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The diversity Wave:A meta-analysis of the native-born white response to ethnic diversity[☆]

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A B S T R A C T

Does ethnic diversity increase or reduce white threat perceptions? Meta-analyses help orient a field and communicate findings to policymakers. We report the results of a meta-analysis of studies measuring the relationship between ethnic context and both opposition to immigration and support for anti-immigration parties. Our analysis attempts to be exhaustive, and is based on 171 post-1995 studies averaging 25,000 observations each, a knowledge base of over 4 million data points. We find a linear association between ethnic change and elevated threat. However, for diversity levels, the relationship between ethnic context and threat is nonlinear. This takes the form of a 'wave', with higher diversity predicting threat responses at the smallest and largest scales, whereas in units of 5000–10,000 people (such as tracts or neighbourhoods), diversity is associated with reduced threat.

1. Introduction

How does rising ethnic diversity in the West affect perceptions of threat among native-born white majorities? In the social sciences there is now a vast and expanding body of research on how the surrounding ethnic context –whether at the local, regional or national level-impacts upon majority perceptions and behaviour. In this paper, we argue that a meta-analysis of studies reveals that the competing claims of threat and contact theory may be reconciled. Threat theory, in the form of anti-black prejudice and politics, has a long scholarly pedigree (i.e. Key, 1949; Blalock, 1967). This has received more attention following a controversial paper published nearly ten years ago in which Robert Putnam (2007) suggested that rising immigration and ethnic diversity –at least in the short-term- tends to reduce social solidarity.

Drawing on findings from a large nationwide survey in the United States, Putnam argued that in more ethnically diverse census tracts citizens tend to 'hunker down' –they feel threatened by ethnic change, withdraw from collective life and become less trusting of their neighbours (also Alesina and La Ferrara, 2002). The debate about the impact of ethnic context on white exit continues and remains unresolved. Putnam's claims about the short-term negative effects of diversity clash with research that appears to highlight the positive effects of intergroup contact in small-scale contexts (Pettigrew and Tropp, 2006; Stolle et al., 2008).

The 'exit' route that Putnam pointed to, namely white withdrawal from community and solidarity under conditions of increased ethnic diversity, has received meta analytic treatment (van der Meer and Tolsma, 2014). But the 'voice' route, namely expressing negative attitudes to immigration and casting a vote for anti-immigration populist radical right parties, has not.

While there are already helpful reviews of public attitudes toward immigration and diversity (Ceobanu and Escandell, 2010; Hainmueller and Hopkins, 2014), and support for the anti-immigration radical right (e.g. Rydgren, 2007), in this paper we contribute

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by conducting a formal meta-analysis, akin to those for the fields of diversity and social solidarity (van der Meer and Tolsma, 2014) and contact theory (Pettigrew and Tropp, 2006).

We argue that the field needs to move beyond the zero-sum debate between contact and threat theory. Our metadata shows that both theories fit the data, but at different geographic scales. Our second contribution to scholarship is therefore to pay closer attention to the size of the context in which diversity occurs. A notable advance in the literature on exit and voice has been attention to the way in which geographic scale moderates the diversity-threat relationship. Rather than a linear conception of the diversity-threat nexus – in the direction of threat or contact - our results reveal how context size acts as a moderating lens. That is, the effect of diversity on threat rises and falls in a systematic wave-like fashion as we vary the size of unit under consideration. What geographers refer to as the 'modifiable areal unit problem' (MAUP) forms the centrepiece of our analysis.

2. Contact, micro-threat and macro-threat

Threat theory (i.e. Putnam, 2007) and contact theory (i.e. Allport, 1954) set the parameters of our interpretive framework. Within threat theory, however, we distinguish between micro- and macro-threat. A number of scholars suggest that contact effects are more likely in smaller geographies than larger units. This is because individuals in diverse locales are able to meet minorities in person, challenging fears or misperceptions, whereas at the city or county level – especially if highly segregated - the modal white person experiences only limited inter-ethnic contact (Kaufmann and Harris, 2015: 1566; Schlueter and Scheepers, 2010: 293). Meanwhile, political contestation increases in larger units (Ha, 2010: 30). This *macro-threat* argument intimates that geography moderates the diversity-threat relationship in linear fashion: as the size of unit increases, the effect of increased ethnic diversity shifts from reducing to enhancing perceptions of threat among native whites. We surmise that there are distinct forms of threat operating at each end of the scale.

By contrast, Dinesen and Sonderskov (2015: 553–54) point to psychological research which suggests co-ethnics tend to trust each other more than members of out-groups. At close quarters, diversity may prompt greater unease among white residents than it may at larger scales. Biggs and Knauss (2012) and Kawalerowicz (2015) find, using a membership list for an anti-immigration radical right party in Britain, that whites in relatively diverse Output Areas (average population 300) are more likely to be party members than whites in homogeneous Output Areas. The *micro-threat* claim appears to run counter to both contact and macro-threat perspectives.

3. Approach

Meta analyses are important to focus research in the field, but are also vital for reaching beyond academia. As in medicine, individual studies may report contradictory findings, creating an impression that no consensus exists and little scientific progress has been made. Meta-analyses help locate the centre of gravity of scholarship, establishing baseline patterns which policymakers and the public can grasp. Our meta-analysis provides a quantitative analysis of all work we could find on ethnic diversity and how it relates to immigration attitudes and support for the radical right. There are extant meta-analyses covering psychological studies of contact and prejudice in controlled or classroom settings (i.e. Pettigrew and Tropp, 2006). This literature thereby falls outside our remit as we focus on the more incidental contact that comes with geographic exposure to diversity in units of varying size, and concentrate on immigration attitudes and populist right support.

We restrict our meta-analysis to studies published since 1995, a period that has witnessed considerable demographic change across the Western world. By undertaking a meta-analysis of the role of ethnic context in anti-immigration mobilization, we compare individual papers in a transparent, rigorous and replicable manner which others may build on.

Our analysis extends much further than past reviews by encompassing over 4 million data points. Articles based on particular datasets may repeatedly uncover similar relationships but it is only by considering the full range of studies that larger patterns may emerge. The meta-analysis reveals a macro-level relationship between geographic context size and ethnic threat that would be difficult to discern from a single dataset or wide knowledge of the literature. This is because few studies examine more than one level, and those that do stop at two. In this paper we survey a finer-grained sweep across nine geographic context sizes to ask how modifying the areal unit affects the association between ethnic diversity and measures of ethnic threat.

Our main finding is an important nonlinear relationship between the size of the ethno-contextual unit and ethnic threat which takes a cubic polynomial form. Cubic functions, well-established in mathematics, exhibit a wave pattern with two inflection points. This is distinct from the curve pattern with one inflection point produced by a quadratic (squared) equation, or the straight line produced by a linear equation. Our model sees white threat responses to diversity crest at the smallest (under 1000 population) and largest (national) geographies but in units of 5000–10,000 people, such as wards or tracts, greater diversity is associated with reduced threat perceptions. This nonlinear relationship holds equally across the threat domains of attitudinal opposition to immigration and minorities, electoral support for the radical right and generalized mistrust. This adjudicates between, and recasts, the currently linear understanding of the diversity-threat relationship. We also claim that whereas diversity *levels* relate to anti-immigration sentiment in a nonlinear way, ethnic *change* has a linear association with threat. Finally, this work seeks to focus the field, pointing to specifications which all studies should apply before highlighting areas most in need of further research. In the next section we provide an overview of existing research. We then present the results of our meta-analysis and conclude by discussing their implications for the study of the contextual effects of diversity on native white 'voice.'

4. Threat, contact and diversity

There is now a vast literature on the political effects of rising ethnic diversity, notably the relationship between ethnic context and public support for anti-immigrant radical right parties (for a full list of studies that were included in our meta-analysis see Appendix 1). Overall, 79% of our sample is comprised of published articles or books and 21% are working papers or dissertations. We consider work from the post-1995 period but there is a strong skew toward the present, with half of all studies dating from 2011 and just 3% from 2000 or earlier. Much of the quantitative work on immigration and the populist radical right is thus of recent vintage. Had we focused on native minorities (i.e. white-black dynamics in the United States), where there is a longer tradition of scholarship, the average year of publication would fall considerably earlier.

Our data consists of 513 reported coefficients from multivariate models published in 171 studies of how ethnic context relates to public attitudes toward immigration or support for anti-immigration parties. Further details on our sampling strategy and inclusion rules may be found in Appendix 1. The studies we analyse deploy variables drawn from various datasets, applying a variety of methods to distinct sets of countries and time periods. This introduces heterogeneity which may obscure 'universal' relationships. Even with a significant general relationship between ethnic diversity and threat at the $p < .05$ level, there is still a 5 percent chance any given study will fail to find a significant effect. Our work helps to surmount such problems by amassing 171 articles averaging 25,000 observations each, resulting in a knowledge base of over 4 million data points.

Our meta-model reflects a 'wisdom of crowds' philosophy in which the average of many viewpoints offers a prediction nearly as good as the best individual result. This is because knowledge in a complex system such as a market or academic discipline is distributed rather than centralised, and thus benefits from being aggregated (Surowiecki, 2004; Schmidt and Hunter, 2015). Accordingly, we harness an unprecedented quantity of accumulated social scientific insight to derive average effects and emergent properties. None of this obviates the need for further research: meta-relationships change between countries and over time while new studies contribute fresh questions, data and methods.

Leaving aside four studies that focus on minorities' attitudes to outgroups, 39 of 171 studies, or 22.5%, examine support for the populist radical right and the rest focus on attitudes to immigration. Tables in Appendix 3 and 4 provide summary statistics for the data. Among the studies we uncovered, just 14% are multilevel: that is, measuring diversity in more than one geographic context (i.e. tract and county minority share). As our work suggests, diversity has disparate effects on white threat perceptions depending on geographic scale, therefore we recommend that researchers should, wherever possible, incorporate more than one level of ethnic context.

Current practice also falls short when it comes to case selection. Just 36% of studies restricted their samples to native-born white respondents. While two-thirds of North American studies are restricted to native whites, this is true of just 41% of European single-country studies and 25% of European multi-country studies. Why is this problematic? As the proportion of minorities in a contextual unit rises, the likelihood that a respondent living in the unit is an ethnic minority increases. This dampens minority threat effects because minorities usually support immigration more than native whites. Though many studies not restricted to native whites include terms for ethnicity and nativity in their models, this approach only works if these individual attributes are interacted with ethnic context. Given that part of the field's aim is to understand white responses to immigration, and minority samples are in any case often too small to properly interrogate minority attitudes, results for native-born whites should be reported separately. Needless to say we find stronger effects – in the direction of both threat and contact - in native-born white samples.

5. Dependent variable

As stated at the outset, a major line of inquiry in the literature has been to test for the effect of ethnic diversity on threat perceptions, with studies often producing mixed results. A useful way forward is to ask, 'What are the characteristics of studies which find that more diversity predicts higher threat, and what are the features of studies that find the opposite to be true?' Our key dependent variable is *diversity threat*, the direction and strength of the diversity-threat association, which is derived from the coefficient reported in each model of our 171 papers. Source coefficients measure the relationship between an ethno-contextual independent variable (i.e. '% Latino', '% immigrants') and a threat outcome variable such as attitude to immigration on a 5-point Likert scale or whether one supports a populist right party. Naturally one could argue that attitudes to immigration or populist right voting are not a reflection of threat, but, first, we need a common label for the set of dependent variables used in this field. Second, many scholars find that threats, be they economic or identity-based, are key to explaining both phenomena (ie. Inglehart and Norris, 2017). Moreover, immigration attitudes are the most consistent predictor of populist right support (Werts et al., 2013) and, as will become evident, the indicators are similarly related to measures of diversity, the independent variable. The simplest formulation of the dependent variable is a dummy for a positive diversity-threat relationship (1) vs. a negative one, i.e. diversity reduces threat (0). This is based on the sign of the coefficient (+ or -) reported, regardless of statistical significance. A positive relationship signifies a threat response to diversity while a negative association suggests a positive contact effect.[1]

A simple positive-negative dependent variable cannot tell us why some studies find a *strongly* positive/negative diversity-threat relationship because it censors the full range of values. As a consequence, in a subsequent step we use the coefficient/standard error

[1] Note that we correct for question wording since questions on some surveys elicit opinion on the benefits of immigration and others on its drawbacks. So too for trust and cohesion questions. We also alter the direction of the observed relationship when context is measured as % native whites rather than % minorities. In some cases odds ratios are reported rather than coefficients: those below 1 are coded as negative relationships.

ratio (equivalent to t-statistic or, for aggregate studies with continuous dependent variables, z-score) to derive a standardized measure of weight of evidence, i.e. the importance of a particular variable in moderating the diversity-threat relationship.[2]

6. Independent variables

We code for the following variables: year of study; number of observations; whether the model contains a term for the economic deprivation/wealth of the contextual unit; multilevel analysis (i.e. whether the study contains ethno-contextual coefficients at more than one geographic level); aggregate or individual-level data (whether the dependent variable is an individual response or a district mean, such as the share of the vote for the populist radical right – 14 percent of our studies are ecological); dataset used; and attitude controls - whether the model includes attitudinal parameters such as ideology, authoritarianism or partisanship which are proximal to threat.

We also record the population size of the contextual units, recoded into 9 categories. These run from 1 for micro geographies such as residential blocks, containing fewer than 1000 people, to 9, for country. We use categories because the number of people per unit is not normally distributed, i.e. a small number of wards, counties or metropolitan areas are very large and many are quite small. Papers usually do not provide the modal population for the contextual units they use thus we do our best to approximate unit size from information in the article and external sources. These categories assume population ranges do not overlap, though we cannot rule out the possibility that a lower ranking unit (e.g. municipality) may have a larger population than a higher level unit (e.g. department). We also include a squared and cubed term for unit size to capture nonlinear effects at the lowest and highest geographic levels. If the relationship between diversity level and threat is a straight slope regardless of unit size, these terms will not be significant. However, if the relationship rises and falls as unit size increases, the coefficient of these variables will be significant and change their sign as we modify the areal unit.

In addition, we include dummy variables for papers that use longitudinal data; measure ethnic change rather than the overall level; contain a dependent variable referring to 'immigration' rather than 'immigrants'; and ask for opinion positively (i.e. 'do immigrants bring benefits?') or negatively ('do they bring costs'). We also code for studies reporting log odds, tobit or probit results as these coefficients are less easily compared to logistic or linear regression coefficients so have been assigned an approximate standardized effect based on statistical significance (± 1 for not significant, ± 2 for significance at $p < .05$, ± 3 for significance at $p < .01$, ± 5 for significance at $p < .01$). We try to avoid models containing interactions (i.e. diversity x authoritarianism or unemployment), but in 13 percent of papers, authors did not show models without them. In these instances, we use the coefficient for the main effect of diversity, but code this as part of a separate dummy for interaction sensitivity. We also record region, country, dataset and other variables, as listed in tables in Appendices 3 and 4.

7. Threat or contact: where does the preponderance lie?

Science is biased toward reporting statistically-significant findings (Easterbrook et al., 1991; Franco et al., 2014). In Appendix 5, we report the results of a 'funnel plot', commonly used in medicine and the sciences to test for bias towards positive results, and find no evidence of systematic bias. Funnel plots plot effect sizes against the number of observations. This is based on the notion that if studies with positive (or negative) results are over-reported, this will show up as a skew in the base of the funnel plot where the bulk of studies (low-N) are reported. We also begin by reporting ethno-contextual coefficients from studies of opposition to immigration/ support for the radical right, irrespective of whether they are statistically significant. Null results may be vital for providing a fuller picture of the phenomena under investigation.

With this in mind, 60% of 513 model coefficients report that diversity is positively associated with threat, 40% that it is negatively associated with it. Does this suggest, as Putnam (2007) did, that most research finds that ethnic diversity increases perceived threat? This is a matter of interpretation. The balance of tests leans in favour of the diversity-threat connection. However, just 158 of 513 (31%) coefficients show a statistically significant ($p < .05$) threat effect – 33% if the criteria are relaxed to include results significant at the $p < .1$ level. This means that most models do not report a statistically significant threat effect from contextual diversity.

There are, however, important reasons to believe that threat effects are larger than contact effects. One of the most robust and consistent findings in our data is that statistically-significant relationships between diversity and threat tend to be positive rather than negative. As noted above, almost 60% of ethno-contextual coefficients report diversity threat. When we restrict our purview to the 257 ethnic context coefficients which are statistically significant predictors of threat, the balance shifts from 60-40 to 71–29 in favour of threat enhancement over abatement. If one views null findings as noise, then Putnam's (2007) claims come closer to the mark. The take home message is clearly different if the reader considers that null findings refute Putnam's thesis.

The results reject a blanket version of the contact hypothesis - that is, one in which diversity at all geographic levels is expected to produce favourable public attitudes to immigration, immigrants and minorities. Yet we also reject a universal threat argument. Diversity *is* associated with reduced threat at certain geographic levels. Indeed, our main point is that both threat and contact theories are valid in their respective geographic spaces. Consequently, our next step is to undertake a more forensic analysis of how geography moderates the diversity-threat relationship. In the next section we show how threat and contact responses are sensitive to the size of the areal unit in which diversity is found, but not in a straightforward way. We deliberately refrain from setting out hypotheses,

[2] For the 14 odds ratio or probit studies, we assign a standardized coefficient of 2 for results at the $p < .05$ level, 3 for $p < .01$ and 5 for significance at the $p < .001$ level. Insignificant coefficients are assigned a zero.

preferring to allow regularities to emerge from the data.

8. Results

Recall that the analysis takes two forms: a logistic regression on a dependent dummy variable for whether a study test's coefficient reported threat decrease (0) or increase (1); and a linear regression on a dependent variable drawn from the standardized coefficient of a study test's reported diversity-threat association (from −8.7, a strong ‘contact’ effect, to +12.3, a strong threat effect). All can be interpreted as asking: which types of studies find threat effects and which report threat-reducing (likely due to contact) effects?

Appendix 2 reports the results of models including a full set of variables we coded for. Many variables we expected to play a significant role do not. These include the type of dependent variable (immigration attitudes, support for the populist radical right); year of study; as well as dummy variables for multilevel model and aggregate (ecological) analysis. Other parameters which failed to explain variation in the diversity-threat relationship between studies include: whether deprivation controls were used at the contextual level; the presence of attitudinal predictors at the individual level; the wording of the dependent variable (i.e. immigrants rather than immigration, positive versus negatively-worded questions); and subjective (versus objective) measures of diversity. This is surprising as including a term for contextual deprivation (i.e. unemployment rate) might be expected to weaken the coefficient for ethnic diversity (i.e. threat effects). Including attitudinal data on ideology or issue positions might also be expected to lessen the impact of diversity effects on threat compared to studies that do not include these. Outcome variables worded as opinion of ‘immigrants’ rather than the more impersonal ‘immigration’ also did not elicit significantly lower threat, contrary, again, to expectations. The total number of cases (N) similarly did not account for variation in threat/contact outcomes between studies. With 84 datasets used, many only once, multicollinearity made it difficult to assess the impact of dataset beyond those with larger numbers of associated articles. No major dataset (ESS, BES, GSS, CID, Eurobarometer) emerged as a significant predictor of threat or contact findings.

Critically, there was no significant difference in the diversity-threat relationship when threat was measured as support for anti-immigration populist radical right parties, anti-immigration attitudes or animosity toward outgroups. This lends credence to the arguments of those who view support for the populist radical right as being motivated principally by immigration rather than dissatisfaction with the economy or political system.

The only significant predictors were geographic unit size, ethnic change or longitudinal study, whether diversity and threat were significantly related and whether the reported coefficient was a main effect run alongside a cross-level interaction between ethnic context and an individual-level variable. Larger geographic unit size, ethnic change and a statistically significant diversity-threat association all predict that a model will find a positive diversity-threat association. The dummy for main effects in interactions is, by contrast, inversely correlated with threat. Main effects for ethnic context may be weakened or altered by being run alongside interactions, so in the next section we take care to run models with and without data from main effects.

The most striking finding, clear in all models in Table A2-1 in Appendix 2, is that when a diversity coefficient is significantly associated with threat, this is more often in the direction of increasing rather than reducing it. The predicted probability of a threat result, with other variables held at their mean, rises from 0.55 to 0.70 when a diversity coefficient moves from insignificance to significance at the $p < .05$ level. When run as a linear regression (on the standardized coefficient of the reported diversity-threat relationship), the size of the threat coefficient increases from. just above zero when a diversity coefficient is reported not significant to 1.31 when returned as significant at the $p < .05$ level. A standardized coefficient of 1.31 is approaching significance at the $p < .1$ level. This reinforces our earlier observation that *significant* diversity-threat relationships usually confirm threat rather than contact theory. Having said this, we shall see that the relationship is not linear: under certain conditions, greater diversity is associated with significantly lower white opposition to immigration or support for the populist right.

9. Size of unit

The key to our nonlinearity argument is unit size. As shown in Appendix 2, the size of the geographic unit in which contextual diversity is measured predicts a significant linear increase in the proportion of positive diversity-threat relations, i.e. a positive link between diversity and threat in larger units. But what if the relationship is nonlinear? Fig. 1 summarises the share of studies reporting a positive diversity-threat relationship for each category of contextual unit size. In Fig. 1, based on our dataset of 513 coefficients from 171 studies, a threat response is reported for 11 of 14 (79%) model coefficients when diversity is located in units of less than 1000 people. Net threat falls as units increase in size to those with populations of between 1000–5000 people. At slightly larger units of between 5000–10,000, higher levels of diversity predict *lower* threat perceptions 65% of the time. However, beyond units of 50,000, threat again dominates (53.8% of coefficients), peaking at units of 100,000–500,000 people before gently declining in the largest geographical unit, the country level.

The wave pattern, which algebraically takes the form of a cubic polynomial (a classic mathematical equation), becomes even more pronounced when we restrict our analysis to studies of native-born whites reporting statistically-significant findings. Fig. 2 presents the overall patterns in threat responses to diversity when the sample is restricted to native-born whites.

Across the 171 studies each ethno-contextual coefficient in each model is treated as a separate observation. For example, a study that presents five models, each of which tests for the effect of the percentage share of immigrants in a geographic unit, would yield ten coefficients, or ten rows of data out of the 513 in our dataset. If, alternatively, the percentage share of immigrants is tested at two geographic levels, i.e. tract and county, this would produce twenty coefficients. A small number of the papers we include do this, hence one of our articles furnishes 18 coefficients out of 513. A third of studies add 9 or more records to our data. At the other end of

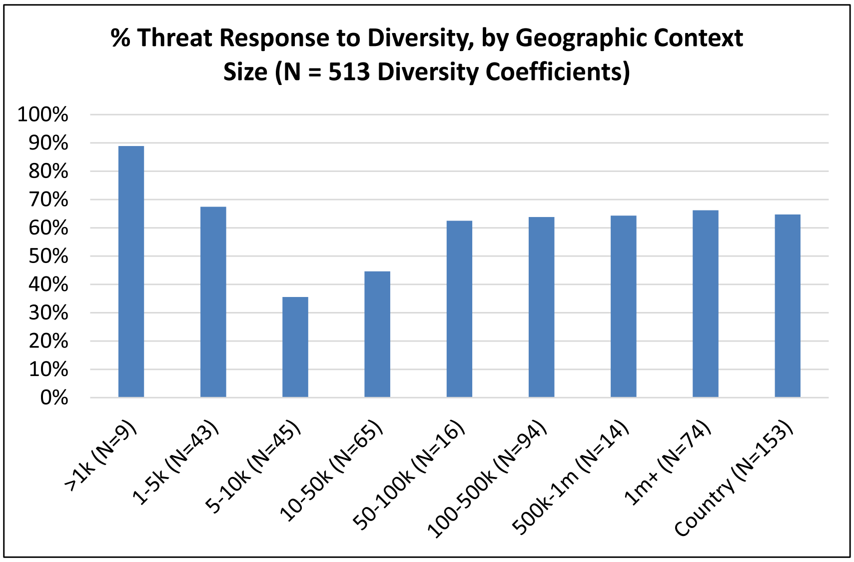

Fig. 1. Proportion of diversity coefficients reporting threat response, by geographic unit size.

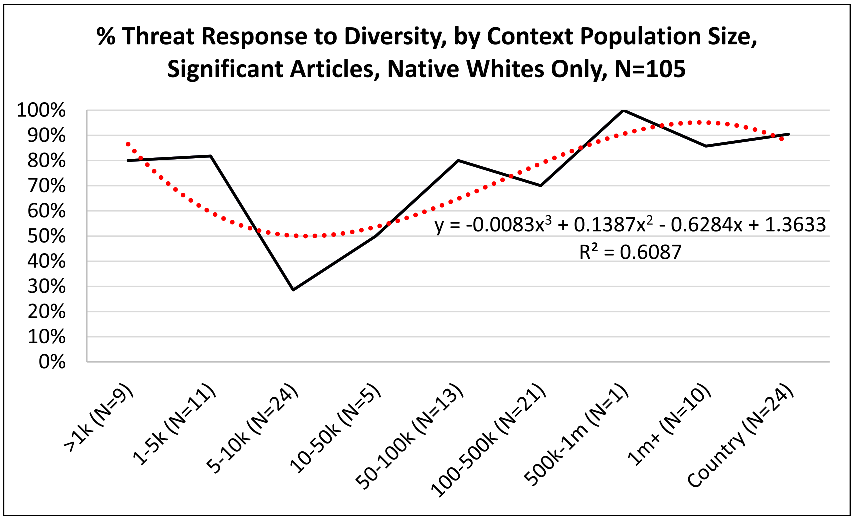

Fig. 2. Proportion of statistically significant diversity coefficients reporting threat response, by geographic unit size (native white respondents only).

the scale, half the papers contribute 4 or fewer ethnic context coefficients and 30 percent just 1 or 2. Since the number of coefficients per paper ranges from 1 to 18, we cluster on article. This ensures a maximum diversity of viewpoints across the discipline, in line with the wisdom of crowds concept. For illustrative purposes, we reproduce Figs. 1 and 2 in Appendix 6 using a frequency weight to accord each study equal representation.

In all these representations, a cubic function (with its distinctive wave pattern) is noticeable, as shown by the dotted line, a 3rd-order polynomial curve (of the form $y = a + bx + bx^2 + bx^3$) whose components we model shortly. In Appendix 6, Figures A6-2 to A6-4, we illustrate how model fit improves as one moves from a linear to a quadratic (squared, curve shape) to a cubic (third power, wave shape) model. Overall, threat effects predominate over contact effects, but when ethnic contexts fall within the lower-middle range (i.e. 5000–10,000 population), greater diversity is associated with reduced native white threat. For the 10,000–50,000 range, there is just as good a chance a study with a significant diversity coefficient will report a threat-abatement effect as a threat-enhancing relationship. One interpretation is that in this range there is an absence of both threat and contact, yielding a neutral result. The other view, however, which we incline towards, is that there is a heterogeneous effect, with diversity prompting contact in some cases and threat in others. In this manner, we believe contact theory is a plausible explanation for the decline in diversity threat observed in the lower-middle part of the geographic distribution.

10. Ethnic levels or ethnic change?

We now consider what happens when a linear term for the rate of ethnic *change* is included in a statistical model of diversity threat. The first point to note is that for native-born white data, of 21 statistically-significant ethnic context coefficients measuring ethnic *changes* rather than *levels*, fully 19 (90%) display a threat effect. Even if we include insignificant studies and relax the native white scope condition, 70% of 83 change coefficients signify diversity threat. In many models where *change* coefficients indicate diversity threat, at least some of the coefficients for minority *levels* are signed in the opposite direction, signifying a cross-cutting dynamic in which higher levels of diversity produce contact while change prompts threat (Havekes, 2014; Havekes et al., 2014; Kaufmann, 2017; Tolsma et al., 2008; Walker and Leitner, 2011). As our models will show, including a coefficient for ethnic change shifts the weight of evidence of studies in the lower middle range even more in the direction of a 'diversity reduces threat' interpretation. Note, for instance, that in 7 of 8 significant models in the lower-middle range – where we noted that higher levels of diversity predict lower threat - change is associated with threat. Future scholarship should, if possible, include a coefficient for both levels and changes to address this.

A final aspect to consider regarding levels and changes is the role of longitudinal data. Longitudinal studies in our dataset measure the effect of ethnic change on *changes* in threat. We noted above that 90% of 21 coefficients measuring the effect of ethnic changes on *levels* of threat show a positive relationship. In similar fashion, longitudinal studies measuring the effect of ethnic change on *changes* in threat find that 15 of 16 (94%) coefficients in the native white data report threat effects. Even if we expand our purview to include non-significant coefficients and relax the native white scope condition, fully 27 of 30 coefficients (90%) report a threat effect. Both ethnic change and longitudinal measures tap ethnic shifts over time rather than historic levels of ethnic diversity, and this *increase* in diversity is what seems most connected to opposition to immigration. For modelling purposes we combine ethnic change and longitudinal studies into a single dummy variable. Diversity levels are of course strongly tied to changes in diversity. Yet the two are not identical: longstanding native minorities may cluster in certain areas such as northern New Mexico while areas with little historic immigration may receive a sudden surge of newcomers, as in Boston, England, or in Hispanic 'new destinations' in the Southeastern United States (Frey, 2015).

Longitudinal data is also important because fixed-effects models filter time-invariant characteristics of geographic units. These play an outsized role in larger units such as nations, whose unique cultural values and historical institutions may be confounded with variables of interest such as diversity. For instance, the liberal political cultures of Canada and Sweden help explain both their levels of ethnic diversity and their citizens' relatively liberal attitudes to immigration. A cross-sectional model of the impact of national diversity on immigration attitudes blends the cross-cutting effects of political culture and diversity threat, obscuring underlying relationships. Ethnically diverse Sweden appears more accepting than ethnically homogeneous Japan but it is Swedish culture and history, not its diversity, which may be driving the relationship. By contrast, a model tracing how immigration attitudes change over time within a country as diversity increases is less subject to error. Comparing the diverse Sweden of today with its more homogeneous incarnation of twenty years ago is better than comparing it to homogeneous Japan (Gallego et al., 2016).

The lack of repeated measures in most large-scale surveys helps explain the relative paucity of longitudinal studies. A few longitudinal datasets measuring voting exist and some researchers have compiled pseudo-cohort or aggregate panel data.[3] Most are at country level as aggregating individual data into national panels is much more feasible than tracking diversity and threat perceptions over time within sub-national units. Indeed, with the exception of Lancee and Sarrasin's German micro-neighbourhood-level fixed effects model (using SOEP), all longitudinal studies we could find (29 coefficients) take country as the unit of analysis (Coenders et al., 2008; Hatton, 2014; Davis and Deole, 2015; Ziller, 2014). Regardless of unit size, when it comes to assessing the impact of diversity on threat, it is abundantly clear that more longitudinal work is needed.

11. Modelling diversity threat

Having eliminated most candidate variables from our dataset, we regress diversity-threat on the size of geographic unit and ethnic change. Standard errors are clustered on article. Recall the two forms of our dependent variable: a simplified version based on a dummy for threat enhancement (1) or reduction (0); and more detailed version taking the form of a standardized coefficient (-8.7 to $+12.3$). Table 1 displays a logistic regression of the threat dummy variable on the main predictor variables. Model 1 shows that geographic unit size (on a 1–9 scale) fails to reach significance as a predictor of whether a study model will show threat enhancement or reduction.

In Model 2, which adds a quadratic term for geographic unit size, geographic predictors remain not significant but the signs of the variables point in the expected (opposite) directions. In Model 3 we introduce a cubed (third power) term for geographic unit size. This increases model fit substantially. The three geographic terms are all significant at the $p < .01$ level and reflect the pattern shown in Figs. 1 and 2 and Appendix 6. Geographic unit size clearly moderates the diversity-threat relationship. Adding a parameter for ethnic change (ethnic change plus longitudinal studies) in Model 4 almost doubles model fit. Year fixed effects (model 5) have a similar impact.

We next proceed to examine the more detailed formulation of the dependent variable which permits more of the variation in the source coefficients to be expressed. In addition, we restrict our attention in Table 2 to significant ethno-contextual source coefficients and native-born white respondents. We repeat the strategy deployed in Table 1, and results show essentially the same pattern, albeit

[3] Longitudinal studies include Britain's BHPS/UKHLS and the German SOEP.

Table 1
Models of positive diversity- threat association (including insignificant coefficients).

	Model 1	Model 2	Model 3	Model 4	Model 5
Geographic Size	.074 (.049)	-.235 (.263)	−3.033** (1.041)	−3.152** (.747)	−2.822** (.948)
Geography squared		.027 (.023)	.606** (.206)	.636** (.208)	.558** (.191)
Geography cubed			-.035** (.013)	-.037** (.012)	-.032** (.012)
Ethnic Change				.906** (.275)	.911** (.275
Year Fixed Effects	N	N	N	N	Y
Constant	-.044 (.333)	.663 (.674)	4.438** (1.514)	4.427** (1.150)	2.970** (2.009)
N	513	513	513	513	513
Pseudo R2	.006	.010	.029	.051	.084

*p < .05; **p < .01; ***p < .001.

Table 2
Models of the Degree of Diversity-Threat Association (Significant coefficients, native-born whites only).

	Model 1	Model 2	Model 3	Model 4	Model 5
Geographic Size	.529** (.154)	-.582 (.642)	−5.203* (2.137)	−5.754** (1.999)	−7.666** (2.689)
Geography squared		.103 (.057)	1.109* (.440)	1.266** (.415)	1.728** (.557)
Geography cubed			-.063* (.027)	-.076** (.025)	-.106** (.034)
Ethnic Change				2.382** (.759)	2.448** (.907)
Year Fixed Effects	N	N	N	N	Y
Constant	−1.654 (.896)	.662 (1.589)	6.313* (2.992)	6.252** (2.798)	7.270* (3.458)
N	105	105	105	105	105
Pseudo R2	.136	.163	.202	.282	.401

*p < .05; **p < .01; ***p < .001.

with improved model fit. The model explains 40 percent of the variation in the direction and size of diversity-threat between studies, around 28 percent without fixed effects.

We thus find a very powerful, parsimonious model of the variables which moderate the diversity-threat relationship. It also speaks to our recommendation that studies include a model restricted to native-born whites. At the very least models should test a full set of cross-level interactions between ethnicity and contextual diversity using white × diversity interactions to be able to best compare with the literature. It should also be noted that the dummy variable for main effects in interactions, which is significant in Appendix 2, is no longer significant when we restrict the sample to native-born whites. In addition, the results in Table 2 are robust to excluding the 17 cases (of 105) where coefficients are from main effects of ethnic context in the presence of cross-level interactions.

12. Theoretical underpinnings of the diversity wave

The linear relationship between ethnic change and white threat accords with perspectives from political psychology which characterize change as a shock to people's cultural, economic or political security – especially their conservative members. Change is thus more likely to evince a threat response than ambient levels of diversity (Newman, 2013; Stenner, 2005). We have seen that the relationship between geographic size and diversity threat is not similarly linear but takes a cubic form, producing a characteristic wave with two inflection points, as the size of the areal unit increases. How can we best explain this ‘diversity wave’ function?

Neighbourhood minority share greatly increases the likelihood that whites will have minority friends: moving from a ward that has no ethnic diversity to one where minorities comprise a 50 percent share of the population more than doubles a White Briton's probability of having minority friends (ONS and Home Office, 2011). We believe this increases inter-ethnic contact, which is the proximate mechanism reducing opposition to immigration. The results of a meta-analysis of the inter-ethnic contact literature in psychology show near-universal positive effects of diversity on out-group attitudes at small scales (Pettigrew and Tropp, 2006). Our work helps explain why this does not contradict the perspective of writers such as Putnam (2007) who report a preponderance of diversity-threat in larger geographies.

What is occurring in large geographies? Here our findings are consistent with evidence from those who claim that larger geographical units such as counties, states or nations are where economic and political contestation takes place. By contrast, one is unlikely to perceive oneself as competing with a neighbour for jobs or political power (i.e. Ha, 2010: 30; Abrajano and Hajnal, 2015). The fact that the politics that counts is *not* local, and mass media operates more efficiently at larger economies of scale, means people pay more attention to city, state or national media than local news. In addition, larger units such as regions or nations figure more centrally for people's sense of ontological (existential) security than locales (Skey, 2011). Nations inculcate an emotional attachment to myths and symbols much more than locales do – to the point where people are willing to lay down their lives for the nation. People may move neighbourhood, but emigrate much less often. While local change may be unsettling, change at the national level might be perceived as an existential threat.

This distinction is captured in polling data in the United Kingdom where respondents who are relaxed about local immigration nevertheless express great concern about its effect on the nation. 51 percent of British respondents say immigration is a problem nationally but not locally while just 8 percent say the reverse. This holds almost as much for whites in diverse locales as homogeneous ones, so is not an artefact of most whites' non-diverse residential contexts. As a comparison, the local-national concern gap over crime, the next highest perception gap, is just two-thirds as large as for immigration (Duffy and Frere-Smith, 2014: 90–91). Likewise, the share of Americans who feel that immigration is changing the nation a lot is over twice as high as those who think it is changing their communities a lot (Cooper et al., 2016: 48).

While contact in local areas and threats to politics and identity in larger units are plausible explanations for the rising middle part of the curve (squared unit size), the negative relationship at the ends of the geographic scale (linear and cubed unit size) challenge conventional explanations. More research is needed at the micro-level, on geographical units of fewer than 1000 residents, and, using a longitudinal approach, on large-scale geographies of more than 500,000. Since we completed our analysis, a paper on diversity and social solidarity by Tolsma and van der Meer (2016) replicated Dinesen and Sonderskov's results for the Netherlands, providing further evidence in support of micro-threat.[4] One plausible albeit initial explanation, therefore, is that psychological discomfort explains micro-threat.

Our cubic model is, moreover, robust to excluding micro-scale studies. The reason is evident in Figs. 1–2 and Appendix 6, where the next level of geography - of 1000–5000 people - scores consistently higher in diversity threat than units of 5000–10,000 population. Both are represented by over 40 studies (1,000,000 data points) in our sample. This again suggests that micro-threat is operating. Note as well that it problematizes the view that selection effects - the 'white flight' of anti-immigration whites from diverse locales but not out of diverse wider geographies – explains why diversity threat is elevated in cities and regions but not neighbourhoods. All of which comports with evidence that anti-immigration and radical right-voting whites are only slightly more likely to move toward whiter neighbourhoods than liberal whites (Kaufmann and Harris, 2015).

But what explains the final curve in the cubic wave in the last column of Figs. 1–2? Specifically, how can we make sense of the dip in threat beyond units of approximately 1 million people? Here the most likely explanation concerns the unobserved characteristics which correlate with both threat and diversity in large units. Comparing diversity and immigration attitudes between Sweden and Greece is difficult because the particularity of these countries shapes both their diversity and attitudes toward immigration. This is also the case for regional 'nations' such as Quebec or Flanders, whose residents are somewhat more opposed to immigration than other Canadians or Belgians; or Scotland and Catalonia, where the reverse is true. This may be because some stateless nations are formed on an ethno-linguistic basis while others originally coalesced around political traditions (i.e. Brubaker, 1992); or due to regional nations adopting an opposing stance to that of the central government.

An analogous pattern obtains in other distinctive large jurisdictions (i.e. East Germany, New Mexico). We surmise that cities are less bound by this kind of particularity because power and national identity operate above the level of the city. The best method for addressing these unit effects is to use fixed effects models with longitudinal data, which controls for unspecified characteristics of units. In this vein, it is noticeable that virtually all country-level longitudinal coefficients in our dataset (27 of 30) report a positive relationship between diversity and threat, with over two-thirds (21/30) finding a significant positive effect.

To summarize: we posit three major influences on diversity threat: micro-threat, contact and macro-threat. These are represented as linear functions in Fig. 3. The curve of micro-threat (t) drops rapidly as the size of a diverse unit increases beyond block level while the contact line (c) declines more gradually because opportunities for whites to mix and make friends in local institutions such as schools, shops and churches remains high as one moves from a diverse block to a diverse neighbourhood. Micro-threats (t) exceed contact effects (c) until inflection point *a*, leading to falling net threat levels in the lower-middle range of the spatial scale. As we move beyond the neighbourhood, opportunities for contact decline while macro-threat (T) rises. Contact (c) predominates over micro- (t) and macro- (T) threats until inflection point *b* is reached, beyond which point macro threats (T) exceed contact effects (c). Increasing media attention, inter-ethnic competition for resources and power, and perceived challenges to the symbolic boundaries of salient identities come together to increase threat perceptions. The final curve in the cubic polynomial takes place at the highest geographies on the far right of the diagram, but we omit it from the diagram because we believe it occurs for methodological rather than substantive reasons.

13. How important are ethno-contextual effects?

We have established that ethnic change, and both micro- and macro-level diversity, predict a native white threat response while neighbourhood-level diversity seems to lower threat. But what is the magnitude of the effect on attitudes and voting behaviour? If small relative to other predictors, diversity carries fewer research or policy implications. While not our principal question, we can conduct a focused comparison of contextual diversity with two individual-level predictors, age and education, which are included in most studies of anti-immigration sentiment and populist right voting. We sample age and education coefficients across 11 papers (corresponding to 40 diversity coefficients) restricted to native white respondents. These correspond to the extreme points of the diversity wave as graphed in Figs. 1–2. The sample of papers used in this exercise is provided in Appendix 7.

Age and education coefficients are compared with mean weight of evidence scores for ethnic context in the corresponding geographic units. The mean for ethnic change is calculated using the entire dataset and compared to education and age effects across the 11 sampled papers. Results are presented in Fig. 4.

[4] There may therefore be a difference in diversity's micro effects between studies of solidarity (exit) and opposition to immigration (voice).

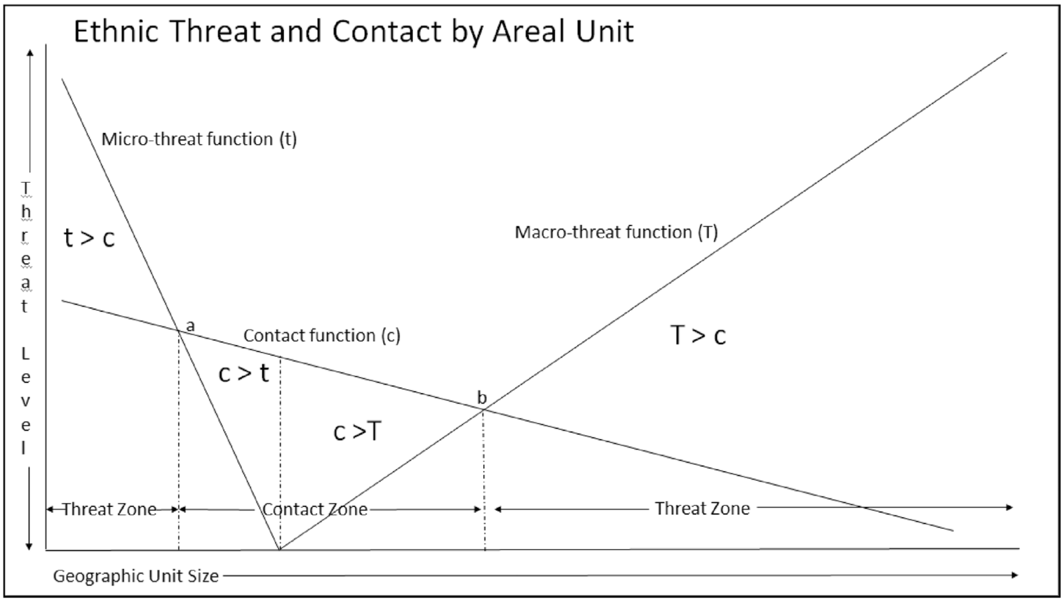

Fig. 3. Schematic model of balance between contact and threat effects at different levels of geography.

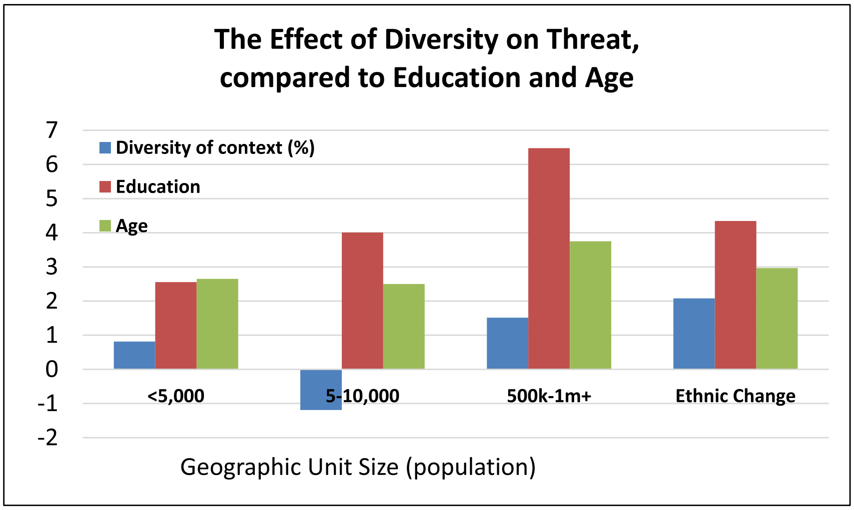

Fig. 4. Effect of diversity levels (or change) on threat, compared to age and education effects on threat, for different levels of geography.

These show, first of all, that education and age display standardized effects that are consistently above 2 (i.e. significant at the $p < .05$ level) at all geographic levels while among the diversity predictors this is only true for ethnic change.

Education has twice the predictive power of ethnic change and between 3 and 4.25 times the power of ethnic diversity level. For age, the difference is 1.4 times ethnic change and between 2.1 and 3.25 times more than the level of ethnic diversity. When only considering models in which diversity coefficients are statistically significant, the effect of ethnic context at the three levels comes close to parity with age (0.75, 1.02 and 1.03 times), and is approximately half as important (0.56, 0.61, 0.39) as education.

Age and education are the variables most consistently associated with opposition to immigration – in an inverse direction. For contextual diversity - especially ethnic change - to approach these predictors in effect size tells us its effects are important. To put this in further perspective, we can examine the median coefficient for proportion immigrants on models of threat in sub-national units of over 500,000 people. If we restrict our focus to papers finding significant contextual effects, we see that for the median result (Markaki, 2014), a one point increase in non-western immigrant share increases the probability a native-born white person will want non-western immigration reduced by 4.4 percent. If we include null results, the equivalent threat enhancement is an increase in probability of around 2 percent. For ethnic change at country level, the median coefficient (Hatton, 2014) shows that a one standard deviation increase in minority share shifts respondents in the direction of threat by 4.7 percent of a standard deviation on an anti-immigration scale. This is occurring each year. Should diversity continue to rise for two decades at a rate of 1 point per year, this would cause a shift in the direction of threat equivalent to nearly half the difference in opinion between the least (Sweden) and most

(Greece) anti-immigration nations in the European Social Survey.

14. Discussion

In this article, we present results from a meta-analysis of 171 articles encompassing over 500 coefficients and 4 million data points on the relationship between ethnic diversity and public attitudes toward immigration or electoral support for the populist radical right. We find support for both threat and contact theory, with each holding sway at a different geographic levels.

The preponderance of studies (over 70%) reporting significant results find that diversity increases opposition to immigration and electoral support for the anti-immigration populist radical right among native-born whites. However, our principal finding is that geographic scale moderates the relationship between diversity and threat, producing a cubic polynomial curve of diversity-threat. As the scale of geographical units increases, threat first declines, then, beyond units of 50,000 people, again begins to rise. As units exceed a population of around 1 million, perceptions of threat again begin to subside.

While further research is required, we posit three substantive drivers of the diversity-threat relationship that operate with varying degrees of force depending on the scale of analysis: micro-threat, contact and macro-threat. The balance between these processes alters as scale increases, which explains the first three sections of the cubic wave. By contrast, the decline in threat at the highest scale arises, we argue, from unspecified time-invariant characteristics of regions and nations. Accordingly, longitudinal work at national level, which does not suffer from this bias, uncovers an overwhelmingly positive relationship between diversity and threat. The vast majority of studies which examine ethnic change also find that increased diversity is associated with higher white threat perceptions. In our meta-analysis, we successfully fit this model to existing meta data on the diversity-solidarity relationship. Our work suggests there is a common underlying relationship between diversity and a range of national-level threat perceptions.

Finally, we make five recommendations for further work in the field. First, scholars should report separate results for native-born white samples or, at the very least, for interactions between diversity and ethnicity. Second, we urge researchers to simultaneously test for levels of, and changes in, diversity. Third, researchers should include two or more parameters for ethnic context, preferably one for units in the 5000–10,000 population range and one for units over 100,000. Fourth, more research is needed at the smallest and largest scales. Finally, in large contexts, more longitudinal work with fixed effects models is required to further assess one of the great questions of our time: whether rising levels of ethnic diversity will engender white backlash.

Our findings have important implications beyond academia. The literature we have meta-analyzed indicates that rising diversity – all else being equal - increases anti-immigration sentiment and support for the populist radical right among native-born whites in the West. It does so not only because immigrant-led diversity is growing, but because of local ethnic shifts powered by the dispersion of minorities beyond their zones of immigrant settlement. This occurs despite powerful evidence that an established presence of local minorities fosters inter-ethnic contact, reducing threat levels at the neighbourhood level.

Local contact is not, however, sufficient to shift national threat levels, perhaps because a large share of native-born white citizens have limited opportunities to experience positive contact due to ethnic residential segregation. For instance, in England and Wales in 2011, three-quarters of wards averaged just 6 percent non-white whereas over 33 percent of non-whites lived in the 4.7 percent of wards which are 'majority minority.' A policy implication is that integration initiatives such as Britain's National Citizen Service may make a difference for majority attitudes.

Education and age are more powerful predictors of attitudes to immigration than contextual diversity, and there is a possibility that more tolerant, better-educated cohorts will replace less tolerant ones. Yet it is far from certain that immigration opinion will liberalize in the same manner as attitudes to women or gays. First, longitudinal work suggests that people may become more conservative on immigration as they age (Duffy and Frere-Smith, 2014; Gallego et al., 2016). Second, population aging means that more people will cherish relatively homogeneous demographic memories.

Education, too, may reflect self-selection or sorting effects (see Janmaat and Keating, 2017), in which case rising aggregate education levels may have scant impact on attitudes (also Lancee and Sarrasin, 2015).

The prognosis in the long run may be different. Minorities could become better established across a wider ecological range, increasing positive contact with whites. Integration and intermarriage may dampen the pace of cultural change. New cohorts should grow up with higher levels of diversity, raising tolerance thresholds. While rapid immigration will probably continue to be associated with elevated threat, integrating forces may be moving in the opposite direction. This said, our meta-analysis suggests the politics of immigration in the West is likely to remain contentious for decades to come.

Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.ssresearch.2018.07.008.

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