-Western minorities in adjacent neighbourhoods has a positive impact on individuals' estimations of the ethnic outgroup size in their own neighbourhood (b = 0.103, se = 0.031; Model 3, Table 2). The incidence rate ratio indicates that the (expected) perceived size of the ethnic outgroup is multiplied by a factor of 1.109 when the (natural logarithm of) the percentage of non-Western minorities increases by one unit. The presence of non-Western minorities in the residential neighbourhood are more likely to trigger high perceptions of neighbourhood outgroup size when also surrounding areas have a relatively high number of residents with a non-Western background (Fig. 4). The

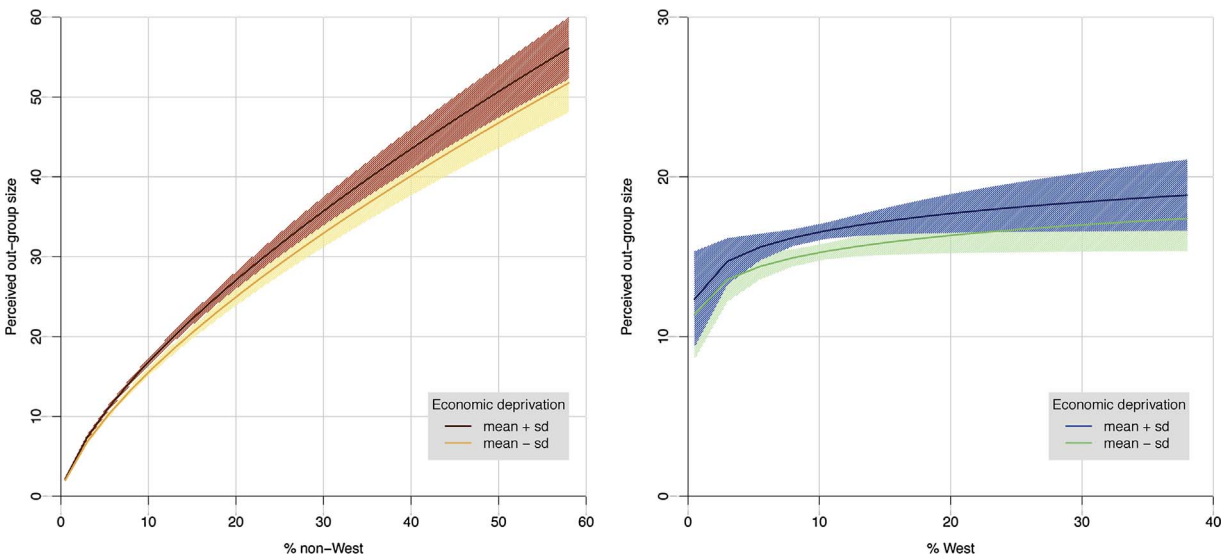

Fig. 2. Predicted values of perceived outgroup size for different values of economic deprivation.
Notes: Predicted values (and the uncertainties therein; 90% CI) are based on estimates of both fixed and random effects. The other continuous variables included in the model are held constant at their mean value: Western population is 9.21%, non-Western population 9.64%, segregation is 33.31, and the crime rate is 10.80.

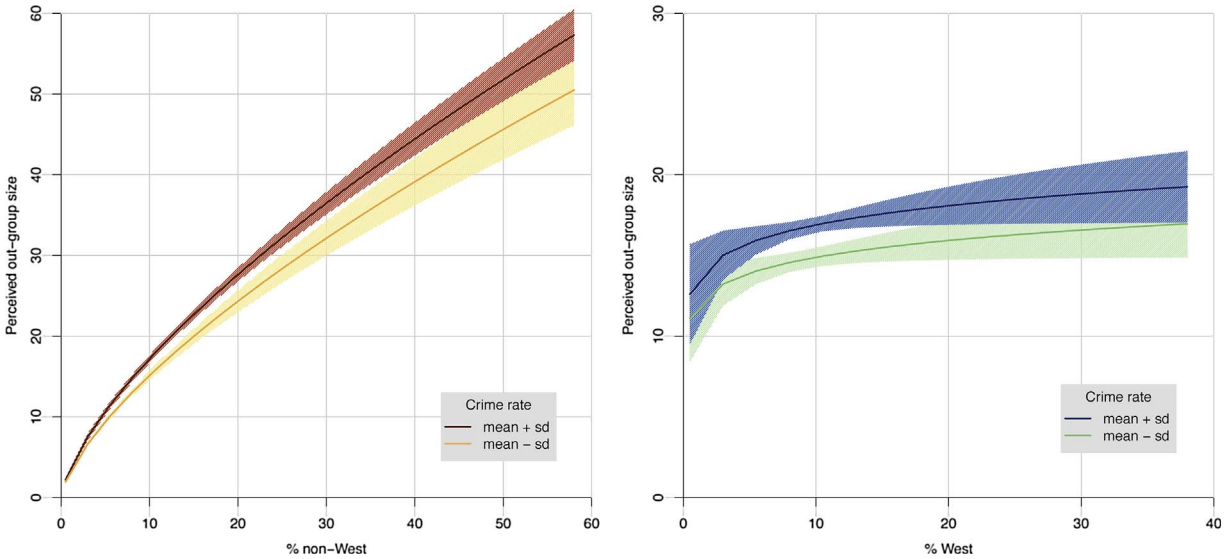

Fig. 3. Predicted values of perceived outgroup size for different values of the crime rate.
Notes: Predicted values (and the uncertainties therein; 90% CI) are based on estimates of both fixed and random effects. The other continuous variables included in the model are held constant at their mean value: Western population is 9.21%, non-Western population 9.64%, segregation is 33.31, and economic deprivation is 20.77.

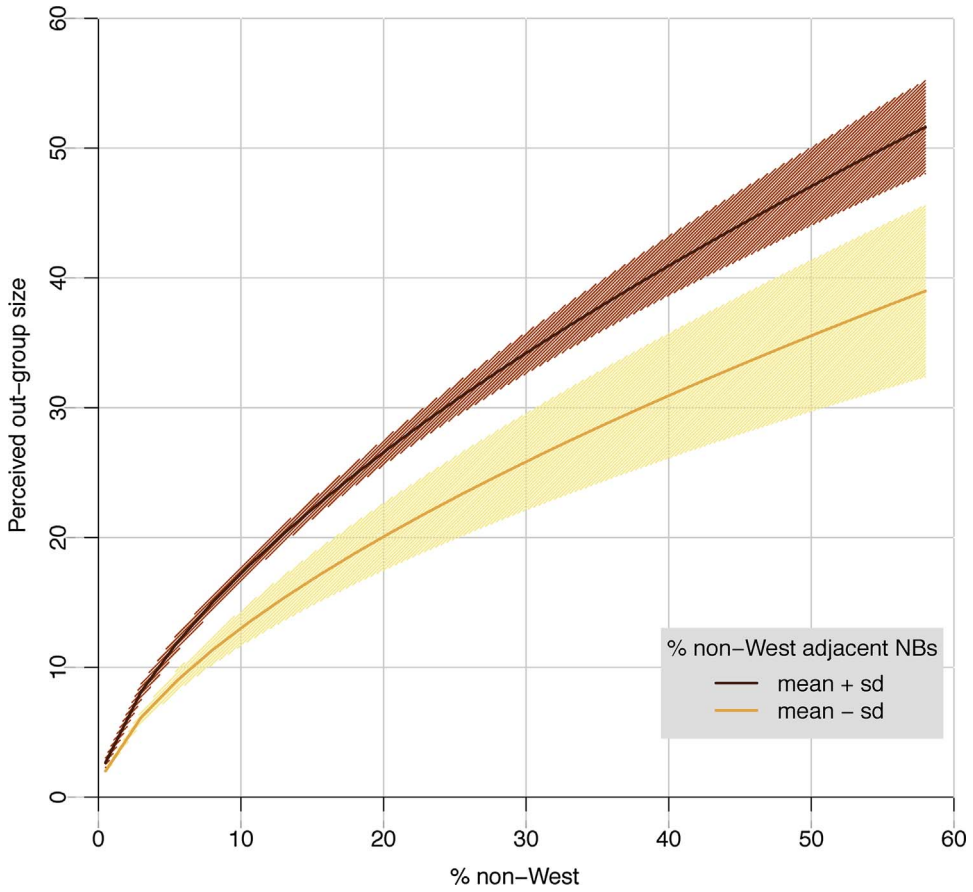

Fig. 4. Predicted values of perceived outgroup size for different values of percentage non-Western minorities in adjacent neighbourhoods.
Notes: Predicted values (and the uncertainties therein; 90% CI) are based on estimates of both fixed and random effects. The other continuous variables included in the model are held constant at their mean value.

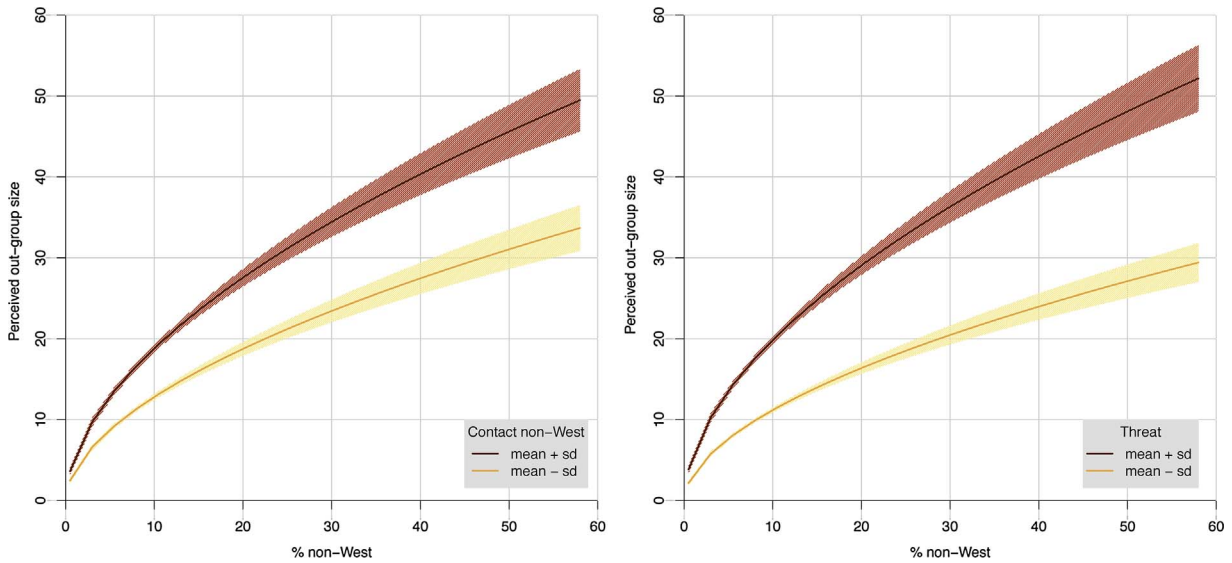

Fig. 5. Predicted values of perceived outgroup size for different values of contact with non-Western minorities and of threat.
Notes: Predicted values (and the uncertainties therein; 90% CI) are based on estimates of both fixed and random effects. The other continuous variables included in the model are held constant at their mean value and the other categorical variables included in the model are held constant at the reference category.

presence of non-Western minorities in adjacent neighbourhoods is also associated with a higher likelihood of overestimating the ethnic outgroup size (b = 0.309, se = 0.079; Model 3, Table 3). The odds of overestimation the total ethnic outgroup size is 148% larger if the size of the non-Western population in adjacent neighbourhoods is one standard deviation higher (exp(8.72*0.309)*100).

The presence of Western minorities in adjacent neighbourhoods does not have a significant influence on the perceived ethnic outgroup size (b = 0.149, se = 0.079; Model 3, Table 2). Nonetheless, the association between the number of Western minorities in people's own neighbourhood and the perceived number of ethnic minorities does turn non-significant after inclusion of the percentage of Western minorities in adjacent neighbourhoods. The presence of Western minorities in adjacent neighbourhoods does not impact the likelihood that people overestimate the size of the ethnic outgroup either (b = 0.027, se = 0.162; Model 3, Table 3).

Besides the presence of non-Western and Western minorities in adjacent neighbourhoods, we expected that the degree of ethnic segregation, the degree of economic deprivation and the number of criminal suspects in adjacent neighbourhoods would also have an additional impact on the perceived ethnic outgroup size in people's own neighbourhood. None of these other neighbourhood characteristics are however related to estimations of the total ethnic outgroup size nor overestimations thereof (Model 3, Table 2 and Table 3).

All in all we find limited corroborative evidence for the idea that surrounding areas affect people's perceptions of the ethnic outgroup size in their own neighbourhood.[13] The presence of non-Western minorities in adjacent neighbourhoods plays the most substantial role.

Impact of contact and threat

In line with previous research (e.g. Wong et al., 2012; Sigelman and Niemi, 2001; Henning and Lieberg, 1996; Forrest, 2008), we find that lower-educated, younger people and people who are unable to work perceive more ethnic minorities in their neighbourhoods and are more likely to overestimate the ethnic outgroup size than higher-educated, older and employed people respectively (Model 4, Table 2 and Table 3).

Even after controlling for these factors, we find that people who have more contact with non-Western minorities perceive more ethnic minorities in the neighbourhood (b = 0.91, se = 0.005; Model 4, Table 2). The left panel of Fig. 5 shows that increases in the actual number of non-Western minorities lead to a substantially stronger increase in the perceived ethnic outgroup size for native Dutch who frequently interact with non-Western minorities than for native Dutch who do not or only rarely interact with non-Western minorities in their neighbourhood. Model 4 in Table 3 shows that contact with non-Western minorities is also positively related to the likelihood of overestimating the total ethnic outgroup size (b = 0.189, se = 0.016). For people who interact with non-Western minorities (almost) every day, the odds of overestimating is 311% larger as compared to people who never interact with non-Western minorities in their neighbourhood (exp(6*0.189*100%)).

People who have more contact with Western minorities also perceive more ethnic minorities in the neighbourhood (b = 0.022,

[13] In an additional analysis, we included interaction terms between the number of ethnic minorities in one's own neighbourhood and the number of ethnic minorities in adjacent neighbourhoods as a means to assess whether people make a relative comparison between their own neighbourhood and surrounding neighbourhoods. These interactions terms turned out to be not significant (not shown).

se = 0.006; Model 4, Table 1). The incidence rate ratio indicates that the (expected) perceived size of the ethnic outgroup is multiplied by a factor of 1.023 when contact increases by one unit. Model 4 in Table 3 shows that contact with Western minorities is also positively related to the likelihood of overestimating the total ethnic outgroup size (b = 0.066, se = 0.019). For people who interact with Western minorities (almost) every day, the odds of overestimating is 149% larger as compared to people who never interact with Western minorities in their neighbourhood (exp(6*0.066*100%)).

Residents who experience ethnic threat perceive more ethnic minorities in their neighbourhood (b = 0.212, se = 0.007; Model 4, Table 2). The incidence rate ratio indicates that the (expected) perceived size of the ethnic outgroup is multiplied by a factor of 1.236 when threat increases by one unit. The right panel of Fig. 5, moreover, shows that increases in the actual number of non-Western minorities lead to a substantially stronger increase in the perceived ethnic outgroup size for native Dutch who experience more ethnic threat than for native Dutch who experience less ethnic threat. Feelings of ethnic threat also increase the likelihood of overestimating the size of the ethnic minority population (b = 0.516, se = 0.026; Model 4, Table 3). For people who experience a lot of threat, the odds of overestimating is 788% larger as compared to people who do not experience threat at all (exp(4*0.516)*100%)). Threat is clearly an important factor in explaining perceptions of the ethnic outgroup size and overestimations thereof.

Discussion

In this study our purpose was to investigate how perceptions and overestimation of the ethnic outgroup size in the neighbourhood come about. In previous studies focussing on the perceived size of the ethnic minority population at the national or large regional level (e.g. Alba et al., 2005; Herda, 2010; Sigelman and Niemi, 2001; Semyonov et al., 2004; Semyonov, Raijman and Gorodzeisky 2008; Strabac, 2011), researchers argued that individuals' estimations of the ethnic outgroup are shaped by people's everyday experience (Nadeau, Niemi and Levine 1993). However, we showed that people's perceptions of the ethnic outgroup size do not necessarily align better with the actual ethnic outgroup size at the neighbourhood level than at the national or large regional level. Native Dutch are more perceptive of non-Western minorities than Western minorities and are more likely to overestimate the size of the non-Western minority population than the size of the Western minority population. How ethnic group sizes are perceived in the local, day-to-day context relates to much more than the objective percentages alone. When native Dutch live in a different neighbourhood but with a similar number of ethnic minorities, they may perceive the ethnic composition differently. Even residents of the same neighbourhood vary widely in how they perceive the ethnic outgroup. The size of the ethnic outgroup is indeed in the eye of the beholder.

The concurrence of ethnic minorities and neighbourhood economic deprivation and neighbourhood crime leads to higher estimations of the ethnic outgroup size. The likely prevalence of ethnic stereotypes linking (stigmatized) ethnic minority groups to both poverty and crime in the Netherlands may explain why this is the case. Future research is, however, necessary to test this theoretical mechanism directly by including measures of ethnic group specific stereotypes into the explanatory model. Another fruitful direction for future research would be to investigate how – besides individuals' perceptions of the ethnic outgroup – perceptions of economic deprivation and the prevalence of crime in the neighbourhood are related to the objective neighbourhood environment, and how these perceptions are, in turn, related to one another.

To our knowledge, we are the first in the field to demonstrate that the actual number of non-Western minorities in surrounding neighbourhoods also augments individuals' perceptions of the ethnic outgroup size in their own residential neighbourhood. The additional impact of non-Western minorities in surrounding neighbourhoods is smaller than the impact of these minorities in people's own neighbourhoods. Segregation, deprivation and crime in adjacent neighbourhoods do not play a substantial role in explaining neither people's perceptions of the ethnic outgroup size nor their likelihood of overestimating the ethnic outgroup size. All in all, these results suggest that the influence of environmental features on people's neighbourhood perceptions should be studied at a small-scale, local level. This is most interesting in light of the ongoing discussion about what constitutes the right level at which to examine neighbourhood effects (e.g. Dinesen and Sønderskov, 2015; Tolsma and Van der Meer, 2016).

With respect to interethnic contact experiences, we find that contact with non-Western minorities in particular increases the perception and overestimation of ethnic minorities. Ethnic threat is strongly related to the perception of ethnic minorities in the neighbourhood. Apparently ethnic threat makes people more aware of the presence of ethnic minorities in the neighbourhood, and consequently makes them more likely to overestimate the actual ethnic outgroup size. However, we should be cautious with making strong causal interpretations as this studied relied on cross-sectional data. Not being able to disentangle the temporal order between threat and the perceived ethnic outgroup size is a limitation of this contribution.

Generally, our results suggest that native Dutch are inclined to think about non-Western minorities when asked about ethnic minorities in general and/or that non-Western minorities are more easily recognized as part of the foreign population than Western minorities. Under certain circumstances native Dutch are somewhat more perceptive of Western minorities in their neighbourhood. In economically deprived and high crime neighbourhoods people are more aware of the presence of these Western minorities. Future research is warranted to uncover more precisely how and when the objective size of specific, more or less culturally or physically distinctive minority groups determines people's assessment of the size of these groups.

During our survey, we provided respondents with a so-called ego-centred definition of neighbourhood (i.e. a radius of 15 minutes' walking distance) to ensure that all respondents thought of similar neighbourhoods when making an assessment of the ethnic outgroup size in the neighbourhood. Unfortunately, we had to aggregate contextual variables to postcode neighbourhoods. The ego-centred definition is not only on average somewhat larger than the latter, but respondents do not all live in the centre of their postcode area. The mismatch between these definitions of neighbourhood is a limitation of this study. That said, if this mismatch had been a serious problem, we would have expected the surrounding environment to play a larger role in shaping individuals'

perceptions of the ethnic outgroup size. Nevertheless, future studies could invest in preventing this mismatch by considering what constitutes a person's neighbourhood. It would furthermore be worthwhile to control for homeownership and length of residence in future studies, because these groups of people may be more invested in the neighbourhood and may have more knowledge about the neighbourhood in general, and the ethnic composition in particular. We would expect consequently that these groups are more accurate in estimating the ethnic outgroup size and thus less likely to overestimate the ethnic outgroup size.

At the outset of this article we argued that the importance of explaining which factors shape individuals' estimations of the ethnic outgroup size should also be understood in the context of a broader public and academic debate about the consequences of migration processes for the wellbeing of Western societies. Knowing that perceptions of the ethnic outgroup size and overestimations thereof are shaped by more than actual percentages of ethnic minorities in a neighbourhood − most notably by ethnic stereotypes and ethnic threat − it is logical that the impact of people's perceptions of the ethnic outgroup size on indicators of cohesion is found to be more consistent than the impact of the objective ethnic composition (e.g. Schaeffer, 2013; Hooghe and De Vroome, 2015; Hipp and Wickes, 2016). This ultimately raises the question as to whether disparities between perceptions and realities of ethnic minority groups can be battled by social policies, and whether neighbourhood cohesion would increase were perceptions to line up with reality.

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