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Where does ethnic concentration matter for populist radical right support? An analysis of geographical scale and the halo effect

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ABSTRACT

It is often hypothesised that the share of the population in an area belonging to an ethnic minority group positively influences the support for populist radical right-wing parties among native residents. However, empirical tests of this relationship have yielded mixed results, which may be a result of the wide variety of geographical scales at which ethnic concentration has been measured. Furthermore, it may be that it is the spatial distribution of minorities within the residential area that matters for radical right support, rather than their overall group size. The present study examines these issues by constructing egohoods and halos of varying sizes around respondents' homes. Connecting survey data from the Netherlands Longitudinal Lifecourse Study to detailed geographical data on ethnic concentration, it is found that support for the Dutch PVV is high in areas with low shares of minorities and decreases in areas with higher minority shares, up to a tipping point when minorities make up around 25% of the population. When shares of ethnic minorities become even larger, we tentatively conclude that support for the PVV increases again. This observed U-shaped pattern is consistent across distance-based egohoods ranging in radii from 200 to 5000 m, population-based egohoods with between 4000 and 120000 inhabitants, and administrative neighbourhoods, districts, and municipalities. Additionally, this study found that, in urban areas, native residents of relatively homogenous neighbourhoods whose surrounding area – the 'halo' – harbours a pronounced cluster of minority residents are more likely to support the radical right.

1. Introduction

Populist radical right-wing parties (PRRPs) have won considerable shares of the vote in recent elections all over Europe (e.g. Inglehart & Norris, 2016). The rise of these parties has stimulated research and debate among social scientists who aim to explain the popularity of PRRPs (Golder, 2016; Inglehart & Norris, 2016; Rydgren, 2007), whose ideological core has been defined as a combination of nativism, authoritarianism, and populism (Mudde, 2007). One line of research has focused on how the residential environment of voters affects PRRP support (e.g. Teney, 2012; Van Gent, Jansen, & Smits, 2014; Van Noord, De Koster, & Van der Waal, 2018; Van Wijk, Bolt, & Johnston, 2019). A contextual characteristic that has got particular attention is that of the concentration of ethnic minorities in the residential environment. It is often expected that the share of the population in an area belonging to an ethnic minority group positively influences PRRP support among native residents (e.g. De Blok & Van der Meer, 2018; Green, Sarrasin, Baur, & Fasel, 2016; Kaufmann, 2017; Savelkoul, Laméris, & Tolsma, 2017). However, tests of the relationship between ethnic concentration and PRRP support have yielded mixed results.

One potential explanation of this inconsistency is the wide variety of geographical scales at which this relationship has been examined. Studied localities range in size from countries (e.g. Arzheimer, 2009), to administrative regions (e.g. Green et al., 2016), to municipalities (e.g. Rink, Phalet, & Swyngedouw, 2009), to neighbourhoods (e.g. De Blok & Van der Meer, 2018). It has been recognised that scale may be an important aspect of the relationship between ethnic concentration and PRRP support (Biggs & Knauss, 2012; Bowyer, 2008; Kaufmann & Goodwin, 2018). However, until now almost all studies suffer from the limitation that they examined the impact of ethnic concentration

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aggregated to one or at best two administratively defined geographical units. This has restricted the inferences that can be made about the important geographical dimension of scale, but also about the impact of the spatial distribution – e.g. segregation – of ethnic groups within and between different geographical units of analysis. So far, there is only limited insight into the question *where* ethnic concentration matters for PRRP support (cf. Sharkey & Faber, 2014).

Relationships between ethnic concentration and PRRP support have been explained from the theoretical mechanisms of perceived ethnic threat and interethnic contact (e.g. Green et al., 2016; Savelkoul et al., 2017). Residents of areas with high shares of minorities are expected to be more likely to support a PRRP, because the presence of minorities in the residential environment heightens feelings of threat among majority members (e.g. Green et al., 2016; Savelkoul et al., 2017). On the other hand, living in an area with many minorities is expected to increase opportunities for (positive) contact between the majority and minority population. Positive interethnic contact has been hypothesised to reduce outgroup prejudice and as a result decrease PRRP support (e.g. Biggs & Knauss, 2012; Savelkoul et al., 2017). What is often missing from these discussions is an explicit consideration of the geographical scale at which these mechanisms are likely to manifest themselves. As social interactions decay with distance, many daily interactions take place within the local neighbourhood (e.g. Onnela, Arbesman, González, Barabási, & Christakis, 2011). In contrast, most corroborative evidence for the threat mechanism has been found at relatively large scales, such as countries (e.g. Arzheimer, 2009) and large voting districts (e.g. Bowyer, 2008; Ford & Goodwin, 2010; Green et al., 2016). The relative relevance of the contact and threat mechanism may thus depend on the geographical scale under consideration (Biggs & Knauss, 2012; Bowyer, 2008). The potential relevance of geographical scale is supported by the findings of a recent meta-analysis by Kaufmann and Goodwin (2018), which included studies that have examined the relationship between ethnic concentration on the one hand and opposition to immigration and PRRP support on the other. They found that the geographical scale at which ethnic concentration is measured is an important predictor of differences in findings. Ethnic concentration more often increased anti-immigration attitudes at the very small and at larger scales, whereas in geographical units with 5000–10000 inhabitants (e.g. large neighbourhoods) ethnic concentration was more frequently associated with reduced opposition to immigration (Kaufmann & Goodwin, 2018). However, studies in this meta-analysis have examined one or at best two spatial scales at the same time. Furthermore, only a small number of studies have examined the effects of ethnic concentration in very small localities with fewer than 1000 residents.

Most studies on the relationship between ethnic concentration and PRRP support have operationalised ethnic concentration by using administrative areal units. Using administrative units to investigate the link between ethnic concentration and support for PRRPs has benefits, as these units often correspond to socially relevant areas with which people may identify. However, a well-known issue in geographical research is that of the modifiable areal unit problem (MAUP; Openshaw, 1984), which indicates that the estimated impact of contextual characteristics may be influenced by the shape and scale of the aggregation units that are used (Andersson & Malmberg, 2015; see also Kwan, 2012). Administratively defined geographic units are furthermore ill-suited to assess whether effects differ across spatial scales, because there are only a limited number of different administratively defined units within specific countries and administrative units of the same type (e.g. municipalities) may vary widely in both population and area size themselves. To tackle this issue and to examine where, at which geographic scale, ethnic concentration matters, this study defined the local environment as an egohood (Andersson & Malmberg, 2015; Hipp & Boessen, 2013), which is an egocentric neighbourhood around a respondent's home that can be constructed for widely varying sizes (based on area or population size).

In addition to effects of ethnic concentration, threat and contact theory also imply an effect of the spatial distribution of ethnic minority groups. According to what has been labelled as the 'halo effect', PRRP support would be higher when ethnic minority shares are higher in the environment surrounding the local residential area than in the local residential area itself (Martig & Bernauer, 2018; Rydgren & Ruth, 2013). Especially these voters would experience threat that cannot be mitigated by contact at the local level. Empirical tests of halo effects are scarce, however, and we are the first to distinguish between halo effects that are produced by a difference in minority group size between the local residential area and the surrounding area (the 'difference hypothesis') and halo effects that are induced by the clustering of minorities in the surrounding environment (the 'clustering hypothesis'). Consistent with our egohood approach, we will examine both general halo effects and clustering effects at a variety of geographical scales.

The focus of this contribution is on the *Partij voor de Vrijheid* (Party for Freedom; PVV hereafter), a Dutch political party that is generally classified as populist radical right (Bakker et al., 2015; Vossen, 2011). The PVV was established in 2006 by its leader and only member Geert Wilders. The biggest success of the PVV was in the 2010 national elections, when the party won 15.45% of the vote. In subsequent elections, the party again won considerable shares of the vote (10.08% in 2012 and 13.06% in 2017), establishing itself as one of the major players in Dutch politics.

Previous studies on the relationship between ethnic concentration and PRRP support have often been based on ecological analyses of election results (e.g. Bowyer, 2008; Martig & Bernauer, 2018; Rydgren & Ruth, 2013), which introduces well-known risks associated with ecological fallacies (Robinson, 1950). As both party preferences and turnout rates may vary between ethnic groups as well as across localities (e.g. Fieldhouse & Cutts, 2008), ecological studies cannot determine the percentage of PRRP voters among the native population in each geographical unit (Savelkoul et al., 2017). This makes it impossible to distinguish compositional and contextual effects. To empirically examine scale and halo effects of the relationship between ethnic concentration and support for the PVV, we combined individual-level survey data from the Netherlands Longitudinal Lifecourse Study (NELLS) and contextual data on ethnic concentration with detailed geographical resolution obtained from Statistics Netherlands.

To sum up, our contribution focuses on two research puzzles. First, we investigate how the relationship between ethnic concentration and PRRP support varies across geographical scales. Second, we examine how differences in ethnic concentration between the own residential area and surrounding areas influence PRRP support. Our approach builds on previous studies by (1) using individual-level data to overcome risks associated with ecological fallacies; (2) examining the ethnic concentration in egohoods rather than administratively defined units to overcome problems associated with the MAUP (Andersson & Malmberg, 2015); (3) testing ethnic concentration and halo effects at a wide variety of geographical scales, including that of the very small locality; and (4) distinguishing between two specifications of the halo effect, namely the difference hypothesis and the clustering hypothesis .

2. Theoretical mechanisms and hypotheses

Two (seemingly) opposing theoretical mechanisms have been suggested to explain the relationship between the concentration of ethnic minorities in the residential environment and PRRP support, which have been termed the ethnic threat and ethnic contact mechanisms. The ethnic threat hypothesis is based on Blumer's (1958) group threat theory, which argues that majority groups develop prejudice of other groups as a defensive reaction to real or perceived threats (Quillian, 1995). These threats could be economic, political, or cultural (Biggs & Knauss, 2012). As feelings of threat are expected to grow with increasing minority group size and visibility, the presence of large ethnic minority groups in the local environment is often presumed to instigate feelings of ethnic threat (e.g. Rink, Phalet, & Swyngedouw, 2009; Savelkoul et al., 2017). Feelings of threat and negative interethnic attitudes have repeatedly been shown to be major determinants of PRRP support (e.g. Mudde, 2007). Hence, group threat theory would predict more PRRP support among native voters living in areas with higher shares of ethnic minorities.

The ethnic contact hypothesis is based on a combination of Allport's (1954) contact theory (see Pettigrew, Tropp, Wagner, & Christ, 2011, for an overview) and Blau's (1977) opportunity structure theory. A higher concentration of ethnic minorities in the residential environment will increase contact between majority and minority groups. It is assumed that these interethnic contact experiences will be mainly positive, and positive contact – even if optimal contact conditions as defined by Allport (1954) are not met – is expected to decrease negative attitudes towards minorities and thereby the likelihood of voting for a PRRP (Biggs & Knauss, 2012; Green et al., 2016).

Empirical tests of the effect of ethnic concentration on PRRP support have yielded mixed results, with some studies finding positive effects of the proportion of ethnic minorities in the residential area (e.g. Coffé, Heyndels, & Vermeir, 2007; Ford & Goodwin, 2010; Green, Sarrasin, Baur, & Fasel, 2016; Strömblad & Malmberg, 2016), some finding no effects (e.g. De Blok & Van der Meer, 2018; Lubbers & Scheepers, 2000), and yet others finding negative effects (e.g. Kaufmann, 2017; Martig & Bernauer, 2018; Rydgren & Ruth, 2013). Other studies have found a nonlinear effect of the proportion of minorities in the residential area, which has often been attributed to the existence of 'threshold effects' or 'tipping points' after which the effects of interethnic contact and ethnic threat either become weaker or stronger (Biggs & Knauss, 2012; Rink et al., 2009; Savelkoul et al., 2017; see also Galster, 2012). Savelkoul et al. (2017) found a positive effect of minority shares in the 4-digit postal code area on support for the PVV only when the proportion of non-Western minorities in the area exceeded 15 per cent. This was explained by the finding that residents of neighbourhoods with high minority shares more often saw minorities as a threat to their neighbourhood (Savelkoul et al., 2017). In other words, a substantial concentration or 'critical mass' of minorities was needed before their presence started to affect PRRP support through perceptions of ethnic threat. In contrast, both Rink et al. (2009) and Biggs & Knauss, 2012 found an inverse U-shaped pattern, with radical right support initially increasing with increasing minority shares, but starting to decrease after a certain threshold (around 5% in Rink et al.'s study and around 25% in Biggs and Knauss' study) was reached. This nonlinear effect was interpreted as each additional minority being more salient and therefore having a stronger effect on perceptions of threat when minority group sizes were smaller (Rink et al., 2009) or as interethnic contact reducing hostility only when it occurred on a frequent basis (Biggs & Knauss, 2012).

One possible explanation that has been formulated to explain these contrasting findings is that the contact and threat mechanisms operate at different geographical scales (Biggs & Knauss, 2012; Bowyer, 2008; Kaufmann & Goodwin, 2018). It is this proposition that we turn to next.

2.1. Geographical scale

Several scholars hypothesised ethnic contact mechanisms to be dominant at smaller spatial scales, whereas they expected ethnic threat mechanisms to be more relevant at higher levels (Biggs & Knauss, 2012; Kaufmann & Harris, 2015). This is based on the idea that many daily interactions occur over short distances. Therefore, natives living in diverse localities are more likely to experience positive interethnic contact, which can in turn challenge fears and reduce prejudice. On the other hand, competition over scarce resources and cultural values (also) takes place in larger geographical units such as cities or regions (Biggs & Knauss, 2012; Kaufmann & Goodwin, 2018).

The results of two studies that have examined the effects of ethnic concentration at multiple scales on support for the British National Party (Biggs & Knauss, 2012; Bowyer, 2008) were roughly in line with this pattern: negative effects of ethnic concentration on PRRP support were found for smaller geographical units, whereas positive effects were found at higher scales.[1] Relatedly, Sluiter, Tolsma, and Scheepers (2015) found a positive effect of the share of ethnic minorities on the frequency of interethnic contact for Dutch natives in smaller residential environments but not in larger areas. Furthermore, they found a negative effect of minority shares on opposition to minority neighbours (an outcome related to feelings of ethnic threat) at smaller scales, which turned positive at larger scales (Sluiter et al., 2015). These findings are consistent with the results of the meta-analysis by Kaufmann and Goodwin (2018). Building on these findings as well as the theoretical idea that interethnic contact is mostly affected by ethnic concentration at smaller scales whereas perceived ethnic threat is also influenced by the ethnic makeup of larger areas, we hypothesise that:

H1. *(scale hypothesis): The effect of the proportion of ethnic minorities in the residential area on PVV support reverses from negative at smaller spatial scales to positive at larger scales.*

Where previous studies examined at most two spatial scales at the same time, we will investigate the effect of ethnic concentration on PRRP support at a wide variety of scales, ranging from the very local level (i.e. egohoods with a radius of 100 m) to the regional level (i.e. egohoods with a radius of 10000 m). No studies so far have focused on the effects of ethnic concentration on PRRP support in residential environments below the neighbourhood level.

2.2. The halo effect

Some scholars have argued that it is not so much the degree of ethnic concentration that matters for PRRP support but rather how ethnic minorities are spatially distributed (e.g. Biggs & Knauss, 2012; Van der Waal, De Koster, & Achterberg, 2013). One variant of this line of reasoning is that of the 'halo effect', which posits that PRRP support is higher when ethnic minority shares are higher in the areas surrounding the residential area than in the residential area itself (Eatwell, 2003; Martig & Bernauer, 2018; Rydgren & Ruth, 2013). Residents of areas surrounded by areas with higher minority shares are likely to observe minorities from a distance without having intensive contact with them (Martig & Bernauer, 2018; Rydgren & Ruth, 2013). As a result, the perceived threat caused by the observation of many minorities from a distance cannot be challenged by close and meaningful contact (Kestilä & Söderlund, 2007; Martig & Bernauer, 2018), and it would be especially this 'non-experiential xenophobia' (Kestilä & Söderlund, 2007, p. 789) that would spur PRRP support.[2]

Although the potential existence of a 'halo effect' has since long been established in the literature on the radical right (e.g. Eatwell, 2003), empirical tests of halo effects are scarce. Kestilä and Söderlund (2007) found no effect of the difference between the mean share of immigrants in a department and that of surroundings departments on the vote share for the French Front National. A recent study by Martig and Bernauer (2018) found a positive effect of the difference in the proportion of foreigners between the surrounding municipalities and the own municipality on the vote share for the Swiss People's Party, in line with the halo effect. However, this effect largely disappeared when the share of foreigners in the own municipality was included in the model. Rydgren and Ruth (2013) examined the halo effect by taking the percentage of immigrants in the neighbouring voting district with the highest

[1] The negative effect found by Biggs and Knauss (2012) at the level of the output area, however, was nonlinear, with positive effects at lower proportions of ethnic minorities, and the positive effect at the authority level was only found as an interaction effect with the level of segregation.

[2] In line with this idea, scholars have demonstrated that the effect of ethnic concentration on feelings of threat is especially strong for residents that have no contact with ethnic minorities (e.g. Savelkoul et al., 2017).

percentage of immigrants, and found a positive effect of this variable on the vote share of the Sweden Democrats. Consistent with the halo effect, this effect was strongest for voting districts with a low proportion of immigrants themselves (Rydgren & Ruth, 2013). In line with the reasoning outlined above and based on previous empirical findings, we hypothesise that:

H2a. *(halo effect - difference hypothesis): The proportion of ethnic minorities in the areas surrounding the local living environment has an additional, positive effect on support for the PVV when this proportion is larger than that of the local living environment.*

The halo effect is related to the literature on the effects of segregation (e.g. Van der Waal et al., 2013) and on the effects of geographical boundaries between social groups (e.g. Dean, Dong, Piekut, & Pryce, 2018; Legewie & Schaeffer, 2016). Dean et al. (2018) argue, for example, that a sharp territorial boundary or 'social frontier' between two groups heightens the sense of social division and territoriality. The segregation of minorities may be perceived as a signal of their lack of integration into society and make differences between ethnic groups more salient ((Biggs & Knauss, 2012; Enos, 2017)). Geographical boundaries between native and minority groups are sharper when the difference in ethnic minority shares between the local and more global environment is larger, but also when minorities are spatially clustered within these larger environments surrounding one's local residential area. Living close to a substantive concentration of ethnic minorities, but not within it, may therefore evoke stronger feelings of ethnic threat among the majority population compared to a situation in which minorities are more equally distributed across the surrounding areas. This is consistent with the operationalisation of the halo effect by Rydgren and Ruth (2013), who looked at the proportion of immigrants in the neighbouring district with the highest share of immigrants, rather than taking the average across all neighbouring districts. Based on the idea that the presence of ethnic minorities especially engenders ethnic threat among natives when minorities are concentrated in space, we hypothesise that:

H2b. *(halo effect – clustering hypothesis): A cluster of ethnic minorities in the areas surrounding the local living environment has an additional, positive effect on support for the PVV.*

The halo effect assumes that the local and global residential environment are clearly distinguishable. However, it was argued in Section 2.1 that this is not the case; rather, environments of varying scales may play differential roles in affecting people's (voting) behaviour. For this reason, we adopt an exploratory approach and examine possible halo effects at a variety of spatial scales.

3. Data and methods

3.1. Data

Analyses were based on survey data from Wave 1 of the Netherlands Longitudinal Lifecourse Study (NELLS; see Tolsma, Kraaykamp, De Graaf, Kalmijn, & Monden, 2014), which were collected in 35 municipalities in the Netherlands between December 2008 and May 2010. The target population of NELLS consists of people aged 15–45 years. For the purpose of this study, only native Dutch respondents (N = 2556) were included.

All respondents in the NELLS sample were geocoded on the basis of their address at the time of the survey. This made it possible to link the survey data with detailed geographical data on the share of non-western ethnic minorities from Statistics Netherlands' (2017a) 100 by 100 m squares map in 2011 (see below).[3]

[3] 2011 was the first year for which data on the proportion of ethnic minorities were available at the level of the 100 by 100 m squares.

3.2. Dependent variable

A dichotomous dependent variable indicated whether respondents supported the PVV (1) or another party (0). This was based on a question in the NELLS questionnaire that asked what political party respondents preferred.

3.3. Individual-level controls

The year of the interview, sex, age, ethnicity, education level, income, and religion were included in all models to control for differences between respondents in their attitudes towards PRRPs possibly correlating with their contextual characteristics. The coding of these variables and the distribution of respondents across groups are shown in Table A1.

3.4. Ethnic concentration in egohoods

We follow the official classification of 'non-western minorities' used by Statistics Netherlands. Data on the share of non-western ethnic minorities (hereafter simply referred to as 'minorities') were derived from Statistics Netherlands' 100 by 100 m squares map. We subsequently constructed egohoods (also termed 'bespoke neighbourhoods'; see MacAllister et al., 2001) with radii of 100 m, 200 m, 500 m, 1000 m, 2000 m, 5000 m, and 10000 m around a respondent's home. Squares were assigned to an egohood if the centroid of the square was located within the specified range of a respondents' residential location. As a result, egohoods with a radius of 100 m can comprise up to four squares. In the original squares map, the proportion of minorities was measured as a categorized variable. We followed previous research (Tolsma & Van der Meer, 2017) in recoding this categorized variable to a continuous one. This allowed us to calculate the proportion of minorities in each egohood (i.e. ethnic concentration). In a last step we recoded this variable so that an increase of 1 unit captured an increment of 10 percentage points.

As geographical distance is an important determinant of potential interaction with and exposure to other people and a central feature of research into sociospatial inequalities (Petrović, van Ham, & Manley, 2018), strong arguments can be made for using fixed radii to define egohoods of varying sizes. Distance-based egohoods may, however, vary considerably in population size, and as an alternative egohoods with equally large population sizes but different radii may be used (e.g. Andersson et al., 2018). An argument in support of using population-based egohoods rather than distance-based egohoods is that spatial interaction is often guided by institutions in need of a threshold population, such as schools, shops, and public transportation (Östh, Clark, & Malmberg, 2015). Therefore, as a robustness check, we also present results based on population-based egohoods. To be able to compare the results of the models using population-based egohoods with those based on the distance-based egohoods, we used the (rounded) average number of residents in our distance-based egohoods as a cut-off point to construct the population-based egohoods. This amounted to egohoods which included the nearest 200, 800, 4000, 12000, 32000, 120000, and 300000 inhabitants.

As a second robustness check, and to be able to examine the extent of the MAUP, we have estimated additional models based on administrative units. We used three administrative units that are often used in the Netherlands, which are the neighbourhood ('buurt', on average 3 km^2 with 1400 inhabitants), the district ('wijk', on average 13 km^2 with 6500 inhabitants), and the municipality ('gemeente', on average 77 km^2 with 37000 inhabitants) (Statistics Netherlands, 2012).

To control for the socioeconomic characteristics of an area, all models include the average residential property value in their respective egohood or administrative district. Property value was chosen because it was the only socioeconomic characteristic on which data were available at the level of the 100 by 100 m squares, and thus the only variable which could be calculated at the egohood level. It was measured in

100,000s of euros centred on 200,000.

3.5. The halo effect

We calculated the proportion of ethnic minorities in 'halos' or 'shells' surrounding – but not including – respondents' egohoods. This was based on the distance-based egohoods to retain halos of equal size, and was done for halos of 100–200 m, 200–400 m, 500–1000 m, 1000–2000 m, 2000–4000 m, and 5000–10000 m. In line with previous research (Kestilä & Söderlund, 2007; Martig & Bernauer, 2018), for each of these halos, the proportion of minorities in the egohood was subtracted from the proportion of minorities in the halo, thus yielding a variable capturing the difference between the proportion of minorities in the egohood and its halo. Because the halo effect only predicts increased PRRP support in the situation in which minority shares are higher in the halo than in the egohood (and does not predict reduced support when minority shares are higher in the egohood than in the halo), all negative values on this variable were set to zero.[4] To retain consistency with our variable capturing the ethnic concentration in egohoods, this variable was recoded so that an increase of 1 unit captured an increase of 10 percentage points in the difference between halo and egohood. This variable is hereafter referred to as 'Δhalo' followed by its respective radii.

White's (1983) index of spatial proximity was used to measure the clustering of ethnic minorities within each halo. This index was used because it explicitly incorporates spatial relationships between population groups (Massey & Denton, 1988; Yao, Wong, Bailey, & Minton, 2018). The index is defined as the ratio of proximity between co-group members and the mean proximity between all members, weighted by group size. The calculation of the index was based on all 100 by 100 m squares within a halo and the recommended negative exponential distance-decay function was used (Massey & Denton, 1988; White, 1983), with distance measured in kilometres. It was calculated for halos of 1000–2000 m, 2000–4000 m, and 5000–10000 m. We subtracted a value of 1 from the clustering index so values larger than 0 indicate clustering, values of 0 indicate an even distribution, and values smaller than 0 indicate an unlikely situation in which members of a group live closer to members of the other group than to members of their own group (White, 1983). All values were then multiplied by 10 to ease interpretation. The clustering index was subsequently multiplied with the difference in minority shares between halo and egohood (i.e. 'Δhalo') in order to capture situations in which minorities are both overrepresented in the halo and clustered in space, because it is only under these circumstances that the cluster in the halo will constitute an observably different situation from the egohood.

Fig. 1 shows four types of residential environments of respondents in the NELLS data, focusing on the ethnic concentration in 1000-m egohoods and 1000-to-2000-m halos. As can be seen, the egohoods and halos are not completely filled by 100 by 100 m squares. This is because not all squares are inhabited. The first respondent in the figure resides in an environment characterised by similar shares of minorities in halo and egohood and no clustering. For the second respondent, the map clearly shows a cluster of minorities in the halo, which is captured by a clustering index of 1.09; however, the share of minorities is nearly the same in this respondents' egohood as in her halo. In the third situation, more minorities live in the respondent's halo than in the egohood, but minorities are quite equally distributed across the halo (clustering index = 1.02). Finally, the fourth map shows a situation in which the share of minorities is higher in the halo than in the egohood and minorities are strongly clustered in the halo (clustering index = 1.10). Our difference hypothesis (H2a) predicts that PVV support is higher in situation 3 and 4 (than in 1 and 2, after taking into account the proportion of minorities in the egohood), whereas our clustering hypothesis (H2b) predicts that PVV support is higher in situation 4 (than in situation 1, 2, and 3, after taking into account the proportion of minorities in the egohood).

3.6. Descriptive statistics of egohood and halo variables

Table 1 shows descriptive statistics for all egohood and halo variables. It can be seen that the mean share of minorities in the residential environment increases as the size of the egohood increases (remember that our sample is limited to native Dutch respondents), whereas the variation decreases. Comparing the mean and variation of our Δhalo-variable across scales suggests that most (positive) differences in minority shares exist between the 1000-to-2000-m halos and the 1000-m egohoods. Finally, Table 1 shows that the mean and variation of the clustering index increase when increasing the scale, indicating that clustering is most pronounced in relatively large areas.

Table 2 shows the correlation coefficients between a selection of egohood and halo variables. This table shows that minority shares at different scales are highly correlated, although the strength of the correlation decreases when the difference in scale increases. Minority shares in distance-based egohoods and population-based egohoods of comparable 'size' are very strongly correlated (e.g. r = 0.94 for the 1000-m distance-based egohoods and the population-based egohoods with 12000 inhabitants), showing the similarity of the two methods.

In addition, our Δhalo-variable is shown to be weakly negatively correlated with minority shares in its egohood, but positively correlated with minority shares in larger areas. Finally, the clustering index is shown to be positively correlated with both minority shares in an egohood and differences in minority shares between halo and egohood, indicating that minorities are clustered more strongly in the halo when they make up a larger part of the population.

3.7. Modelling approach

Multilevel logistic regression was used to account for the nested nature of the data, with respondents nested in municipalities.[5] The contextual variables based on the egohoods and halos were included in the analyses as individual-level variables, as these variables were unique for each respondent. Therefore, these variables can explain variation both within and between municipalities.

The first model estimated the effects of the individual-level control variables. This model served as a baseline to which all subsequent models could be compared. After this first analysis, the variables capturing the ethnic concentration in the residential environment were added to this baseline model. This was done separately for each scale. A first model estimated the linear effect of the percentage of non-western minorities. A second model added a quadratic term to test for nonlinear effects.[6] The difference in ethnic concentration between halos and their egohoods was added in a third model, with each Δhalo variable added to the model comprising the share of minorities in the egohood that was surrounded by that halo. In a fourth model, the term capturing the clustering index multiplied by the Δhalo variable was added to the second model (i.e. omitting the main effects of Δhalo and the clustering index).

As a robustness test, the models investigating halo effects (i.e. Model 3 and 4) were also estimated for a subsample of respondents living in

[4] An alternative specification, in which negative differences between halos and egohoods were retained, yielded very similar results.

[5] No spatial autocorrelation was found in the residuals of the model with individual variables (Table 3), so the use of a spatial regression model was not deemed necessary.

[6] Models in which nonlinear effects were estimated using a specification with a categorical variable can be found in the Appendix (Table A2).

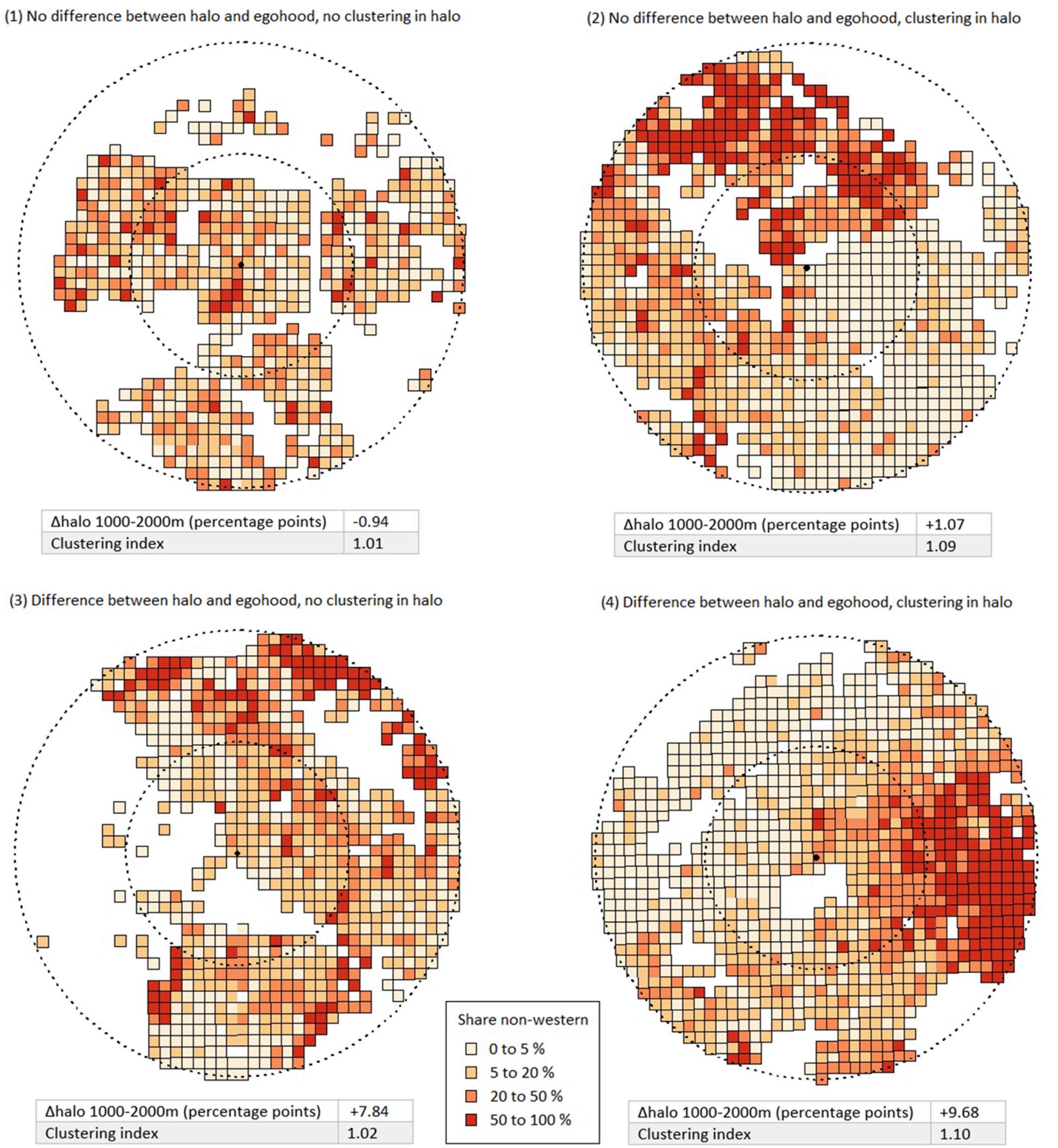

Fig. 1. –Different types of residential environments for four NELLS respondents residing in urban areas, concerning the ethnic concentration in 1000-m egohoods and 1000-to-2000-m halos.

urban municipalities.[7] This was done because halo and clustering effects may be more pronounced in urban than in suburban and rural areas, as this is where the distance between groups is small and absolute numbers are high, making differences more easily observable.

Respondents who had missing data on one or more of the variables capturing the ethnic concentration in their egohoods and halos (n = 72) were excluded from the analyses, resulting in a total sample of 2484

[7] The categorization was based on a frequently used measure of urbanity developed by Statistics Netherlands. Following this measure, all municipalities with an address density of over 1500 addresses per square kilometre were coded as urban.

Table 1
Descriptive statistics of egohood and halo variables (N = 2484).[a]

Egohood variables	% non-western			Average property value (in 1000s of euros)		
Distance-based egohoods	Mean	SD	Range	Mean	SD	Range
100 m	8.20	11.28	0–70.7	232.6	82.2	85.0–828.8
200 m	8.52	10.39	0–70.7	229.5	74.0	86.5–743.9
500 m	9.01	9.77	0–67.79	225.3	61.1	98.4–666.6
1000 m	9.22	9.11	0–63.69	224.2	52.4	101.7–598.9
2000 m	9.98	8.97	0–54.92	224.4	44.0	117.3–469.7
5000 m	10.48	8.03	0.26–43.27	224.9	36.5	142.9–338.3
10000 m	10.33	7.31	2.05–30.92	230.3	32.2	148.2–296.3
Population-based egohoods	Mean	SD	Range	Mean	SD	Range
200 inhabitants	8.42	11.42	0–70.7	228.8	76.4	87.8–823.4
800 inhabitants	8.75	10.49	0–73.66	224.8	64.8	88.8–767.2
4000 inhabitants	9.21	9.83	0.35–70.30	221.1	52.3	95.4–671.5
12000 inhabitants	9.87	9.31	0.89–67.85	223.2	48.2	98.1–628.5
32000 inhabitants	10.27	8.99	1.64–66.65	223.6	42.2	101.0–509.8
120000 inhabitants	10.88	8.10	2.64–54.65	223.0	34.6	122.0–353.8
300000 inhabitants	10.77	7.60	3.62–46.34	228.1	28.1	136.5–304.6
Administrative units	Mean	SD	Range	Mean	SD	Range
Neighbourhoods	9.14	10.56	0–82.0	236.4	69.4	97.0–702.0
Districts	9.59	9.60	0–85.0	234.7	53.4	113.0–459.0
Municipalities	9.57	7.95	1.0–36.0	233.9	38.9	150.0–327.0
Halo variables	Δhalo			Clustering index		
Halos	Mean	SD	Range	Mean	SD	Range
100–200 m	2.17	3.81	0–30.93	–	–	–
200–400 m	1.99	3.68	0–38.16	–	–	–
500–1000 m	1.60	2.93	0–28.14	–	–	–
1000–2000 m	2.53	6.11	0–50.90	0.014	0.026	−0.041–0.195
2000–4000 m	2.29	4.18	0–25.53	0.026	0.035	−0.007–0.254
5000–10000 m	1.95	3.75	0–23.39	0.055	0.054	−0.005–0.351

[a] Statistics are shown for variables before recoding to aid interpretation.

Table 2
Correlations between a selection egohood and halo variables (N = 2484).

	% non-western 100 m	% non-western 1000 m	% non-western 10000 m	% non-western 12000 inhabitants	Average property value 1000 m	Δhalo 100–200 m	Δhalo 1000–2000 m	Clustering index 1000–2000 m
% non-western 100 m	1.00							
% non-western 1000 m	0.73	1.00						
% non-western 10000 m	0.33	0.49	1.00					
% non-western 12000 inhabitants	0.71	0.94	0.56	1.00				
Average property value 1000 m	−0.21	−0.30	0.24	−0.21	1.00			
Δhalo 100–200 m	−0.03	0.29	0.11	0.26	−0.12	1.00		
Δhalo 1000–2000 m	−0.04	−0.03	0.42	0.20	0.22	−0.04	1.00	
Clustering index 1000–2000 m	0.32	0.44	0.50	0.51	−0.01	0.10	0.51	1.00

respondents. [8]

Models were estimated using the 'glmer' function in the R package 'lme4' (Bates, Mächler, Bolker, & Walker, 2015).

[8] Missing data on egohood and halo variables were the result of a situation in which no information was available on any of the 100-by-100-m squares within the (distance-based) egohood or halo. This may happen because Statistics Netherlands does not publish information on ethnicity and property values for squares with fewer than 10 inhabitants or houses. As a partial way around this problem, we assigned missing values in the 100-by-100-m squares the value in the larger 500-by-500-m squares map (Statistics Netherlands, 2017b). Respondents that still had 'empty' egohoods or halos after this imputation process were excluded from the analyses.

4. Results

Table 3 shows the effects of the individual-level control variables. The model for the full sample shows that PVV support was higher in 2009 and 2010 than in 2008, and among male, younger, lower educated, non-religious and catholic, middle-income respondents, which is roughly in line with findings of previous studies (e.g. Ford & Goodwin, 2010; Golder, 2016). After taking into account these individual-level characteristics, around 5.9% of the unexplained variance is located at the municipality level.[9]

Turning to our egohood and halo variables, the linear models in Table 4 show that no significant linear effects of the share of ethnic minorities in an egohood were found at any of the scales. Model 2 shows that the effect of the percentage of non-western minorities in the residential environment was nonlinear between 200 and 5000 m, whereas no effects were found at the most local (100-m) and most global (10000-m) scales. The nonlinear effect is shown in Fig. 2 for the 200-m, 1000-m, and 5000-m egohoods. All lines show a U-shaped effect, with PVV support first decreasing and then – after a certain turning point – increasing.[10] In other words, this model would predict that PVV support will be high in areas with low and very high shares of non-western minorities, and low in areas with average and a bit above average shares of non-western minorities. Results based on an alternative specification, in which minority shares were measured using categories, show a similar non-linear effect in egohoods of 200–5000 m, with the lowest probability of PVV support found in egohoods in which minorities constituted 20–25% or 25–30% of the population (depending on the scale) (Table A2Table A2). We have to bear in mind, however, that our sample contains only few respondents that live in egohoods with minority shares of more than 25%, and, as a consequence, estimates of PVV support in areas with high minority shares are surrounded by considerable uncertainty. We only tentatively conclude that there is a threshold effect and that PVV support increases again when migrant shares become larger than (approximately) 25%.

That being said, our results indicate that the turning point at which the effect of ethnic concentration in an egohood on PVV support turned positive decreased at increasing scales: it changes from a minority share of 30.3% for the 200-m egohoods, to 28.1% for the 500-m egohoods, to 26.2% for the 1000-m egohoods, to 26.5% for the 2000-m egohoods, to 21.2% for the 5000-m egohoods (see also Fig. 2). Comparing the model fit (indicated by the AIC) of the different models shows that model fit was best for the 2000-m egohoods, which was also the model that explained most of the municipality-level variance.

For the full sample, we found no significant effects of the difference in minority shares between egohoods and halos at any of the spatial scales. Furthermore, no significant effects were found for the variable denoting the multiplication of the halo effect and the clustering index. In urban municipalities, there was some evidence that PVV support was higher when minority shares were higher in the halo than in the egohood for halos of 2000–4000 m, but the effect was only borderline significant (Difference models, urban areas: b = 0.632, SE = 0.339). More convincingly, and again in urban municipalities, a significant and positive effect was found for the impact of a cluster of minorities in halos of 1000–2000 m (Clustering models, urban areas: b = 0.661, SE = 0.331) and for halos of 2000–4000 m (b = 0.670, SE = 0.282). Thus, in urban areas, PVV support was higher among respondents who lived in an area with relatively low shares of minorities (compared to the surrounding areas) close to (i.e. within 1000–4000 m) a cluster of ethnic minorities. This effect was quite substantive: going from a situation with no difference in minority shares between halo and egohood and no clustering in the halo to a situation where minority shares are 10 percentage points higher in the 1000-to-2000-m halo than in the 1000-m egohood and have a clustering index of 0.10 almost doubles the probability that a ‘typical’ respondent in an urban municipality (i.e. with a mean score on all other variables) supports the PVV (from 0.025 to 0.047; predicted probabilities based on fixed effects only).

The average property value in an egohood had no significant effect in any of the models.[11]

In sum, a significant, U-shaped effect of the share of ethnic minorities was found in egohoods with radii ranging from 200 to 5000 m, although the positive effect at the end of the distribution was based on only a small number of observations. No evidence was found that the relationship between minority shares and PVV support changed signs across scales, rejecting the scale hypothesis (H1). In addition, for the full sample, no support was found for the halo effect, neither for the difference hypothesis (H2a) nor for the clustering hypothesis (H2b). In urban municipalities, however, evidence was found in support of the clustering hypothesis.

Table 3
Results of multilevel logistic regression models with individual-level effects (N = 2484). Dependent variable: PVV support. Standard errors in parentheses.

	Full sample
Constant	**−3.230 (0.514)**
Year of interview (ref = 2008)	
2009	**1.344 (0.469)**
2010	**1.565 (0.487)**
Sex (ref = male)	
Female	**−0.941 (0.162)**
Age (mean-centred)	**−0.029 (0.011)**
Education level (ref = low)	
Middle	**−0.513 (0.168)**
High	**−1.943 (0.302)**
Religion (ref = no religion)	
Catholic	−0.136 (0.226)
Protestant	**−1.145 (0.370)**
Other	*−0.800 (0.477)*
Income (ref = 0–999)	
1000–1999	**1.003 (0.251)**
2000–2999	**0.799 (0.281)**
3000+	*0.515 (0.303)*
Don’t know/don’t want to say	0.431 (0.329)
Variance components	
Municipality level	0.206
AIC	1261.2

Bold values indicate p < 0.05, *italic* values indicate p < 0.1.

4.1. Robustness check using population-based egohoods and administrative units

As a robustness check, we estimated the linear and quadratic models for population-based egohoods and administrative units. Results are reported in Table 5, and confirm the finding of a U-shaped effect of minority shares on support for the PVV. For the population-based egohoods, we found a U-shaped effect at all scales, which is statistically significant for egohoods with between 4000 and 120000 inhabitants. The strongest effects were found for the relatively large egohoods with 120000 inhabitants. In general, the model fit (as indicated by the AIC) was slightly better for the distance-based egohoods than it was for the population-based egohoods.

Minority shares also had a significant, U-shaped effect on PVV support in all three administrative units, supporting the results of the

[9] Calculated by taking an individual-level variance term of 3.29 (Hox, Moerbeek, & van de Schoot, 2010).

[10] Additional models simultaneously included minority shares in the 200-m and 5000-m egohoods. This showed a similar U-shaped effect of minority shares at both scales, albeit somewhat reduced in effect size due to the correlation between minority shares at different scales (Pearson’s r = 0.54).

[11] For egohoods with radii of 200–1000 m, we did find a negative and significant interaction effect between the average property value in an egohood and the percentage of non-western minorities, which is in line the hypothesis that interethnic contact reduces prejudice more when economic conditions are favourable, whereas feelings of ethnic threat are more important in poorer areas (Quillian, 1995). Estimating separate models for egohoods with property values below and above the median shows that the U-shaped effect of minority shares we report is consistent across poor and rich areas, however.

Table 4
Results of multilevel logistic regression model of distance-based egohoods of varying sizes, for the full sample (N = 2484) and for respondents in urban municipalities (Model 3b and 4b; N = 1006). Dependent variable: PVV support. Standard errors in parentheses.

	Linear models	Quadratic models	Difference models	Difference models, urban areas	Clustering models	Clustering models, urban areas
100 m						
% non-western	−0.093 (0.088)	−0.115 (0.202)	−0.125 (0.203)	−0.225 (0.317)		
% non-western^2		0.005 (0.039)	0.005 (0.039)	0.024 (0.054)		
Δhalo 100–200m			−0.105 (0.225)	0.320 (0.307)		
Average property value	−0.033 (0.117)	−0.035 (0.118)	−0.039 (0.118)	−0.045 (0.209)		
Municipality-level variance	0.182	0.180	0.174	0		
AIC	1264.1	1266.0	1267.8	394.0		
AIC of quadratic models, urban areas				393.0		
200 m						
% non-western	−0.075 (0.097)	*−0.421 (0.218)*	*−0.420 (0.217)*	−0.389 (0.340)		
% non-western^2		*0.069 (0.038)*	*0.068 (0.038)*	0.064 (0.053)		
Δhalo 200–400m			−0.137 (0.250)	0.312 (0.305)		
Average property value	0.011 (0.129)	−0.027 (0.130)	−0.028 (0.130)	−0.017 (0.227)		
Municipality-level variance	0.187	0.148	0.143	0		
AIC	1264.5	1263.5	1265.1	393.9		
AIC of quadratic models, urban areas				392.8		
500 m						
% non-western	−0.095 (0.109)	**−0.587 (0.237)**	**−0.587 (0.234)**	−0.260 (0.370)		
% non-western^2		**0.104 (0.044)**	**0.103 (0.044)**	0.056 (0.061)		
Δhalo 500–1000m			−0.322 (0.304)	−0.049 (0.433)		
Average property value	−0.016 (0.160)	−0.070 (0.157)	−0.059 (0.156)	0.116 (0.284)		
Municipality-level variance	0.181	0.129	0.122	0		
AIC	1264.4	1261.4	1262.2	395.1		
AIC of quadratic models, urban areas				393.1		
1000 m						
% non-western	−0.106 (0.124)	**−0.597 (0.263)**	**−0.594 (0.259)**	−0.277 (0.420)	**−0.595 (0.263)**	−0.406 (0.430)
% non-western^2		**0.114 (0.054)**	**0.113 (0.053)**	0.075 (0.074)	**0.114 (0.054)**	0.094 (0.076)
Δhalo 1000–2000m			−0.172 (0.161)	0.456 (0.402)		
Clustering index*Δhalo 1000–2000m					−0.045 (0.185)	**0.661 (0.331)**
Average property value	0.085 (0.191)	0.037 (0.183)	0.070 (0.181)	0.068 (0.323)	0.041 (0.182)	0.091 (0.319)
Municipality-level variance	0.185	0.124	0.106	0	0.120	0
AIC	1263.8	1261.8	1262.6	393.6	1263.7	391.5
AIC of quadratic models, urban areas				392.8		
2000 m						
% non-western	*−0.232 (0.123)*	**−0.774 (0.274)**	**−0.748 (0.280)**	−0.171 (0.518)	**−0.748 (0.281)**	−0.362 (0.515)
% non-western^2		**0.146 (0.066)**	**0.140 (0.067)**	0.068 (0.101)	**0.140 (0.067)**	0.102 (0.100)
Δhalo 2000–4000m			−0.166 (0.231)	*0.632 (0.339)*		
Clustering index*Δhalo 2000–4000m					−0.114 (0.197)	**0.670 (0.282)**
Average property value	−0.188 (0.223)	−0.177 (0.209)	−0.128 (0.222)	−0.300 (0.426)	−0.154 (0.215)	−0.208 (0.397)
Municipality-level variance	0.151	0.093	0.104	0	0.105	0
AIC	1261.6	1259.4	1260.9	391.6	1261.1	390.0
AIC of quadratic models, urban areas				392.9		
5000 m						
% non-western	−0.204 (0.132)	**−0.876 (0.341)**	**−0.853 (0.331)**	0.426 (1.145)	**−0.924 (0.334)**	0.394 (1.163)
% non-western^2		**0.206 (0.096)**	**0.205 (0.094)**	−0.022 (0.247)	**0.221 (0.095)**	−0.015 (0.251)
Δhalo 5000–10000m			0.317 (0.243)	0.211 (0.449)		
Clustering index*Δhalo 5000–10000m					0.201 (0.167)	0.130 (0.264)
Average property value	−0.178 (0.275)	−0.183 (0.257)	−0.286 (0.260)	−0.268 (0.622)	−0.243 (0.255)	−0.237 (0.635)

(*continued on next page*)

Table 4 (*continued*)

	Linear models	Quadratic models	Difference models	Difference models, urban areas	Clustering models	Clustering models, urban areas
Municipality-level variance	0.171	0.125	0.098	0	0.103	0
AIC	1262.8	1260.7	1261.1	392.8	1261.4	392.8
AIC of quadratic models, urban areas				391.0		
10000 m						
% non-western	−0.142 (0.143)	0.327 (0.636)				
% non-western^2		−0.155 (0.205)				
Average property value	−0.485 (0.307)	*−0.543 (0.320)*				
Municipality-level variance	0.166	0.173				
AIC	1261.9	1263.3				

Bold values indicate $p < 0.05$, *italic* values indicate $p < 0.1$. Notes: all models control for the year of the interview, sex, age, education level, religion, and income. The effects of these control variables do not substantially differ across models and are reported in Table 3. lme4 returns a random effect equal to zero when the variability between municipalities is not significantly different from zero (Bates et al., 2015), which is the case for the models based on respondents in urban municipalities.

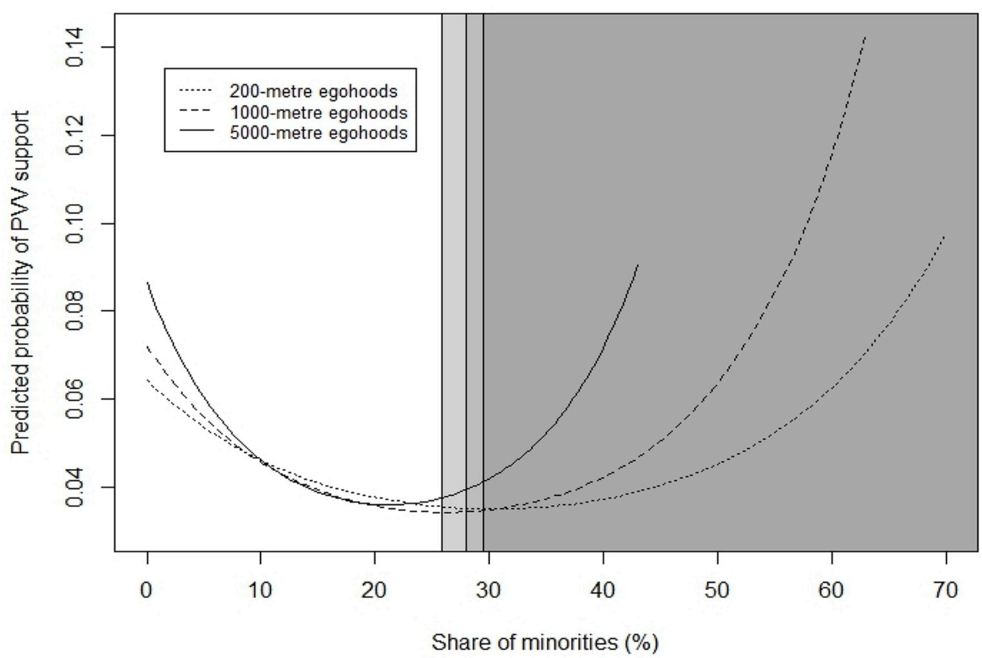

Fig. 2. Predicted probability of PVV support by the percentage of non-western minorities in the 200-m, 1000-m, and 5000-m egohoods. As calculated at the average value of all other independent variables. Based on fixed effects only.
Note: Lines were drawn until the highest observed minority share. The grey background indicates that 95% of the observations on the distribution of minority shares were located left of that point, for the 1000-m (light grey), 5000-m (grey), and 200-m (dark grey) egohoods.

analyses based on egohoods. The effect of the proportion of minorities was especially strong when measured at the level of municipalities.

5. Discussion

Our study concurs with recent calls for attention to issues of geographical scale in segregation and neighbourhood effects research (e.g. Andersson et al., 2018; Kaufmann & Goodwin, 2018; Petrović et al., 2018). We found little evidence, however, that the effect of ethnic concentration on support for radical right-wing parties was dependent on the scale of analysis. Rather, we found a U-shaped effect of the share of ethnic minorities in an area on support for the PVV, which was consistent across distance-based egohoods of 200–5000 m, population-based egohoods with 4000–120000 inhabitants, and administrative neighbourhoods, districts, and municipalities. Therefore, the decisive factor that determined whether positive or negative effects were dominant was not the geographical scale of analysis but rather the relative size of native and minority groups. If minorities were not strongly overrepresented in an area, their presence was associated with lower support for the PVV among native residents, which may be attributed to positive interethnic contact experiences that reduce prejudice and anti-immigrant attitudes. Once a critical mass of minorities – around 25% of the population in our study – was present, however, additional minorities increased the probability that a native resident supported the PVV, which may indicate that threat became dominant over contact. Although the evidence of this positive effect was somewhat weak due to a low number of respondents living in egohoods where minorities made up more than 25% of the population, the finding of such a threshold effect is in line with recent findings in the Netherlands by Savelkoul et al. (2017). Moreover, it aligns well with our finding that living near a cluster of minorities increases PVV support. This suggests that once minorities form a substantial concentration – either in the own or a nearby residential area – they may be perceived to challenge majority culture, as native residents observe unfamiliar religious practices, hear foreign languages, and notice the establishment of migrant communities. Radical right support can then be seen as a defensive reaction of the native population to the marked presence of ethnic minorities in or nearby their residential area.

The lack of a scale effect in our study calls into question the relevance of scale as an explanation of inconsistent findings in previous studies on

Table 5
Results of multilevel logistic regression model of population-based egohoods and administrative units of varying sizes (N = 2484). Dependent variable: PVV support. Standard errors in parentheses.

Population-based egohoods	Linear models	Quadratic models
200 inhabitants		
% non-western	−0.148 (0.092)	*−0.383 (0.202)*
% non-western^2		0.047 (0.036)
Average property value	−0.091 (0.128)	−0.116 (0.129)
Municipality-level variance	0.169	0.149
AIC	1262.4	1262.7
800 inhabitants		
% non-western	−0.095 (0.098)	*−0.397 (0.221)*
% non-western^2		0.060 (0.038)
Average property value	−0.021 (0.153)	−0.059 (0.153)
Municipality-level variance	0.180	0.148
AIC	1264.2	1264.0
4000 inhabitants		
% non-western	−0.055 (0.109)	**−0.511 (0.235)**
% non-western^2		**0.090 (0.041)**
Average property value	0.071 (0.201)	0.019 (0.195)
Municipality-level variance	0.194	0.139
AIC	1264.6	1262.2
12000 inhabitants		
% non-western	−0.135 (0.119)	**−0.572 (0.255)**
% non-western^2		*0.096 (0.050)*
Average property value	−0.070 (0.219)	−0.085 (0.208)
Municipality-level variance	0.169	0.119
AIC	1263.9	1262.6
32000 inhabitants		
% non-western	−0.193 (0.123)	**−0.586 (0.266)**
% non-western^2		*0.096 (0.057)*
Average property value	−0.218 (0.251)	−0.199 (0.243)
Municipality-level variance	0.165	0.129
AIC	1262.7	1262.2
120000 inhabitants		
% non-western	−0.177 (0.132)	**−0.845 (0.357)**
% non-western^2		**0.167 (0.081)**
Average property value	−0.204 (0.299)	−0.095 (0.294)
Municipality-level variance	0.182	0.155
AIC	1263.3	1261.4
300000 inhabitants		
% non-western	−0.097 (0.136)	−0.709 (0.514)
% non-western^2		0.167 (0.135)
Average property value	−0.497 (0.361)	*−0.307 (0.386)*
Municipality-level variance	0.172	0.154
AIC	1263.1	1263.7
Administrative units		
Neighbourhoods		
% non-western	−0.048 (0.102)	**−0.432 (0.218)**
% non-western^2		**0.070 (0.035)**
Average property value	0.025 (0.145)	−0.037 (0.144)
Municipality-level variance	0.193	0.136
AIC	1264.8	1263.2
Districts		
% non-western	−0.155 (0.118)	**−0.592 (0.222)**
% non-western^2		**0.087 (0.038)**
Average property value	−0.232 (0.197)	−0.266 (0.188)
Municipality-level variance	0.170	0.111
AIC	1263.0	1260.2
Municipalities		
% non-western	**−0.306 (0.147)**	**−1.339 (0.351)**
% non-western^2		**0.321 (0.102)**
Average property value	−0.147 (0.254)	−0.193 (0.218)
Municipality-level variance	0.132	0.054
AIC	1260.9	1254.6

Bold values indicate $p < 0.05$, *italic* values indicate $p < 0.1$. Note: all models control for the year of the interview, sex, age, education level, religion, and income. The effects of these control variables do not substantially differ across models and are reported in Table 3.

ethnic concentration and radical right support. Previous studies on the radical right that did find scale effects have largely been based on the UK (Biggs & Knauss, 2012; Bowyer, 2008; see also Kaufmann & Harris, 2015). As ethnic residential segregation levels are higher in the UK than in the Netherlands (Lichter, Parisi, & De Valk, 2016; Musterd, 2005), this may indicate that scale effects are more relevant in countries with high levels of ethnic segregation.

We were the first to examine halo effects on PRRP support using individual-level data, and we have done so at a variety of scales and have operationalised the halo effect both as the difference in minority shares between halo and egohood (H2a) and as the degree to which minorities were clustered within the halo (H2b), providing the most sophisticated test of the halo effect so far. For the full sample, we found no support for the existence of a halo effect in any of these specifications. When focusing on respondents in urban municipalities, however, we found more support for the PVV in areas that house relatively few minorities themselves (compared to the surrounding areas) yet that are close to a cluster of ethnic minorities. This finding indicates that the halo effect should be seen as an urban phenomenon, potentially because minorities need to be both adjacent (i.e. without open space in between) and high in absolute numbers for the halo effect to manifest itself. In addition, in urban areas the strongest support for the halo effect was found when minorities were not only overrepresented but also clustered within the halo. It is thus not only the difference between the own area and surrounding areas, but also the degree of clustering within the surrounding area that matters for the halo effect. This corresponds well with our finding that the presence of minorities only starts to excite feelings of threat when they constitute a critical mass, and suggests that the spatial clustering of minorities in nearby areas has an additional 'threat-enhancing' effect. It is furthermore consistent with the operationalisation of the halo effect by Rydgren and Ruth (2013), who found the most robust evidence for a halo effect so far by examining the percentage of immigrants in the neighbouring voting district with the highest percentage of immigrants (as compared to other studies (Kestilä & Söderlund, 2007; Martig & Bernauer, 2018) that took the average across all surrounding areas). Finally, we examined halo effects at a variety of scales, and found support for the halo effect (in urban areas, and combined with the clustering of minorities within the halo) for halos of 1000-to-2000 m and 2000-to-4000 m, which corresponds roughly to a large neighbourhood.

So far, we have interpreted the results in light of contact and threat theory. We should note, however, that our data did not contain appropriate measures to measure contact and threat, and therefore we could not test the theoretical mechanisms directly. Future studies should test the relevance of contact and threat for the relationship between ethnic concentration and PRRP support by including measures of positive as well as negative interethnic contact, and measures of perceived ethnic threat at the local as well as the national level. Furthermore, based on our cross-sectional data we could not rule out the possibility that results were caused by the selective migration of radical right supporters into residential areas with few minorities. Although there is some evidence that selection plays only a limited role in research on ethnic concentration and anti-immigration attitudes (Kaufmann & Harris, 2015), future studies should further investigate this issue in other contexts. Combining this with approaches that take into account the inherently geographical nature of the relationship between the residential environment and radical right support will substantially improve our understanding of the present upsurge in support for radical right-wing parties.

Declaration of competing interest

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.polgeo.2019.102097.

Appendix

Table A1
Descriptive statistics of individual-level variables.

	N	%
Support for political party		
PVV	205	8.3
Other party	2279	91.7
Year of interview		
2008	192	7.7
2009	1726	69.5
2010	566	22.8
Sex		
Female	1321	53.2
Male	1163	46.8
Education level		
Low	711	28.6
Middle	1050	42.3
High	723	29.1
Religion		
No religion	1653	66.5
Catholic	381	15.3
Protestant	349	14.0
Other	101	4.1
Income		
0–999	560	22.5
1000–1999	437	17.6
2000–2999	560	22.5
3000+	690	27.8
Don't know/don't want to say	237	9.5
	Mean	SD
Age	31.7	9.1
Total	2484	100

Table A2
Results of multilevel logistic regression model of distance-based egohoods of varying sizes, for the full sample (N = 2484). Dependent variable: PVV support. Standard errors in parentheses.

100 m	
% non-western (ref = 0–5)	
5–10	−0.168 (0.224)
10–15	−0.005 (0.277)
15–20	−0.454 (0.458)
20–25	−0.192 (0.405)
25–30	0.086 (0.580)
>30	−0.634 (0.444)
Average property value	−0.029 (0.118)
Municipality-level variance	0.185
AIC	1271.2

(continued on next page)

Table A2 (*continued*)

100 m	
% non-western (ref = 0–5)	
200 m	
% non-western (ref = 0–5)	
5–10	−0.336 (0.209)
10–15	−0.525 (0.320)
15–20	−0.551 (0.413)
20–25	*−1.459 (0.744)*
25–30	0.380 (0.494)
>30	−0.193 (0.403)
Average property value	−0.028 (0.128)
Municipality-level variance	0.140
AIC	1264.5
500 m	
% non-western (ref = 0–5)	
5–10	−0.153 (0.205)
10–15	**−0.797 (0.343)**
15–20	−0.458 (0.370)
20–25	*−0.963 (0.553)*
25–30	*−1.254 (0.756)*
>30	0.148 (0.404)
Average property value	−0.056 (0.155)
Municipality-level variance	0.124
AIC	1263.3
1000 m	
% non-western (ref = 0–5)	
5–10	**−0.513 (0.227)**
10–15	*−0.484 (0.267)*
15–20	**−1.024 (0.435)**
20–25	−0.191 (0.399)
25–30	−1.218 (0.759)
>30	−0.034 (0.477)
Average property value	0.038 (0.180)
Municipality-level variance	0.114
AIC	1262.8
2000 m	
% non-western (ref = 0–5)	
5–10	**−0.508 (0.221)**
10–15	**−0.522 (0.255)**
15–20	**−1.066 (0.358)**
20–25	**−1.432 (0.620)**
25–30	−0.426 (0.568)
>30	−0.416 (0.408)
Average property value	−0.143 (0.199)
Municipality-level variance	0.061
AIC	1261.2
5000 m	
% non-western (ref = 0–5)	
5–10	−0.157 (0.231)
10–15	**−0.590 (0.273)**
15–20	−0.521 (0.320)
20–25	**−1.674 (0.650)**
25–30	*−1.300 (0.772)*
>30	0.218 (0.426)
Average property value	−0.097 (0.251)
Municipality-level variance	0.109
AIC	1260.0
10000 m	
% non-western (ref = 0–5)	
5–10	0.117 (0.253)
10–15	−0.022 (0.369)
15–20	0.097 (0.434)
20–25	−0.314 (0.448)
25–30	−0.261 (0.391)
>30	−0.316 (1.151)
Average property value	*−0.556 (0.334)*
Municipality-level variance	0.174
AIC	1271.1

Bold values indicate $p < 0.05$, *italic* values indicate $p < 0.1$. Notes: all models control for the year of the interview, sex, age, education level, religion, and income. The effects of these control variables do not substantially differ across models and are reported in Table 3.

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