Divergent Responses to Local Diversity: Outgroup differences and the impact of personality

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Research has shown that differences in personality can help explain attitudes towards immigration. Personality may also moderate the impact of local immigrant levels. Using attitudinal measures from the British Election Study, this research confirms the importance of all Big Five personality traits in predicting immigration attitudes in the UK and finds consistent evidence of an interaction between extraversion and local immigrant concentrations. In areas with high levels of immigrants, extraverted individuals are associated with more supportive immigration attitudes. Moreover, this study shows that the response to local immigrant levels varies by immigrant group. Levels of nonwhite immigrants and immigrants from predominantly Muslim countries are associated with greater levels of immigration hostility, whereas this is not the case for white immigrants or immigrants from Western and Eastern Europe. These findings demonstrate that an individual's response to local immigration levels depends on both their personality and the immigrant group in question.

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1. Introduction

Immigration has become central to many contemporary political debates, and anti-immigration parties and politicians have risen to prominence in many countries. The unprecedented UK vote to leave the European Union, for example, was largely fueled by fears over immigration (Clery et al., 2017). This growing salience of immigration may be a consequence of increased immigration levels, a backlash effect. How one responds to changes in immigration levels, however, is not uniform. Using data from the UK, I argue that the way one responds to rising numbers of immigrants in their local area will greatly depend on both their own personality, as well as the origin and race of the immigrants.

Personality, which shapes our behavior and emotions, is likely to impact how we respond to changes in our neighborhood and local area. It has been shown to influence our general political attitudes (Mondak, 2010) and more recently been found to predict prejudice and immigration attitudes (e.g., Akrami et al., 2011; Dinesen et al., 2016; Gallego and Pardos-Prado, 2014; Sibley and Duckitt, 2008). This should not be surprising, as we know that prejudice and immigration attitudes are linked to emotional reactions (Brader et al., 2008).

As the concentration of immigrants increases in a local area, there is an increased chance of contact between members of the majority community and immigrants. Contact theory (Allport, 1954) argues that these interactions, especially close ones, should reduce prejudice and hostility towards the minority group. Although Allport put a lot of emphasis on the quality of contact for it to be successful at alleviating prejudices, recent research indicates that even under less ideal conditions contact can have a positive effect. A meta-analysis of the large literature on this subject found that contact typically does reduce prejudice, and while close contact has a stronger effect, even impersonal contact can improve relations (Pettigrew and Tropp, 2006).

However, positive responses to contact are not a given, and some studies have found increases in prejudice and hostility from contact (e.g., Enos, 2014, Hopkins et al., 2014; Johnston et al., 2015; Quillian, 1995). As areas become more diverse, one's personality may begin to take up an even larger role in determining responses to these changes, as personality has been shown to impact friendships and contact networks (Harris and Vazire, 2016; Selden and Goodie, 2018). With more people from an immigrant background in one's local area, there are more opportunities for people to have contact with immigrants, but not all people are equally likely to strike up a conversation or begin a new friendship with people from other countries and cultures. Personality here seems likely to impact patterns of contact. When the opportunities for contact are greater, there may be more room for personality to exert influence.

But patterns of contact are only part of the equation. We cannot assume everyone would interpret or be affected by the same experiences in the same way. What one feels as threatening, might be exciting or enriching to another. This difference in response would be expected even in the absence of contact. This phenomenon can be seen in the authoritarianism literature. Early experimental research on authoritarianism indicated that individuals may be triggered by threats, displaying more intolerant attitudes (Feldman and Stenner, 1997). In real world settings, authoritarianism moderated the impact of ethnic change on perceived levels of cultural threat (Johnston et al., 2015), as well as moderated the effect of local diversity on prejudice, political intolerance, and immigration attitudes (Velez and Lavine, 2017).

Whether through contact patterns, or through different threat perceptions, research is beginning to find an interaction between immigration levels and Big Five personality traits (Ackermann and Ackermann, 2015; Ackermann, Ackermann and Freitag, 2018; Danckert et al., 2017). However, the interactions found in these studies differ. They differ in which traits were found

to moderate the impact of diversity and contact, as well as whether the traits became more or less powerful in diverse environments. Some of this may be due to differences in methodology, however it also indicates that context may play a large role in determining response patterns.

When considering distinct reactions to rising immigration numbers, personality is not the only variable to consider. Who the immigrants are should matter. This is not to blame or target any particular group, but to simply understand that we should not expect that individual responses to immigration would be the same for all immigrant groups. Research has shown that attitudes towards immigrants differ depending on the group (Brader et al., 2008; Dustmann and Preston, 2007; Ford et al., 2012; Hainmueller and Hangartner, 2013; Hainmueller and Hopkins, 2015). These attitudes are likely to influence contact patterns as well as reactions to immigration from those groups, even in the absence of contact. One's personality may serve to exaggerate or dampen the effects of these pre-existing beliefs.

Through analysis of personality and attitudinal measures from the British Election Study and UK government sources of local immigration data, this study helps us to disentangle some of these issues. This study begins by looking at the effect of total immigrant concentrations in one's local area, and then proceeds to break that down in two main ways. First, by comparing the effects of white and nonwhite immigrant concentrations, and second by comparing the effects of living near immigrants from three different origins: Western Europe, Eastern Europe, and predominantly Muslim countries. The racial category will collapse several different groups together, and so it can be seen as a rough measure. The benefit is that it is a simple and intuitive division which covers all immigrant groups. These groupings allow the study to look at how contact effects may vary depending on the kind of outgroup in question. When comparing immigrants from different regions, perceptions may be influenced by a number of factors, such

as ethnicity, religion, and many other cultural characteristics. This study cannot determine what is the ultimate source of any difference in how people respond to immigrants from these regions. The important thing here is to be able to compare the effects of immigration from groups which are viewed as having differing levels of threat.

This study contributes to the literature in three main ways. First, it confirms the importance of personality's association with immigration attitudes. Unlike other studies in this area, however, it finds the strongest predictors of immigration attitudes are openness and conscientiousness, reflecting the broader personality findings. Second, by modeling several immigrant groups together, it finds strong evidence that a distinction between immigrant groups is necessary. While the percent of white immigrants in one's local area is associated with more positive attitudes towards immigration, the percent of nonwhite immigrants is associated with more negative attitudes towards immigration. Similarly, only the concentration of immigrants from Muslim countries is associated with more negativity towards immigration, not immigrants from Western Europe or Eastern Europe. It is worth noting that these findings pertain only to individuals born outside of the UK. UK-born minority shares as well as the children of immigrants are excluded from this analysis. The relationships seen in this study may differ with individuals from those groups. Third, this study found consistent evidence of an interaction between extraversion and immigrant levels. As immigrant levels increase in one's local area, extraverted individuals are more associated with positivity towards immigration. This is noteworthy as extraversion has not been identified as a particularly relevant trait for political attitudes and in fact did not have a significant main effect towards immigration attitudes. Perhaps the impact of this trait only manifests in the presence of higher than average immigrant concentrations, where there is more opportunity for contact to take place. There are two limitations to note. First, as contact is not measured in this study, we cannot be sure of the

explanation. On this point, most studies on contact effects focus on a smaller geographical unit, such as a neighborhood. Local authorities are much larger areas, and therefore these findings, whatever may be driving them, may not extend to changes at a smaller geographical unit. Second, this study has not controlled for self-selection, either through instrumental variables, or time series analysis. However, previous research does not indicate that self-selection would be a major problem (Kaufmann and Harris, 2015).

The findings here are notable in two other respects. First, these interactions did not differ considerably depending on the immigrant group. Therefore, although the group did impact overall levels of acceptance, it seems irrelevant for the relationship with extraversion. Second, the lack of consistent interactions with the other traits provides evidence that the "triggering" we see with authoritarianism is not as strong as with Big Five traits.

2. Personality and immigration attitudes

This section will discuss both direct effects of personality on immigration attitudes, as well as how personality could interact with local immigration levels.

2.1 Direct effects

Personality can be thought of as our general patterns of thinking, behaving, and feeling, and can be seen as a precursor to political attitudes (Block and Block, 2006; Mondak, 2010). In the field of personality research, the Big Five is currently the major measurement construct for personality, used in the majority of psychological studies using personality (John et al., 2008). This measure is composed of five traits: openness (or openness to experience), conscientiousness, extraversion, agreeableness and neuroticism (also called emotional

stability). These traits are highly heritable (Bouchard, 2004) and quite stable throughout one's life, though they do continuously change as one ages (Caspi et al., 2005). There has been a growing literature on how these traits are associated with political attitudes generally (Gerber et al., 2011; Mondak, 2010; Mondak et al., 2010), as well as immigration attitudes (e.g., Ackermann, Ackermann and Freitag 2018; Dinesen et al., 2016; Gallego and Pardos-Prado, 2014), and levels of prejudice (Akrami et al., 2011; Sibley and Duckitt, 2008).

Openness describes how curious people are and how open they are to new experiences. A high level of openness has been the most consistent Big Five predictor of left-wing views overall (Gerber et al., 2011; Jost et al., 2009). Beyond that, it has been found to predict less-prejudicial views (Akrami et al., 2011; Sibley and Duckitt, 2008) as well as been associated with more tolerant and permissive views towards immigration (Ackermann and Ackermann, 2015; Ackermann, Ackermann and Freitag 2018; Dinesen et al., 2016; Freitag and Rapp, 2015; Gallego and Pardos-Prado, 2014; Ziller and Berning, 2019). Relatedly, it has been found to predict lower voting levels for a right-wing populist party (Ackermann, Zampieri and Freitag 2018).

Conscientiousness describes how rule-following and organized people are. A high level of conscientiousness is the most consistent Big Five predictor of right-wing views overall (Gerber et al., 2011; Jost et al., 2009). As it is associated with upholding tradition and national unity, it is not a big surprise that it has also been found associated with anti-immigration views (Ackermann and Ackermann, 2015; Ackermann, Ackermann and Freitag 2018; Dinesen et al., 2016; Gallego and Pardos-Prado, 2014; Ziller and Berning, 2019) as well as voting for a right-wing populist party (Ackermann, Zampieri and Freitag 2018). It has been found to weakly

predict prejudicial views, however that depends on the region of the world (Sibley and Duckitt, 2008).

Extraversion describes how socially outgoing an individual is. Research results regarding its impacts on general political attitudes are mixed, though there are indications it may weakly correlate with right-wing views (Gerber et al., 2011). It has not been found associated with prejudice (Sibley and Duckitt, 2008). However, it has been associated with anti-immigrant views (Freitag and Rapp, 2015) and voting for a right-wing populist party (Ackermann, Zampieri and Freitag 2018), although the majority of studies in this area did not find a significant effect related to immigration attitudes.

Agreeableness describes how friendly or empathetic an individual is. Although it is not a strong predictor of left- or right-wing views overall (e.g., Gerber et al., 2011; Mondak, 2010), it has been found to be associated with lower levels of prejudice (Akrami et al., 2011; Sibley and Duckitt, 2008), more supportive views towards immigration (Ackermann and Ackermann, 2015; Ackermann, Ackermann and Freitag 2018; Dinesen et al., 2016; Freitag and Rapp, 2015; Gallego and Pardos-Prado, 2014; Ziller and Berning, 2019) and less support to a right-wing populist party (Ackermann, Zampieri and Freitag 2018).

Neuroticism indicates how sensitive to negative emotions one is. Overall, it is not as strong a predictor of overall left- or right-wing views as openness or conscientiousness, but higher levels of neuroticism tend to predict left-wing economic views (Gerber et al., 2011), and the trait been associated with support for parties which provide “shelter against material or cultural challenges” (Schoen and Schumann, 2007, pp. 492). Like with conscientiousness, it has also been found to weakly correlate with prejudicial views, but only in some regions (Sibley and

Duckitt, 2008). It has also been found in at least one study to predict anti-immigration attitudes (Gallego and Pardos-Prado, 2014).

Beyond direct associations between personality and immigration attitudes, personality is especially relevant when it comes to examining the effect of immigration levels on attitudes towards immigration for two main reasons. First, the behavioral patterns associated with different personality traits will likely impact the quantity and quality of contact with immigrants. As areas become more diverse, there is greater opportunity for personality to influence one's own contact with immigrants. Second, personality may shape the reactions people have to rising levels of immigration. Even in the absence of contact, one's personality may impact how a changing neighborhood is felt and what political feelings that stirs up inside.

2.2 Driving patterns of behavior

Initial attempts to understand immigration attitudes focused on whether and to what extent these attitudes are determined by economic or cultural concerns (Hainmueller and Hopkins, 2014; Sides and Citrin, 2007; Sniderman et al., 2004). Research has made it clear that while both are relevant to voters (e.g., Hainmueller and Hopkins, 2015), cultural concerns seem to dominate in certain contexts (Card et al., 2012; Carey, 2002). Schneider (2008) argues that in Europe higher immigration levels do in general produce a backlash against immigration, and this is driven by cultural concerns and a fear of conflict over values, and not economic competition. This perceived conflict of values is likely connected to and strengthened by prejudice, which has also been associated with negative views towards immigration (e.g., Hainmueller and Hopkins, 2014).

Contact theory (Allport, 1954) argues that hostilities and prejudices between groups should decrease as contact, and especially close contact, occurs between members of those groups. Though it was not originally developed with immigration as its focus, if prejudices and cultural fears are behind much of the hostility towards immigration, contact between members of the majority population and immigrants should lessen those concerns. A large number of studies have now found that contact with immigrants is associated with less hostile attitudes (Ellison et al., 2011; Kokkonen et al., 2016; Laurence, 2014; McLaren, 2003; Savelkoul et al., 2011; Schlueter and Scheepers, 2010; Schneider, 2008). This is not necessarily causal, as one would expect those who are already less hostile to immigration would be more likely to befriend and associate with immigrants. However, Laurence (2014) shows that areas with more diversity have more interethnic ties, and both McLaren (2003) and Kokkonen et al. (2016) show an interaction between the percentage of immigrants in areas and contact. As immigration levels increase, attitudes diverge more and more between those who have immigrant contact and those who do not.

Although contact theory research has not focused on the role of personality, several traits are associated with behavioral patterns which ought to be relevant. Openness, extraversion, and agreeableness have been associated with larger friendship and contact networks (Harris and Vazire, 2016; ; Selden and Goodie, 2018; Zhu et al., 2013). Conscientiousness and neuroticism have not been found to be associated with network size, but neuroticism predicts instability in current friendships (Harris and Vazire, 2016) and may hinder friendship formation (Selden and Goodie, 2018). More critical to this research, openness has been associated with more interethnic friendships (Jackson and Poulsen, 2005; Laakasuo et al., 2017), as well as a more positive interpretation of those experiences (Jackson and Poulsen, 2005). Similarly, extraversion has been found to predict lower intergroup anxiety, through higher cross-group

contact levels (Turner et al., 2014). Agreeableness as well has been associated with lower intergroup anxiety (Turner et al., 2014), and more intergroup contact, with a more positive interpretation of those experiences (Jackson and Poulsen, 2005).

2.3 Context, perceived threat, and personality

When studying the effect of local immigration on immigration attitudes, it is likely necessary to distinguish between groups. Cultural concerns, in general, are amplified for more different groups (Brader et al., 2008; Dustmann and Preston 2007; Ford et al., 2012; Hainmueller and Hangartner, 2013; Hainmueller and Hopkins, 2015). Potential culture clashes are not viewed as equally likely with all immigrant populations, and specific groups have specific concerns or fears attached to them. This is likely to impact the main effect of immigration on attitudes, but also may interact with personality through the two pathways discussed above.

While different immigrant groups may be more or less likely to come into contact with the majority population, our personality traits and existing beliefs may also drive our responses to immigrants in the absence of contact. Gravelle (2016) found that the relationship between political party identification and attitudes towards illegal immigration was moderated by local levels of diversity, but not interpersonal contact. Karreth et al. (2015, pp. 1) found similarly that increasing visible diversity is "associated with negative attitudes towards immigrants, but only among natives on the political right". These findings may be due to the impact of existing beliefs and political preferences or an underlying predisposition aligned with political identification.

Authoritarianism, for example, has been found to moderate the impact of ethnic change as well as local diversity (Johnston et al., 2015; Velez and Lavine, 2017). As these relationships may be grounded in cultural threat, it is reasonable to believe there may be an interaction between immigrant group and authoritarianism. Indeed, Claassen and McLaren (2021) found experimental evidence that authoritarians are galvanized by cultural threats. They found that the impact of authoritarianism on opposition to immigration varied considerably depending on the origin of the immigrants, with "immigrants from Muslim societies being particularly likely to activate authoritarian predispositions" (ibid, pp. 677). Peresman et al. (2021) found additional evidence that authoritarianism is associated with opposition to immigration among groups which may be perceived as culturally distant.

Authoritarianism, similar to the Big Five, has been found associated with levels of prejudice (Sibley and Duckitt, 2008). Both openness and conscientiousness correlate with authoritarianism, and the association between openness and prejudice was, according to this analysis, largely mediated by authoritarianism (ibid). Big five personality traits may operate similarly to authoritarianism. Certain individuals may be predisposed to be triggered by immigrants of certain groups which they find threatening. This would indicate an interaction between personality traits and the presence of specific immigrant groups. Due to their personality, some individuals may become much more hostile towards immigration due to the presence of certain immigrant groups and not others – depending on how much those groups cause the individuals to feel threatened.

However, there is reason to believe that sometimes an opposite process could take place. Although authoritarian individuals may be predisposed to be triggered by groups perceived to be culturally threatening, an opposing dynamic has also been found in non-experimental

studies. Hetherington and Weiler (2009) as well as Hetherington and Suhay (2011) found that under threat, it is typically nonauthoritarians whose views change, moving closer to the baseline authoritarian positions. One could also imagine an additional scenario, that immigrant contact could serve to relax the positions of those most critical of immigration, while leaving unchanged the views of those already supportive of immigration.

It is possible something like this happened in Ackermann and Ackermann (2015) and Ackermann et al. (2018). These two studies from Switzerland found that perceived neighborhood diversity moderated the effect of conscientiousness on immigration attitudes. However, conscientiousness only predicted hostile attitudes in *less* diverse areas. In *more* diverse areas the negative association disappeared. This is the opposite of what they predicted, but could be explained through the two mechanisms discussed above.

Other interactions have also been found with openness and agreeableness. Openness interacted with immigrant contact and subjective neighborhood diversity, increasing the effect of openness in those conditions (Danckert et al., 2017), and in more diverse areas the positive association between agreeableness and immigration attitudes increased (Ackermann, Ackermann and Freitag, 2018). In both of these cases it is unclear if it is more open and more agreeable individuals becoming even more accepting, or if less open and less agreeable individuals are being triggered by the increased diversity.

As the effect of local immigration levels on immigration attitudes is likely related to how threatening the group is perceived to be, it makes sense to look at the interaction between personality and individual immigrant groups. If some people are predisposed to be triggered by cultural threats, would we expect all groups to trigger them equally? The mixed results in

previous research in this area may be because all immigrant groups were being clumped together. It is possible that by disaggregating immigrant categories, this effect can be seen more clearly with immigrant groups perceived to be more threatening. Additionally, by disaggregating the immigrant category, we may get a better sense of what kind of dynamic is occurring when we see an interaction.

To carry out this kind of analysis, I first compare white and nonwhite immigrants. I additionally distinguish between three immigrant groups. First, Western European immigrants, who are arguably culturally similar and likely not viewed with much concern. Second, Eastern European immigrants, a group which arrived recently to the UK, and has been a great source of low-skilled labor in the country – serving as an economic competitor to many Britons. Finally, immigrants from predominantly Muslim countries. They were chosen as the third group because Muslims may be viewed with concern in the UK. A 2017 survey in the UK found that 52 percent of respondents agreed that "Islam poses a serious threat to Western civilisation", 42 percent were more suspicious of Muslims as a result of recent terror attacks, and only 10 percent believed that Muslims were similar to themselves (HOPE not Hate, n.d.). Those results, though about Muslims as a religious group, accord with Peresman et al. (2021), which finds that respondents in the UK are more negative towards immigrants from Muslim countries, relative to European immigrants.

2.4 Putting it all together

We can be confident in predictions about direct effects of personality traits. In line with previous research, we can expect openness and agreeableness to be associated with positive attitudes towards immigration, and conscientiousness and neuroticism to be associated with

negative attitudes. The mixed results for extraversion and lack of consistent associations between extraversion and political attitudes more generally lead to no firm expectations for a direct effect. As immigration attitudes are greatly influenced by cultural concerns, we can also be confident that immigration from groups perceived to be more culturally distant or threatening will be associated with greater hostility.

We can be less confident about interactions between immigration levels and personality traits. Results in the literature have been mixed, and previous studies in this area have not separated groups, as I am doing here. Openness, extraversion, and agreeableness could be implicated in contact effects, due to the relationships these traits have with relevant measures of contact and friendship networks. For interactions based around individual reactions to diversity, similar to those seen for authoritarianism, prediction is harder. All the traits which display a direct relationship with immigration attitudes are candidates for an interaction. Moreover, interactions where the trait's effect is exaggerated and those where the effect is attenuated are plausible. Therefore, this examination is exploratory in nature. While informative, the interactions found in previous Big Five immigration research may not be the best guide for what to expect now, as the literature is small and the findings have been mixed. Additionally, interactions may be quite sensitive to the number of observations, the modeling strategy, as well as the local context. When it comes to which immigrant groups will display interactions with personality traits, this too is exploratory. That said, if interactions differ considerably between groups perceived as more or less threatening, this would further justify breaking down the effects of immigration by group in future research.

3. Research Design

In order to investigate these issues, I combined several data sources. For data on political attitudes, as well as personality, I used Wave 1 (version 5.0) of the internet panel of the British Election Study (Fieldhouse et al., 2014). This dataset contains information about the respondents' local authority, which allowed me to merge it with data concerning these local authorities. Wave 1 was used as it was closest in time to the latest census, which provides the most accurate data on immigrant distributions. Immigration data come from the 2001 and 2011 censuses for England and Wales, and for Scotland (National Records of Scotland, 2020a, 2020b, 2022a, 2022b; Office for National Statistics, 2020a, 2020b, 2022a, 2022b).[2] For the analysis, Western European immigrants are those who come from countries which were members of the EU prior to 2001, Eastern European immigrants come from countries which joined the EU between 2001 and 2011, and immigrants from predominantly Muslim countries are those who came from the Middle East, North Africa, Pakistan and Bangladesh.[3] Individuals born in the UK to immigrant parents are not counted as immigrants in this analysis.

Additionally, it is necessary to control for local factors which may correlate with both immigration attitudes and immigrant levels. Unfortunately, there is no agreed upon standard for what should be controlled for. I used two economic measures, as an economic deprivation has been argued to lead to immigration hostility (Hainmueller and Hopkins, 2014). I have used UK government estimates of unemployment for these local areas averaged over the year 2014 (Office for National Statistics, 2019) as well as estimates of the local areas' median weekly

[2] In order to maintain confidentiality, the small, random adjustments were made in the UK censuses. The effect of this is that it introduces extra noise into the analysis.

[3] There might be slight discrepancies in which countries are included in the Eastern European category between 2001 and 2011. This is unlikely to impact results in any large way – and the main results are solely for the 2011 percentages.

(employment) pay for 2014 from the Annual Survey of Homes and Earnings (Office for National Statistics, 2022c). From the census' I also used the total populations for the local areas. Finally, as education is a strong predictor of individual immigration attitudes (Hainmueller and Hopkins, 2014), I included the percent in each local area with level 4 qualifications or higher (e.g., a university degree or higher), taken from the 2011 censuses as well (Office for National Statistics, 2022d).

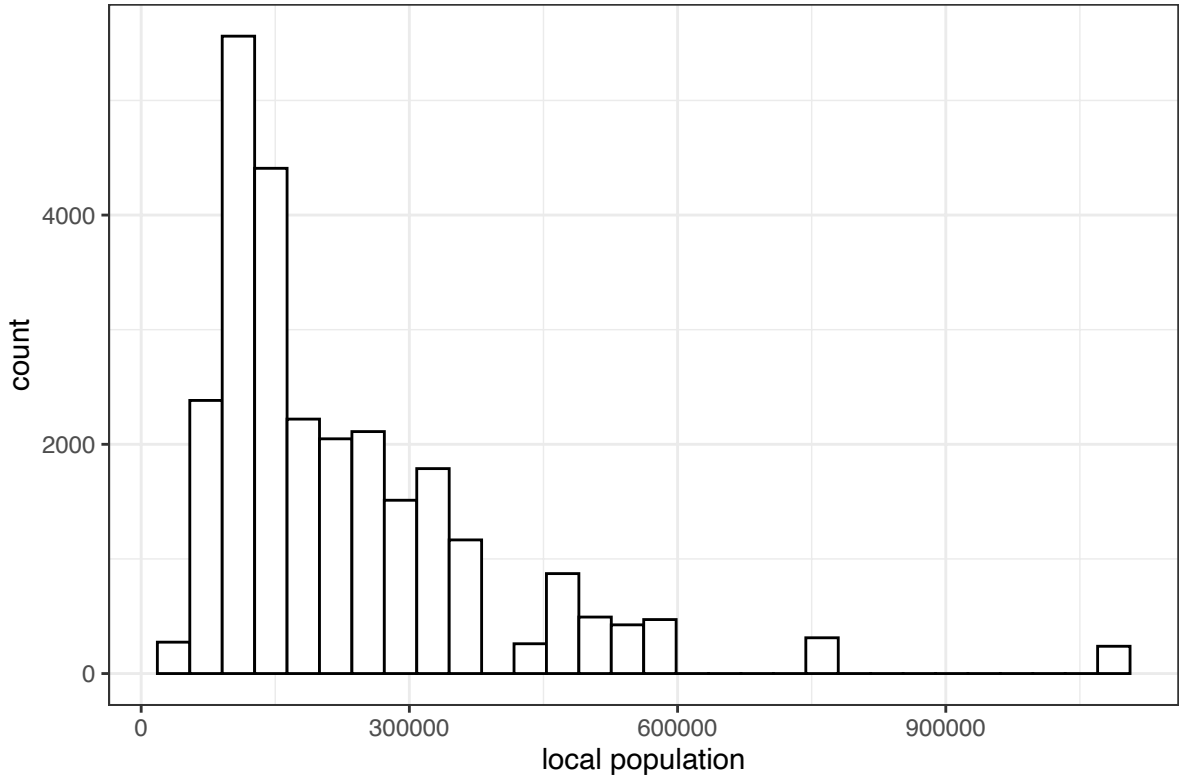
Table 1: Correlation matrix of immigrant population variables (regional)

Variables	(1)	(2)	(3)	(4)	(5)	(6)
(1) Western European Percent	1.00					
(2) Eastern European Percent	0.53	1.00				
(3) Muslim Country Percent	0.45	0.49	1.00			
(4)Western European Change	**0.85**	0.48	0.48	1.00		
(5) Eastern European Change	0.32	**0.93**	0.39	0.30	1.00	
(6) Muslim Country Change	0.04	0.20	**0.63**	0.02	0.27	1.00

Notes: Change represents percentage point change from 2001 to 2011. Correlations between percent and change measures for the same immigrant group are bolded. For space concerns, only regional variables shown here.

I used immigration data from 2001 in order to calculate the percentage point changes in each local authority for each immigrant group. This is because there may be a different effect of immigration change as there is for total immigrant shares (see, e.g., Kaufmann, 2017). As can be seen in Table 1, the correlations between the change variables and the percent variables for each origin group are quite high, indicating very similar relationships with the variables of interest. Indeed, that was what was found – for these regional origin categories, as well as the other categories not shown in Table 1. For purposes of simplicity, only the analysis for the immigration percent variables will be shown below. See the appendix for main results for the immigration change variables.

Figure 1: Histogram of sizes of local areas, by respondent count



In Figure 1 we can see a histogram of the population sizes for the different local areas in the dataset. As we can see, most of the respondents live in areas quite large in population. Unfortunately, I am not able to measure the diversity in the respondents' neighborhoods. Previous research indicates that at the scale being measured here, greater diversity is associated with greater perceived threat outcomes, such as opposition to immigration (Kaufmann and Goodwin, 2018). They find at the level of a neighborhood, in contrast, greater diversity is associated with lowered threat perceptions. This may be due to the likelihood of contact taking place. It is possible many of the respondents live in diverse neighborhoods, however, that is not being measured here. The data used here is also not longitudinal, so we cannot be sure the extent that selection effects impact our results. However, previous research in the UK indicates there has been only limited "white flight" selection effects (Kaufmann and Harris, 2015).

Table 2 shows summary statistics for the different immigrant measures. While the mean percent for total immigrants is over 10 percent, the values drop considerably for the specific regional origins. These are all low, between 1 and 2 percent. However, the maximum values are significantly higher, reaching up to 16 percent, indicating a long tail in values. If we look to the white and nonwhite groups, as well as the total immigrant category, we see that some local areas have very large immigrant percentages. As this study focuses on how individuals of the majority population respond to living in areas with varying levels of non-UK born residents, I am restricting the sample to only those who are UK citizens and who answered that their ethnicity was "White, British".

Table 2: Summary statistics for immigrant population variables

Variables	Mean	SD	Min	Max
Total Immigrant Percent	10.83	9.83	2.15	55.08
White Immigrant Percent	5.47	3.98	1.32	32.76
Nonwhite Immigrant Percent	5.36	6.67	0.46	42.01
Western European Percent	1.44	1.27	0.33	14.52
Eastern European Percent	1.75	1.47	0.20	10.58
Muslim Country Percent	1.44	2.05	0.06	17.01

Notes: Observations omitted when NAs present for key variables in base models. N = 18,301.

The outcome variable I am using, *Immigration Attitudes* is the mean of the *Economic Effects* and *Cultural Effects* variables. These questions ask the respondents: "*Do you think immigration is good or bad for Britain's economy?*" and "*And do you think that immigration undermines or enriches Britain's cultural life?*", respectively. While the sources of immigration concern may vary, it seems that the respondents largely see the effects as being the same or highly similar, as these two variables are highly correlated ($r = 0.80$).

Measures of personality are based on responses to the Ten-Item Personality Inventory (TIPI) (Gosling et al., 2003). Shown in the appendix, correlations indicate the traits are not highly correlated with each other. The highest correlation is between conscientiousness and neuroticism at $r = -0.34$. The correlation between the two most politically relevant traits, openness and conscientiousness is low ($r = 0.08$). None of these correlations are therefore perceived to be problematic for the analysis. The correlations between personality traits and immigrant group percentages are very low, but not zero. The largest is between openness and Western European immigrants $(r = 0.05)$. It is likely that personality influences where people choose to live, and due to its relationships with income and employment status, it will indirectly influence what options are available. I believe these correlations are sufficiently low, however, to avoid serious theoretical problems for the analysis. That these correlations do exist, may indicate the possibility of a small selection effect, however.

Demographic controls are used in the analysis: sex, age, a measure of education, and personal income. Possible mediators are also used in the analysis. This includes self-reported left-right placement, as well as dummy variables for the major political parties. Local area-level covariates for unemployment level, median pay, education level, and population size are also used, as discussed above. The analysis was conducted using OLS multilevel regressions, with random intercepts varying by local area. To compare effect sizes within the analyses, the independent variables have been min-max transformed so that 0 represents the lowest value and 1 the highest. In order to make the results more comprehensible, predicted values are plotted to visualize the important relationships.

4. Results

In this section I will focus first on results for direct relationships before moving onto interactions.

4.1 Direct relationships

The major results for all immigration categories are summarized in Table 3. For reasons of space, values for demographic, political, and area-level variables are excluded from the table. However, I will discuss them here, and the full tables are in the appendix.

In terms of demographic control variables, some findings should be noted. As has been found previously, age is found to predict hostility towards immigration in all models, while both higher levels of education and income were found to predict less hostile immigration attitudes, with education having a stronger effect. In all cases, the effect size of education decreases slightly after the inclusion of political covariates, however the effect size of income increases. Additionally, men were predicted to be slightly less hostile to immigration, however, this was only significant in models which included political covariates.

Local area level variables are also noteworthy. A greater population is for all models associated with less hostile attitudes, although this fails to reach statistical significance. Of the economic covariates, higher unemployment levels predict less hostile attitudes, but only when not controlling for political covariates. Similarly, median pay is associated with more hostile attitudes, also only when not controlling for political covariates. The largest impact comes from

the percent of the local population which is highly qualified. For all models this is highly significant and strongly associated with less hostile attitudes.

All personality traits, aside from extraversion, were found to predict immigration attitudes, and in precisely the directions expected. The strongest effects were with openness and conscientiousness. In models without political covariates, the effect sizes of these two traits were approximately two thirds the size of the education variable. Including political covariates reduces the coefficients for all three variables, but relatively more for the two personality traits. In this case, they are slightly more than half the effect size of education. This is notable, given the weight put on education as a predictor of immigration attitudes (Hainmueller and Hopkins, 2014). We find here that agreeableness predicts support for immigration, while neuroticism hostility, as expected. However, the effect of agreeableness becomes insignificant when political variables are included in the models. This is somewhat surprising, given the trait had been consistently identified as a predictor of lower levels of prejudice and support for immigration (e.g., Ackermann and Ackermann, 2015; Ackermann, Ackermann and Freitag 2018; Akrami et al., 2011; Dinesen et al., 2016; Sibley and Duckitt, 2008), despite not playing a prominent role in left-right ideology (e.g., Gerber et al., 2011; Mondak, 2010). Aside from neuroticism, the effect sizes of all personality variables shrink in the presence of these party and political covariates. This indicates part of their effects may be mediated by ideology and party preference – and in the case of agreeableness, completely so. That neuroticism does not have this effect indicates that its relationships with immigration attitudes may run counter to its relationships with left-right placement or party preference. That would accord with previous findings that neuroticism is associated with left-wing economic ideology *and* hostility towards immigration (Gallego and Pardos-Prado, 2014; Gerber et al., 2011).

Table 3: Linear mixed models

	All	All	Race	Race	Region	Region
Openness	-0.99***	-0.59***	-0.99***	-0.59***	-0.98***	-0.59***
Conscientiousness	0.98***	0.66***	0.99***	0.66***	0.98***	0.66***
Extraversion	0.10	-0.01	0.10	-0.01	0.10	-0.01
Agreeableness	-040***	-0.05	-040***	-0.05	-039***	-0.05
Neuroticism	0.31***	0.41***	0.31***	0.41***	0.31***	0.41***
Total Immigrant Percent	0.03	-0.11				
White Immigrant Percent			-0.60*	-0.62**		
Nonwhite Immigrant Percent			0.38*	0.23		
Western European Percent					-0.56	-0.62*
Eastern European Percent					-0.21	-0.20
Muslim Country Percent					0.74***	0.51**
Individual demographics	✓	✓	✓	✓	✓	✓
Political covariates		✓		✓		✓
Area controls	✓	✓	✓	✓	✓	✓
Observations	15,431	15,431	15,431	15,431	15,431	15,431
Groups (Local Areas)	374	374	374	374	374	374
Log Likelihood	-30,017.42	-28,609.04	-30,014.60	-28,606.14	-30,010.99	-28,604.10
Akaike Inf. Crit.	60,068.84	57,264.09	60,065.21	57,260.27	60,059.98	57,258.20
R Squared (fixed)	0.15	0.29	0.15	0.29	0.15	0.29
SD of Random Effects:						
Local Area (intercept)	0.21	0.16	0.20	0.15	0.19	0.15
Residual	1.68	1.54	1.68	1.54	1.68	1.54

Notes: *p<0.05; **p<0.01; ***p<0.001. All continuous IVs standardized to be on 0 - 1, min-max scale. Higher values in the dependent variable indicate greater hostility. In order to better compare the results between the models, participants were dropped models if they did not respond to the political questions. Exact demographics, political covariates and area controls used are described in the research design section.

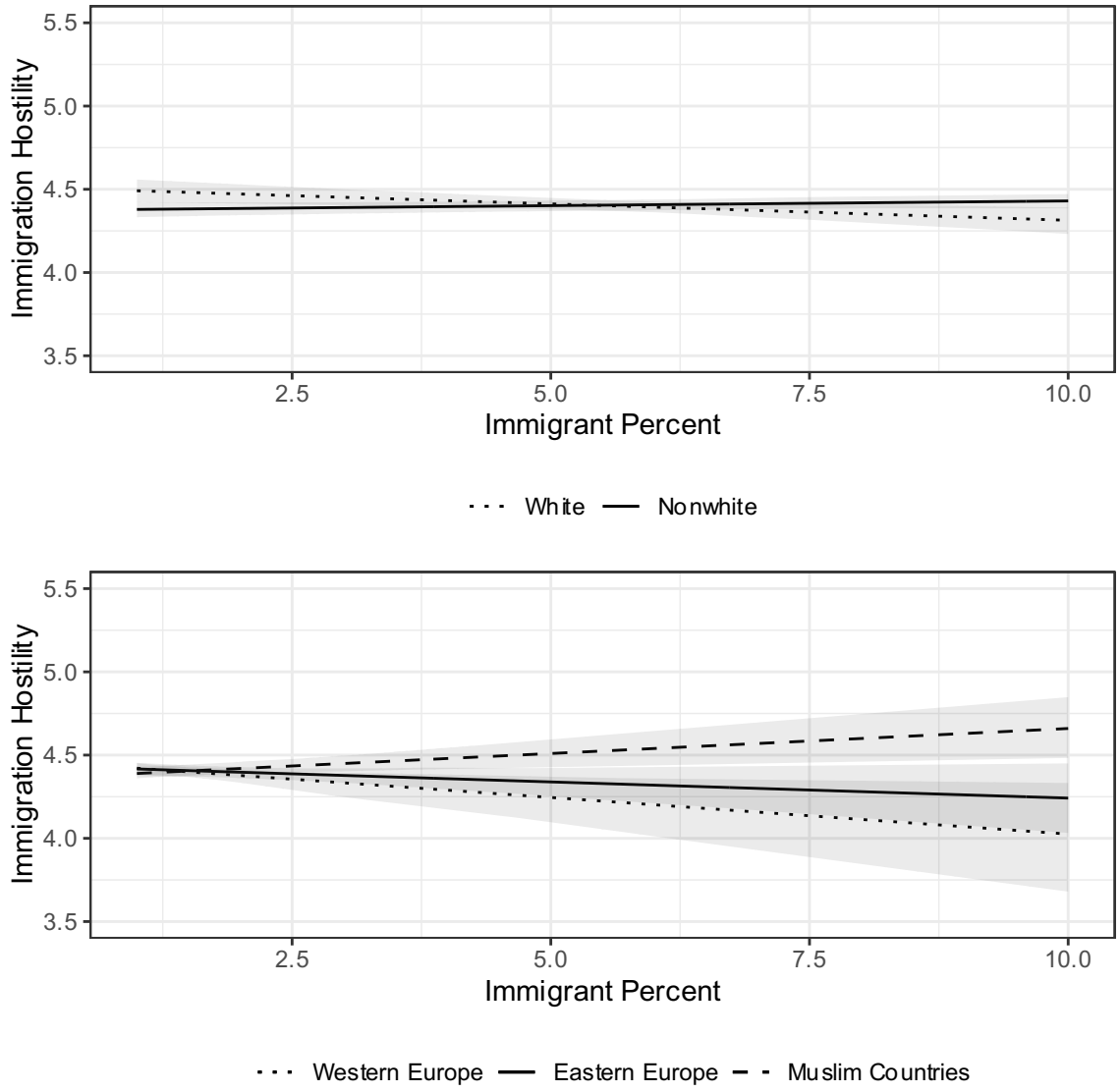
The findings for the immigration variables are noteworthy. When looking at total immigration, there is no significant effect on attitudes. Only by focusing on particular groups can we see an impact. When looking at white vs. nonwhite immigration, we see that white immigrant levels are associated with more supportive attitudes towards immigration, while the opposite is the case for nonwhite immigrant levels. However, in the latter case, this only reaches statistical significance in the absence of political covariates. When looking at immigrants from different origin regions, we see that both Western European and Eastern European immigrant levels are associated with less hostility towards immigration, but only for Western European immigration, and only when controlling for political covariates, is the relationship significant. The strongest and most significant relationships are with immigration from predominantly Muslim countries. Here we see a clear signal that this form of immigration predicts greater hostility towards immigration.

In all cases we see a better model fit for models including political covariates, according to both the log likelihood and Akaike information criterion. We also see that using more granular immigration measures (i.e. region instead of race, or race instead of total immigration levels) improves the model fit slightly, according to both measures. I have also displayed the r-squared for the models, however for the sake of simplicity, I have included just the variance explained by the fixed effects. The increase in explained variance due to the random intercept is minimal and does not impact model comparisons. We can see that models without political covariates explain about 15% of the variance, while including these covariates nearly doubles the explained variance.

Figure 2 depicts predicted levels of hostility for racial and regional immigration categories. 10% was chosen as the maximum value in order to not exceed what is found in the data. While

1% as a minimum is below what is found in the data for white immigrants, the difference is not substantial and increasing the minimum much higher would not reflect the lower levels seen for the regional categories. These results are estimates based on regressions and not descriptive statistics. It is worth noting that the impact of immigration from the regional categories is much greater than the racial ones, however, these have much more uncertainty as there is far fewer observations at the greater levels. Therefore, we should be quite tentative when it comes to the magnitude of these effects. It is also worth noting that the effect sizes are sensitive to issues of model specification. Specifically, if these models were to exclude the highly-qualified area-level covariate, the effect sizes for white immigrants and Western European immigrants both increase substantially. This sensitivity may help explain some differing results in the literature.

Figure 2: Predicted immigration attitude levels by group population share



Notes: Predicted values estimated from multilevel linear model, with bootstrap confidence intervals. Specifically, this represents the full race and region models presented above in Table 3, without the immigration levels min-max transformed. Immigration attitude scale runs from 1 to 7. Values above 4 represent hostility, while values below 4 represent support.

This finding supports the expectation that white British citizens react differently to different groups of immigrants, with groups perceived to be more different or more culturally distant from the majority population provoking more hostile responses. This is important nuance. When predicting the effects of neighborhood diversity on immigration attitudes, simply

looking at the total number of immigrants is likely to be misleading. It is essential to disentangle the groups and measure them separately, in order to understand their effects.

4.2 Interactions

In order to establish whether immigrant presence moderates the effects of personality traits, I added interaction effects to the models presented in Table 3. I re-ran the models with an individual interaction between one of the personality traits and one of the immigrant group variables. Thus, for each personality trait, twelve separate models were constructed, each with one interaction. The purpose of this was to look for consistent patterns, both in terms of significance, as well as direction of effect. There could be a difference in how individuals respond to the different immigrant groups, however, to trust any differences found in immigrant group interactions, they should form a sensible pattern. These interactions are at the local authority level and not the neighborhood level, which is the case for most studies on contact effects. Therefore, these findings may not apply to smaller scales, and may not represent the effect of contact.

Table 4: Interactions

	Open.	Consc.	Extra.	Agree.	Neuro.
Without Political Covariates - (N = 18301)					
Total immig. %	-0.95*	0.03	-0.82**	0.41	-0.13
White immig. %	-1.18*	0.31	-0.85	0.40	-0.11
Nonwhite immig. %	-1.02*	-0.09	-0.97**	0.50	-0.18
Western Europe %	-1.53	0.81	-0.78	0.75	-0.02
Eastern Europe %	-0.97	-0.38	-1.08**	0.38	-0.37
Muslim country %	-0.95	-0.13	-0.98*	0.46	0.07
With Political Covariates - (N = 15431)					
Total immig. %	-0.70	0.15	-0.92**	0.29	-0.11
White immig. %	-0.58	0.27	-1.02*	0.21	-0.14
Nonwhite immig. %	-0.86*	0.13	-1.07**	0.39	-0.14
Western Europe %	-0.46	0.69	-1.28*	0.46	-0.01
Eastern Europe %	-1.04*	-0.22	-1.12**	0.18	-0.35
Muslim country %	-0.80	-0.06	-1.16**	0.55	0.09

Notes: *p<0.05; **p<0.01; ***p<0.001. All continuous IVs standardized to be on 0 - 1, min-max scale. All are multilevel linear models, including other covariates as seen in Table 3. Unlike in Table 3, to maximize power, participants were not dropped from the first set of models.

Table 4 shows the results of these interactions. First it is important to note what I did not find. For conscientiousness, agreeableness, and neuroticism there are no significant results. The two traits which do show evidence of interaction effects are openness and extraversion. Openness and extraversion were highlighted as strong contenders for interactions. Openness is a likely predictor for both its consistent connection to political attitudes more generally, as well as to friendship networks and to inter-ethnic friendships. No specific prediction was made for a main effect of extraversion, and indeed was not found to have such an effect. However, given its role in friendship networks, it was reasonable to expect that extraversion might be implicated in a contact effect, especially at higher immigration levels. The lack of a main effect would therefore be likely due to the fact that average immigration levels are quite low.

The interactions for extraversion are stronger and more consistently significant than those for openness. In the appendix I replicate this analysis with a more conservative modeling strategy, with each model having five interactions – one for each personality trait and a particular immigrant group percentage. Following that strategy, the openness interactions stay consistent in terms of sign, however, they all lose their statistical significance. The extraversion interactions, while weakened in terms of significance, still support the findings above, with 9 out of the 12 interactions reaching conventional statistical significance ($p < 0.05$). Therefore, we can be more confident in the extraversion findings.

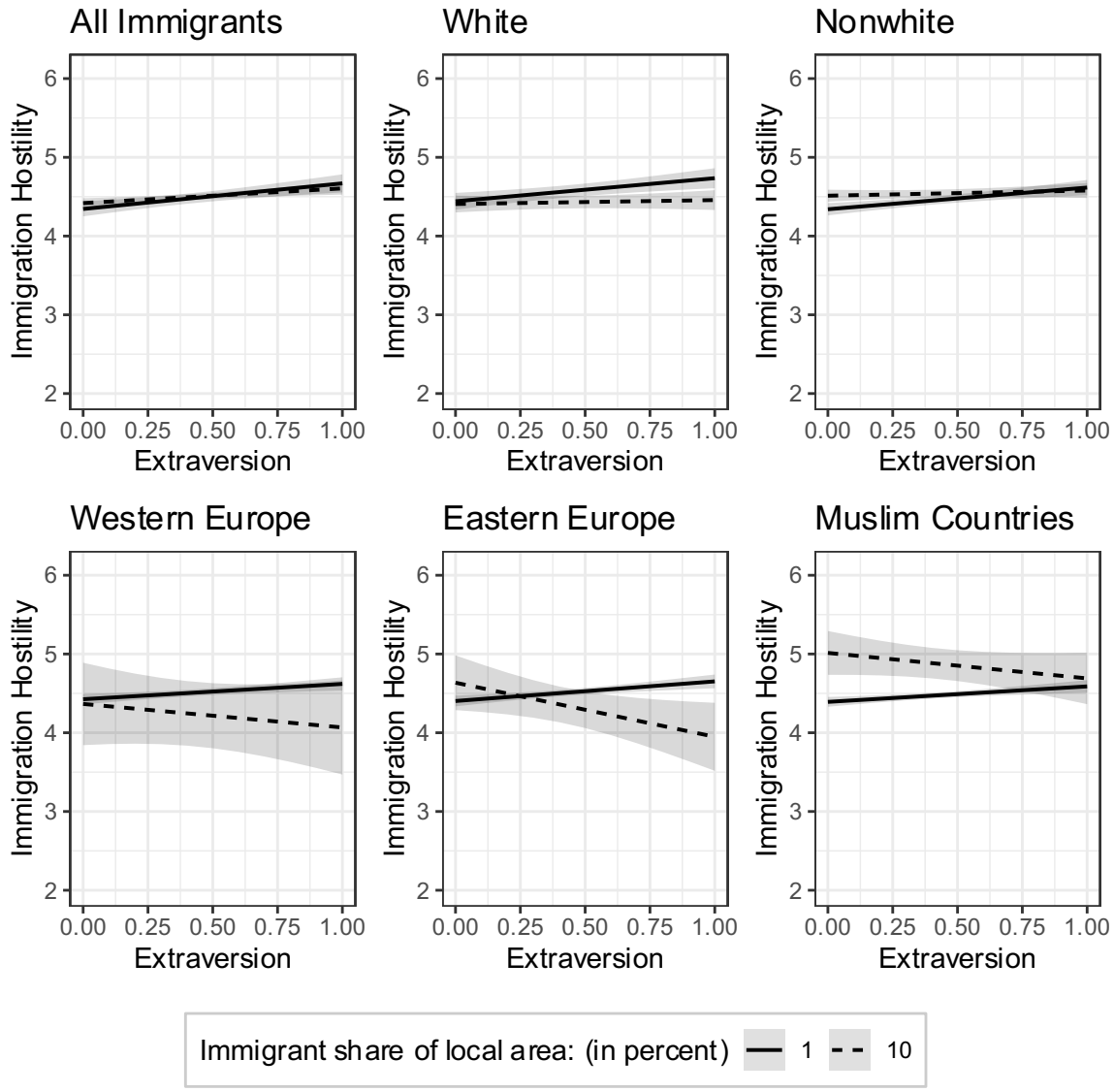
4.3 Predicted values for extraversion interactions

As the extraversion interactions are generally more trustworthy, I will highlight them here and present predicted values, so the impact of this relationship can be better understood. Figure 3 shows us predicted levels of immigration attitudes at 1% and 10% immigrant shares for the three groups, by levels of extraversion, excluding political covariates. The low value was chosen to present an intuitive number which does not go below the values shown for most of the immigrant groups. Only white and total immigrants exceed that. The high value was chosen similarly, so that it does not exceed what is seen in the data. Both values also match what is seen in Figure 2. These values present reasonable minimums and maximums, balancing the different local levels of the immigrant groups in the dataset. Political covariates were excluded from these plots in order to display a fuller effect of extraversion, controlling only for demographic and area-level variables.

As the level of specificity increases, the difference in slope also increases. There is a greater moderation effect for race than for all immigrants, and greater still for regional measures. We

should be cautious here. At each greater level of specificity the model is relying on fewer datapoints at higher immigration levels. The models also become more complicated, with multiple correlated immigration categories included together. As a result of these factors, the confidence intervals are much larger. That said, all six plots display a similar pattern for the interaction, though with some important differences.

Figure 3: Predicted immigration hostility based on extraversion and immigrant interactions



Notes: X-axis represents increase from lowest value of extraversion to highest. Solid lines represent 1% share of population by immigrant group in question, dashed lines 10%. Shaded regions represent 95% confidence intervals. Predictions made from multilevel linear models,

excluding political covariates. Immigration attitude scale runs from 1 to 7. Values above 4 represent hostility, while values below 4 represent support.

For all six plots, the 1% line has an increasing slope. This shows that at low levels of immigration, extraversion is associated with greater hostility towards immigration. As was pointed out in the introduction, the extraversion literature is mixed, with only a few studies showing it associated with support for right-wing populist parties and anti-immigrant views. These findings demonstrate a similar opposition to immigration, but at low levels. However, this slight association with opposition would not usually rise to the level of statistical significance, as can be seen in the following section.

At 10% levels, we see some notable differences between the plots. For the total percent of immigrants, this slope still increases, but not as steeply as with 1%. For both white and nonwhite categories, it is more or less flat. In contrast, we see a clear downward slope for the regional immigration categories. However, the same concerns expressed above apply here. Furthermore, despite a potentially larger "cultural threat" for some of these groups, this is not clearly reflected in the slope of the interactions. Instead, what we see is that 10% lines for the regional categories are shifted upwards – most clearly for the Muslim Country category – demonstrating that the overall level of hostility is at higher for some groups at 10%. This is another way of visualizing what was displayed in Figure 2.

These findings with extraversion may point to an unmeasured contact effect. It may be that at low levels of immigration, extraversion is weakly associated with hostility towards immigration. However, as immigration levels increase, extraverted individuals have greater levels of contact with immigrants than introverted individuals. For some immigrant categories this may make the overall effect of extraversion on immigration attitudes disappear, while for

others, it may change the direction of extraversion's effect and make the associations between extraversion and immigration attitudes more pronounced.

4.4 Area-level subset analysis

The 10% immigrant line in Figure 3 is, especially for the region variables, estimated based on few datapoints. It would therefore be useful to look at the effects of extraversion for areas with higher and lower numbers of the different immigrant groups. Therefore, I re-ran the main regression models for areas in the bottom and top quartiles for each immigrant group (calculated based on the respondents). The full regression tables can be found in the appendix. There you can also see how the other personality traits are associated with political attitudes in the high- and low-immigration areas.

As the quartiles were determined for each group individually, the values differ between them. On the one extreme, the two Muslim country quartiles consisted of areas with less than 0.26% immigrants from Muslim countries and more than 1.72% immigrants. At the other extreme, the total immigrant quartiles consisted of areas with less than 4.5% immigrants and more than 12.34% immigrants. This has obvious comparability problems. However, doing it this way allows all groups to have a similar number of observations – and sufficient observations to detect small effects. As the immigrant groups are correlated with each other, there is likely a good deal of overlap between the different subsets.

This analysis included 24 models, 12 based on low-immigration areas, and 12 based on high-immigration areas. Comparing the corresponding models, all of them show that extraversion is less associated with immigration hostility in areas with more immigrants. Moreover, 7 of the

12 comparisons showed a sign change, with extraversion going from predicting greater hostility to predicting lower hostility.

However, caution is definitely deserved here too. Though we see these sign changes, the difference in effect sizes are minimal and, in general, the effect sizes for extraversion are quite small. Of the 24 extraversion coefficients, only 3 of them reached statistical significance – 2 of them predicting less hostility in high-immigration areas and 1 of them predicting more hostility in a low-immigration area. While these results support the findings from above, the evidence does not indicate, at least for the low immigration levels we see in the data, a very large effect of extraversion.

5. Discussion and Conclusions

Rising immigration levels could provoke two different responses. Either individuals could become more positive towards immigration, or more negative. And indeed, both phenomena were found here, for different groups of immigrants. This highlights the importance of avoiding broad conclusions about the effects of increasing diversity.

This study also confirmed the important role of personality traits in predicting immigration attitudes, even when controlling for explicit measures of political preference and affiliation. Finally, this research showed that personality, in this case extraversion, consistently moderated the effect of immigrant presence on immigration attitudes. This research also displayed weaker evidence that openness may moderate the effect as well.

However, these interactions should be interpreted with caution. The findings for openness are inconsistent and the significance disappeared when following a more conservative modeling strategy. As a result, they were not focused on throughout the paper. Although the findings for extraversion are more robust, there is reason for caution here too. A strong impact between extraversion and immigration attitudes only emerges at higher immigrant levels, however mean immigrant levels in the study were low, meaning this association is based on limited data points. Testing the role of extraversion in subsets with higher immigrant levels did sometimes show a statistically significant impact of extraversion, but this was inconsistent and weak. While it is striking that extraversion can have no main effect but such consistent interactions, that in itself should warrant further examination.

Both openness and extraversion were identified as contenders for predicting increased contact with immigrants, providing a clear explanation for these interactions, but contact was not measured, which is a major limitation of this study. The interactions for extraversion especially point in the direction of a contact-driven relationship. Future research should establish more clearly if and when extraversion plays a role in contact. This study had very large local areas, and it is unclear how much the level of diversity in these larger areas increases the opportunities for contact, especially the kind of close contact which is theorized to be most impactful on attitudes. Previous research indicates that at the local area sizes measured here, contact effects may not offset context effects (Kaufmann and Goodwin, 2018). More precise measures for smaller areas, as well as measurement of contact would help greatly with understanding these phenomena. It is entirely possible that these interactions are driven by differential responses to demographic changes in one's community and not actually contact with members of immigrant communities, and the findings here may not extend to smaller geographical units where contact is more likely.

Allport (1954) argued that prejudice would be reduced when there is equal status contact between groups, as they are in pursuit of common goals, especially when given institutional support. Although it is difficult to quantify how much this was occurring in the UK at this time, Lessard-Phillips et al. (2020) provides evidence for immigrants as a whole during this time period. They find that 49% of immigrants are members of a civic organization. This percentage increases as immigrants are in the country longer, indicating it is likely a form of integration. Furthermore, they find that 40% of immigrants have a British spouse. These phenomena, as well as employment and friendships – though not measured here – could potentially satisfy Allport's conditions. Unfortunately though, for our respondents, we do not have measures of whether they were in such environments and had these kinds of contacts with immigrants. Future research could establish not just whether contact took place, but the form and quality of it. This could help us to understand the dynamic better, as well as contact effects more generally, even if the current literature indicates that weaker forms of contact tend to also lower prejudice levels (Pettigrew and Tropp, 2006).

It is also worth noting that these results may point to the important role of modeling strategies. Some of the area-level covariates were strongly predictive of attitudes – particularly the percent of the population who had high qualifications. The addition of that covariate dampens the impact of the different immigrant groups. While some of the differences we see in the literature may have to do with the breakdown of immigrant groups, as I have argued, much of the difference may also lie in modeling choices, as there is no standard or clear way to make some of these modeling decisions. As some area-level covariates may lie on the causal pathway between immigrant groups and attitudes, their inclusion could significantly bias the results.

The broad personality findings are in accordance with existing research about the connections between the various traits and attitudes towards immigration and prejudice (e.g., Ackermann, Ackermann and Freitag 2018; Akrami et al., 2011; Dinesen et al., 2016; Gallego and Pardos-Prado, 2014; Sibley and Duckitt, 2008). However, in previous immigration-personality studies, openness and conscientiousness were not consistently highlighted as the most important traits, whereas here they were. This is more in line with the general findings about personality. Despite the differences with other studies, it should be noted that the effect sizes here for those two traits are between half and two thirds as large as for education, which has been considered a major predictor of immigration attitudes (Hainmueller and Hopkins, 2014). This further indicates the importance of personality to immigration attitudes. The differences in which traits are found to be major predictors may have to do with study methodology as well as local context. Both conscientiousness and neuroticism, for instance, were found to predict prejudice only in certain regions (Sibley and Duckitt, 2008). Future studies can help us to understand better when certain traits are more relevant to immigration attitudes, and why these differences exist between different contexts. It is also possible that the personality measures used differ in their quality. Differences between the types of scales and the translations used, could all play a role in differing results. Many of these studies, including this one, rely on personality measures which are very short. However, short personality inventories may not accurately reflect the full impact personality has on political attitudes (Bakker and Lelkes, 2018).

Previous studies have found interactions between personality traits and immigration levels or outgroup contact (Ackermann and Ackermann, 2015; Ackermann, Ackermann and Freitag 2018; Danckert et al., 2017; Turner et al., 2014), however they do not precisely match what was found here. That said, they do not conflict with these findings either. The openness

interactions in this study accord with previous research, but are very weak and disappear when using a more conservative modeling strategy.

While the findings here for extraversion may point to contact effects, research should continue to examine possible context-level triggering effects. That said, if some people are inclined to be triggered by cultural threats, that may be balanced by contact, especially over the long term. Ackermann, Ackermann and Freitag (2018) and Ackermann and Ackermann (2015) found that the effect of conscientiousness disappeared in areas with higher diversity, running counter to the triggering hypothesis. Their results could be explained either by more conscientious individuals having their hostilities reduced in the presence of greater immigration numbers (perhaps due to contact) or less conscientious individuals being themselves triggered so that their views begin to match those of the more conscientious respondents. More research should be done to understand when each phenomenon is likely to occur.

As I have argued, triggering effects may be more pronounced for certain immigrant groups. However, this study found that the interaction patterns (even when nonsignificant) were quite similar regardless of group, even for openness, which unlike extraversion could be associated with such an effect. These findings may have to do with the lack of sensitivity of the measures, or it could indicate that this effect is similar for all outgroups, just with differing starting points. It is worth reiterating that these results are specifically for immigrants born outside of the country and are not responses to overall levels of diversity. UK-born minority share is not the focus of this study and the results of an analysis based on that may be different. Therefore, one should be cautious when generalizing these results. Additionally, the outcome variable here relates to attitudes towards immigration, and not attitudes towards diversity in general and is not a measure of prejudice. However, that Muslim and nonwhite immigrant shares are

associated with greater hostility comports with findings from Kaufmann and Goodwin (2018) which showed that at larger geographic units, increased diversity is associated with greater anti-immigration attitudes.

Finally, longitudinal data would be very useful for understanding how opinions change over time. This would be helpful to understand both contact effects as well as effects driven by threat perceptions. With this study, we do not know how long the respondents have been living in their listed local areas, or where they moved from. We do not know how much these findings may in fact relate to self-sorting and not contact directly – or any response to the immigrants themselves. Although self-sorting is often viewed as flight away from groups deemed undesirable, it could also run to some extent in the opposite direction, and may help explain some positive associations between certain immigrant groups and immigration attitudes. It may not be that people are drawn to the immigrants themselves, but rather, people positive towards immigration may be drawn to the same areas that certain types of immigrants are also drawn to. Controlling for appropriate area-level covariates may help understand these relationships better.

What effect do increasing levels of immigration have on political attitudes? It is a simple question, but the answer may not be so straightforward. There is no single effect. This study finds strong evidence that immigration origin greatly influences the likelihood of provoking positive or negative responses in the British population. That likelihood will also depend on the individual, as this study also finds strong evidence for the importance of personality. Not only is it a strong predictor of immigration attitudes, but as local immigration levels increase, the effects of certain traits may become even more prominent.

Declaration of Interest

Declaration of interest: none.

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Appendix

Table A1: Summary statistics for immigrant population change variables

Variables	Mean	SD	Min	Max
Total Immigrant Change	3.68	3.03	-0.07	19.43
White Immigrant Change	1.48	1.3	-1.2	10.93
Nonwhite Immigrant Change	2.2	2.24	-0.11	15.25
Western European Change	0.26	0.45	-0.44	3.40
Eastern European Change	1.39	1.18	-1.30	10.34
Muslim Country Change	0.37	0.70	-3.40	4.07

Notes: Change represents percentage point change from 2001 to 2011. Observations omitted when NAs present for key variables in base models. N = 18,301.

Table A2: Correlation matrix of personality and immigrant group percentages

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Open.	1.00										
(2) Consc.	0.08	1.00									
(3) Extra.	0.30	0.02	1.00								
(4) Agree.	0.09	0.24	0.05	1.00							
(5) Neuro.	-0.11	-0.34	-0.13	-0.26	1.00						
(6) All	0.04	-0.04	0.02	-0.04	0.02	1.00					
(7) Wh	0.05	-0.03	0.02	-0.04	0.01	0.87	1.00				
(8) NWh	0.03	-0.03	0.01	-0.04	0.02	0.95	0.68	1.00			
(9) W.E.	0.05	-0.03	0.02	-0.04	0.01	0.80	0.94	0.62	1.00		
(10) E.E.	0.02	-0.03	0.01	-0.03	0.02	0.78	0.75	0.69	0.53	1.00	
(11) M.	0.02	-0.02	0.02	-0.04	0.02	0.73	0.47	0.80	0.44	0.49	1.00

Notes: The correlation reported here between Western European and Muslim immigrant groups is slightly different from that reported in Table 1 ($r = 0.45$). This is due to slight variations in which respondents were omitted due to missing values.

Table A3: Linear mixed models for total immigrant variables

	Linear Mixed Model			
	(1)	(2)	(3)	(4)
Openness	-0.99***	-0.59***	-0.99***	-0.59***
	(0.08)	(0.08)	(0.08)	(0.08)
Conscientiousness	0.98***	0.66***	0.99***	0.66***
	(0.08)	(0.07)	(0.08)	(0.07)
Extraversion	0.10	-0.01	0.10	-0.01
	(0.07)	(0.06)	(0.07)	(0.06)
Agreeableness	-0.40***	-0.05	-0.40***	-0.05
	(0.09)	(0.08)	(0.09)	(0.08)
Neuroticism	0.31***	0.41***	0.31***	0.41***
	(0.07)	(0.06)	(0.07)	(0.06)
Male	-0.05	-0.10***	-0.05	-0.10***
	(0.03)	(0.03)	(0.03)	(0.03)
Age	0.34***	0.16*	0.34***	0.16*
	(0.08)	(0.07)	(0.08)	(0.07)
Education	-1.40***	-1.09***	-1.40***	-1.09***
	(0.04)	(0.04)	(0.04)	(0.04)
Income	-0.16*	-0.32***	-0.16*	-0.32***
	(0.06)	(0.06)	(0.06)	(0.06)
Left-Right		2.26***		2.26***
		(0.07)		(0.07)
Conservative		0.01		0.005
		(0.04)		(0.04)
Labour		-0.18***		-0.19***
		(0.04)		(0.04)
Libdem		-0.62***		-0.62***
		(0.05)		(0.05)
UKIP		1.04***		1.04***
		(0.06)		(0.06)
Green		-0.50***		-0.50***
		(0.09)		(0.09)
Population	-0.10	-0.05	-0.11	-0.05
	(0.17)	(0.14)	(0.17)	(0.14)
Unemployment	-0.47***	-0.02	-0.48***	-0.05

	(0.14)	(0.12)	(0.13)	(0.11)
Median Pay	0.39*	0.25	0.39*	0.22
	(0.17)	(0.15)	(0.17)	(0.14)
Highly Qualified %	-1.38***	-0.96***	-1.38***	-1.00***
	(0.18)	(0.15)	(0.17)	(0.14)
Total immigrant percent	0.03	-0.11		
	(0.14)	(0.12)		
Total immigrant change			0.05	-0.04
			(0.14)	(0.12)
Constant	5.56***	4.02***	5.56***	4.05***
	(0.14)	(0.13)	(0.13)	(0.12)
Observations	15,431	15,431	15,431	15,431
Log Likelihood	-30,017.42	-28,609.04	-30,017.38	-28,609.38
Akaike Inf. Crit.	60,068.84	57,264.09	60,068.77	57,264.77
Bayesian Inf. Crit.	60,198.79	57,439.90	60,198.72	57,440.58

Notes: *p<0.05; **p<0.01; ***p<0.001. All continuous IVs standardized to be on 0 - 1, min-max scale. Higher values in the dependent variable indicate greater hostility. In order to better compare the results between the models, participants were dropped from models 1 and 3 if they did not respond to the political questions.

Table A4: Linear mixed models for immigrant race variables

	Linear Mixed Model			
	(1)	(2)	(3)	(4)
Openness	-0.99***	-0.59***	-0.98***	-0.59***
	(0.08)	(0.08)	(0.08)	(0.08)
Conscientiousness	0.99***	0.66***	0.99***	0.66***
	(0.08)	(0.07)	(0.08)	(0.07)
Extraversion	0.10	-0.01	0.10	-0.01
	(0.07)	(0.06)	(0.07)	(0.06)
Agreeableness	-0.40***	-0.05	-0.40***	-0.05
	(0.09)	(0.08)	(0.09)	(0.08)
Neuroticism	0.31***	0.41***	0.31***	0.41***
	(0.07)	(0.06)	(0.07)	(0.06)
Male	-0.05	-0.10***	-0.05	-0.10***
	(0.03)	(0.03)	(0.03)	(0.03)
Age	0.34***	0.16*	0.34***	0.15*
	(0.08)	(0.07)	(0.08)	(0.07)
Education	-1.40***	-1.09***	-1.40***	-1.09***
	(0.04)	(0.04)	(0.04)	(0.04)
Income	-0.16*	-0.32***	-0.16**	-0.32***
	(0.06)	(0.06)	(0.06)	(0.06)
Left-Right		2.25***		2.26***
		(0.07)		(0.07)
Conservative		0.01		0.004
		(0.04)		(0.04)
Labour		-0.19***		-0.19***
		(0.04)		(0.04)
Libdem		-0.62***		-0.62***
		(0.05)		(0.05)
UKIP		1.05***		1.04***
		(0.06)		(0.06)
Green		-0.50***		-0.50***
		(0.09)		(0.09)
Population	-0.21	-0.14	-0.22	-0.14
	(0.17)	(0.14)	(0.16)	(0.14)
Unemployment	-0.49***	-0.03	-0.52***	-0.09
	(0.13)	(0.12)	(0.13)	(0.11)

Median Pay	0.41*	0.27	0.29	0.14
	(0.17)	(0.15)	(0.16)	(0.14)
Highly Qualified %	-1.21***	-0.80***	-1.31***	-0.95***
	(0.19)	(0.16)	(0.16)	(0.14)
White immigrant percent	-0.60*	-0.62**		
	(0.26)	(0.22)		
Nonwhite immigrant percent	0.38*	0.23		
	(0.18)	(0.15)		
White immigrant change			-0.62***	-0.53**
			(0.19)	(0.16)
Nonwhite immigrant Change			0.50**	0.31*
			(0.16)	(0.14)
Constant	5.57***	4.03***	5.67***	4.15***
	(0.14)	(0.13)	(0.13)	(0.13)
Observations	15,431	15,431	15,431	15,431
Log Likelihood	-30,014.60	-28,606.14	-30,010.79	-28,604.50
Akaike Inf. Crit.	60,065.21	57,260.27	60,057.58	57,256.99
Bayesian Inf. Crit.	60,202.80	57,443.73	60,195.18	57,440.45

Notes: *p<0.05; **p<0.01; ***p<0.001. All continuous IVs standardized to be on 0 - 1, min-max scale. Higher values in the dependent variable indicate greater hostility. In order to better compare the results between the models, participants were dropped from models 1 and 3 if they did not respond to the political questions.

Table A5: Linear mixed models for regional immigration variables

	Linear Mixed Model			
	(1)	(2)	(3)	(4)
Openness	-0.98***	-0.59***	-0.98***	-0.59***
	(0.08)	(0.08)	(0.08)	(0.08)
Conscientiousness	0.98***	0.66***	0.98***	0.66***
	(0.08)	(0.07)	(0.08)	(0.07)
Extraversion	0.10	-0.01	0.10	-0.01
	(0.07)	(0.06)	(0.07)	(0.06)
Agreeableness	-0.39***	-0.05	-0.40***	-0.05
	(0.09)	(0.08)	(0.09)	(0.08)
Neuroticism	0.31***	0.41***	0.31***	0.41***
	(0.07)	(0.06)	(0.07)	(0.06)
Male	-0.05	-0.10***	-0.05	-0.10***
	(0.03)	(0.03)	(0.03)	(0.03)
Age	0.34***	0.16*	0.34***	0.16*
	(0.08)	(0.07)	(0.08)	(0.07)
Education	-1.40***	-1.09***	-1.40***	-1.09***
	(0.04)	(0.04)	(0.04)	(0.04)
Income	-0.16*	-0.32***	-0.16*	-0.32***
	(0.06)	(0.06)	(0.06)	(0.06)
Left-Right		2.25***		2.25***
		(0.07)		(0.07)
Conservative		0.01		0.01
		(0.04)		(0.04)
Labour		-0.19***		-0.18***
		(0.04)		(0.04)
Libdem		-0.62***		-0.62***
		(0.05)		(0.05)
UKIP		1.04***		1.05***
		(0.06)		(0.06)
Green		-0.50***		-0.50***
		(0.09)		(0.09)
Population	-0.27	-0.19	-0.25	-0.17
	(0.17)	(0.14)	(0.17)	(0.14)
Unemployment	-0.53***	-0.07	-0.42**	-0.02
	(0.14)	(0.12)	(0.14)	(0.12)

Median Pay	0.40*	0.25	0.48**	0.28*
	(0.17)	(0.14)	(0.16)	(0.14)
Highly Qualified %	-1.26***	-0.84***	-1.24***	-0.90***
	(0.20)	(0.17)	(0.18)	(0.15)
W. European Percent	-0.56	-0.62*		
	(0.36)	(0.31)		
E. European Percent	-0.21	-0.20		
	(0.15)	(0.13)		
Muslim Country Percent	0.74***	0.51**		
	(0.20)	(0.18)		
W. European Change			-0.38	-0.31
			(0.21)	(0.19)
E. European Change			-0.16	-0.24
			(0.18)	(0.16)
Muslim Country Change			0.74***	0.58**
			(0.22)	(0.19)
Constant	5.59***	4.05***	5.23***	3.82***
	(0.14)	(0.13)	(0.16)	(0.14)
Observations	15,431	15,431	15,431	15,431
Log Likelihood	-30,010.99	-28,604.10	-30,009.27	-28,602.26
Akaike Inf. Crit.	60,059.98	57,258.20	60,056.53	57,254.51
Bayesian Inf. Crit.	60,205.22	57,449.30	60,201.77	57,445.61

Notes: *p<0.05; **p<0.01; ***p<0.001. All continuous IVs standardized to be on 0 - 1, min-max scale. Higher values in the dependent variable indicate greater hostility. In order to better compare the results between the models, participants were dropped from models 1 and 3 if they did not respond to the political questions.

Table A6: Interactions for change variables (conservative modeling)

	Open.	Consc.	Extra.	Agree.	Neuro.
	Without Political Covariates – (N = 18301)				
Total Δ	-0.94	-0.38	-0.69	0.43	-0.20
White Δ	-0.87	-0.32	-1.00	0.59	-0.51
Nonwhite Δ	-0.93	-0.40	-0.58	0.42	-0.05
W. Europe Δ	-1.46*	1.02	-0.53	0.74	0.48
E. Europe Δ	-0.45	-1.25	-1.40*	0.54	-1.07
Muslim C. Δ	-0.08	-0.21	-0.34	0.67	-0.22
	With Political Covariates – (N = 15431)				
Total Δ	-0.81	0.001	-0.88*	0.22	-0.17
White Δ	-0.56	-0.20	-1.26*	0.04	-0.37
Nonwhite Δ	-0.85	0.06	-0.75	0.31	-0.08
W. Europe Δ	-0.26	0.91	-1.16*	0.38	0.57
E. Europe Δ	-0.86	-0.80	-1.30*	0.23	-0.97
Muslim C. Δ	-0.25	-0.28	-0.40	0.29	-0.37

Notes: *p<0.05; **p<0.01; ***p<0.001. All continuous IVs standardized to be on 0 - 1, min-max scale. All are multilevel linear models, including other covariates as seen in previous tables. To maximize power, participants were not dropped from models without political covariates.

Table A7: Interactions for percent variables (conservative modeling)

	Open.	Consc.	Extra.	Agree.	Neuro.
	Without Political Covariates – (N = 18301)				
Total %	-0.74	-0.08	-0.68*	0.49	-0.19
White %	-0.98	0.29	-0.67	0.44	-0.05
Nonwhite %	-0.76	-0.28	-0.84*	0.60	-0.30
W. Europe %	-1.50	0.89	-0.49	0.77	0.31
E. Europe %	-0.66	-0.69	-1.01*	0.45	-0.71
Muslim C. %	-0.64	-0.21	-0.83	0.64	-0.03
	With Political Covariates – (N = 15431)				
Total %	-0.42	.07	-0.86**	0.35	-0.15
White %	-0.25	0.24	-1.01*	0.24	-0.13
Nonwhite %	-0.54	-.0002	-0.99**	0.48	-0.21
W. Europe %	-0.05	0.69	-1.31*	0.47	0.18
E. Europe %	-0.73	-0.45	-1.03*	0.22	-0.65
Muslim C. %	-0.39	-0.19	-1.10*	0.73	-0.01

Notes: *p<0.05; **p<0.01; ***p<0.001. All continuous IVs standardized to be on 0 - 1, min-max scale. All are multilevel linear models, including other covariates as seen in previous tables. To maximize power, participants were not dropped from models without political covariates.

Table A8: Linear mixed models for low and high total immigrant areas (basic)

	Low	High
Openness	-0.82***	-1.24***
	(0.16)	(0.15)
Conscientiousness	0.96***	0.81***
	(0.15)	(0.14)
Extraversion	0.19	-0.02
	(0.12)	(0.12)
Agreeableness	-0.38*	-0.28
	(0.16)	(0.15)
Neuroticism	0.38**	0.41**
	(0.13)	(0.13)
Male	-0.13*	-0.13*
	(0.05)	(0.05)
Age	-0.24	0.30*
	(0.15)	(0.14)
Education	-1.35***	-1.66***
	(0.08)	(0.08)
Income	-0.31*	-0.33**
	(0.12)	(0.11)
Population	0.05	0.36
	(0.36)	(0.23)
Unemployment	-0.19	-0.79**
	(0.29)	(0.25)
Median Pay	-0.49	0.76**
	(0.45)	(0.25)
Highly Qualified %	-0.48	-1.83***
	(0.48)	(0.23)
Total Immigrant %	-1.81	-0.06
	(3.38)	(0.18)
Constant	5.77***	6.30***
	(0.30)	(0.24)
Observations	4,569	4,662
Log Likelihood	-8,898.80	-9,062.21
Akaike Inf. Crit.	17,831.60	18,158.41
Bayesian Inf. Crit.	17,940.86	18,268.02

Notes: *p<0.05; **p<0.01; ***p<0.001. All continuous IVs standardized to be on 0 - 1, min-max scale. Higher values in the dependent variable indicate greater hostility. Low <= 4.50; High >= 12.34.

Table A9: Linear mixed models for low and high total immigrant areas (full)

	Low	High
Openness	-0.52**	-0.77***
	(0.16)	(0.15)
Conscientiousness	0.68***	0.58***
	(0.15)	(0.14)
Extraversion	0.07	-0.21
	(0.13)	(0.11)
Agreeableness	0.02	0.02
	(0.16)	(0.15)
Neuroticism	0.47***	0.45***
	(0.13)	(0.12)
Male	-0.10	-0.11*
	(0.06)	(0.05)
Age	-0.08	0.51***
	(0.16)	(0.14)
Education	-0.98***	-1.18***
	(0.08)	(0.08)
Income	-0.28*	-0.30**
	(0.12)	(0.10)
Left-Right	2.12***	2.46***
	(0.14)	(0.14)
Conservative	0.12	-0.01
	(0.08)	(0.08)
Labour	-0.10	-0.24***
	(0.07)	(0.07)
Libdem	-0.72***	-0.53***
	(0.12)	(0.10)
UKIP	1.24***	0.99***
	(0.12)	(0.12)
Green	-0.61**	-0.28*
	(0.23)	(0.14)
Population	-0.08	0.18
	(0.27)	(0.20)
Unemployment	0.13	-0.21
	(0.25)	(0.22)
Median Pay	-0.65	0.27

	(0.38)	(0.21)
Highly Qualified %	-0.24	-1.04***
	(0.41)	(0.20)
Total Immigrant %	-4.27	-0.12
	(2.82)	(0.16)
Constant	4.04***	4.11***
	(0.30)	(0.24)
Observations	3,787	4,045
Log Likelihood	-7,110.36	-7,423.69
Akaike Inf. Crit.	14,266.73	14,893.38
Bayesian Inf. Crit.	14,410.23	15,038.40

Notes: *p<0.05; **p<0.01; ***p<0.001. All continuous IVs standardized to be on 0 - 1, min-max scale. Higher values in the dependent variable indicate greater hostility. Low <= 4.50; High >= 12.34.

Table A10: Linear mixed models for low and high immigrant areas by race (basic)

	Low W	High W	Low NW	High NW
Openness	-0.74***	-1.03***	-1.06***	-1.25***
	(0.16)	(0.15)	(0.16)	(0.15)
Conscientiousness	1.12***	0.82***	1.00***	0.89***
	(0.15)	(0.14)	(0.15)	(0.14)
Extraversion	0.19	0.02	0.17	0.06
	(0.12)	(0.12)	(0.12)	(0.12)
Agreeableness	-0.53***	-0.37*	-0.31*	-0.33*
	(0.16)	(0.15)	(0.16)	(0.15)
Neuroticism	0.46***	0.37**	0.43**	0.36**
	(0.13)	(0.13)	(0.13)	(0.13)
Male	-0.10	-0.13*	-0.10	-0.15**
	(0.05)	(0.05)	(0.05)	(0.05)
Age	-0.27	0.27	-0.26	0.16
	(0.15)	(0.14)	(0.15)	(0.14)
Education	-1.29***	-1.65***	-1.37***	-1.77***
	(0.08)	(0.08)	(0.07)	(0.08)
Income	-0.33**	-0.27**	-0.11	-0.23*
	(0.12)	(0.10)	(0.12)	(0.11)
Population	-0.39	0.07	-0.17	0.15
	(0.39)	(0.43)	(0.42)	(0.25)
Unemployment	-0.06	-0.52	0.04	-0.96**
	(0.28)	(0.28)	(0.35)	(0.29)
Median Pay	-0.04	0.73**	-0.75	0.67*
	(0.44)	(0.26)	(0.53)	(0.31)
Highly Qualified %	-0.73	-1.65***	-0.18	-1.64***
	(0.45)	(0.30)	(0.50)	(0.35)
White Immigrant %	0.24	-0.34	-0.92	-0.43
	(2.70)	(0.31)	(1.41)	(0.39)
Nonwhite Immigrant %	1.83*	0.08	10.52	0.15
	(0.71)	(0.21)	(9.19)	(0.22)
Constant	5.53***	6.14***	5.59***	6.52***
	(0.31)	(0.23)	(0.34)	(0.26)
Observations	4,592	4,676	4,595	4,626
Log Likelihood	-8,926.37	-9,060.80	-8,964.46	-9,005.81
Akaike Inf. Crit.	17,888.73	18,157.59	17,964.92	18,047.61

Bayesian Inf. Crit.	18,004.51	18,273.70	18,080.70	18,163.52

Notes: *p<0.05; **p<0.01; ***p<0.001. All continuous IVs standardized to be on 0 - 1, min-max scale. Higher values in the dependent variable indicate greater hostility. Low white <= 3.09; High white >= 6.21. Low nonwhite <= 1.16; High nonwhite >= 6.79.

Table A11: Linear mixed models for low and high immigrant areas by race (full)

	Low W	High W	Low NW	High NW
Openness	-0.42**	-0.55***	-0.74***	-0.72***
	(0.16)	(0.15)	(0.16)	(0.15)
Conscientiousness	0.84***	0.59***	0.57***	0.62***
	(0.15)	(0.14)	(0.15)	(0.14)
Extraversion	0.03	-0.16	0.11	-0.26*
	(0.13)	(0.11)	(0.12)	(0.12)
Agreeableness	-0.17	-0.07	0.01	-0.06
	(0.16)	(0.15)	(0.16)	(0.15)
Neuroticism	0.53***	0.44***	0.50***	0.43***
	(0.14)	(0.12)	(0.13)	(0.13)
Male	-0.07	-0.10*	-0.05	-0.12*
	(0.06)	(0.05)	(0.05)	(0.05)
Age	-0.11	0.48***	-0.08	0.39**
	(0.16)	(0.13)	(0.16)	(0.14)
Education	-0.97***	-1.15***	-0.95***	-1.31***
	(0.08)	(0.08)	(0.08)	(0.08)
Income	-0.26*	-0.31**	-0.22	-0.22*
	(0.13)	(0.10)	(0.12)	(0.11)
Left-Right	2.07***	2.31***	2.34***	2.46***
	(0.14)	(0.14)	(0.14)	(0.14)
Conservative	0.12	-0.03	0.05	-0.01
	(0.08)	(0.08)	(0.08)	(0.08)
Labour	-0.10	-0.33***	-0.06	-0.17*
	(0.07)	(0.07)	(0.07)	(0.07)
Libdem	-0.62***	-0.62***	-0.65***	-0.53***
	(0.12)	(0.10)	(0.11)	(0.10)
UKIP	1.14***	0.96***	1.26***	0.97***
	(0.12)	(0.11)	(0.12)	(0.12)
Green	-0.67**	-0.37**	-0.54*	-0.38*
	(0.23)	(0.14)	(0.21)	(0.15)
Population	-0.33	0.11	-0.20	0.10
	(0.36)	(0.32)	(0.28)	(0.24)
Unemployment	0.29	-0.08	0.22	-0.44
	(0.27)	(0.24)	(0.28)	(0.28)
Median Pay	-0.03	0.30	-0.60	0.15

	(0.42)	(0.22)	(0.41)	(0.29)
Highly Qualified %	-0.58	-1.00***	0.15	-0.80*
	(0.43)	(0.25)	(0.40)	(0.34)
White Immigrant %	-1.65	-0.29	-2.48*	-0.38
	(2.55)	(0.27)	(1.11)	(0.37)
Nonwhite Immigrant %	1.15	0.11	3.49	-0.02
	(0.68)	(0.17)	(6.95)	(0.21)
Constant	3.82***	4.03***	3.88***	4.39***
	(0.32)	(0.23)	(0.31)	(0.27)
Observations	3,791	4,078	3,850	3,970
Log Likelihood	-7,117.08	-7,461.28	-7,192.08	-7,317.46
Akaike Inf. Crit.	14,282.16	14,970.56	14,432.16	14,682.93
Bayesian Inf. Crit.	14,431.93	15,122.08	14,582.30	14,833.80

Notes: *p<0.05; **p<0.01; ***p<0.001. All continuous IVs standardized to be on 0 - 1, min-max scale. Higher values in the dependent variable indicate greater hostility. Low white <= 3.09; High white >= 6.21. Low nonwhite <= 1.16; High nonwhite >= 6.79.

Table A12: Linear mixed models for low and high immigrant areas by origin region (basic)

	Low WE	High WE	Low EE	High EE	Low M	High M
Openness	-0.63***	-1.05***	-0.97***	-1.02***	-1.08***	-1.09***
	(0.16)	(0.16)	(0.16)	(0.16)	(0.16)	(0.16)
Conscientiousness	1.03***	0.87***	1.11***	0.95***	0.96***	0.89***
	(0.15)	(0.15)	(0.15)	(0.14)	(0.15)	(0.15)
Extraversion	0.21	0.05	0.33**	0.06	0.22	0.01
	(0.12)	(0.12)	(0.13)	(0.12)	(0.12)	(0.12)
Agreeableness	-0.56***	-0.32*	-0.53**	-0.36*	-0.37*	-0.13
	(0.16)	(0.16)	(0.16)	(0.16)	(0.16)	(0.16)
Neuroticism	0.46***	0.34*	0.44**	0.40**	0.35**	0.32*
	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)
Male	-0.12*	-0.11*	-0.06	-0.02	-0.08	-0.13*
	(0.05)	(0.06)	(0.06)	(0.05)	(0.05)	(0.05)
Age	-0.29	0.30*	-0.27	0.05	-0.43**	0.002
	(0.15)	(0.14)	(0.15)	(0.14)	(0.15)	(0.14)
Education	-1.28***	-1.74***	-1.32***	-1.68***	-1.40***	-1.71***
	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)
Income	-0.25*	-0.31**	-0.40**	-0.34**	-0.17	-0.26*
	(0.12)	(0.11)	(0.13)	(0.11)	(0.12)	(0.11)
Population	-0.26	-0.08	-0.34	0.11	-0.05	-0.10
	(0.41)	(0.41)	(0.37)	(0.43)	(0.42)	(0.24)
Unemployment	-0.25	-0.54	0.002	-0.84***	-0.09	-1.00***
	(0.28)	(0.31)	(0.29)	(0.25)	(0.34)	(0.28)
Median Pay	0.03	0.73**	-0.37	0.65*	0.08	0.63
	(0.51)	(0.27)	(0.38)	(0.29)	(0.45)	(0.37)
Highly Qualified %	-0.99	-1.68***	-0.42	-1.63***	-0.77	-1.67***
	(0.54)	(0.34)	(0.44)	(0.34)	(0.49)	(0.41)
W. European %	5.73	-0.16	0.62	-0.23	-0.10	-0.40
	(5.88)	(0.42)	(2.47)	(0.46)	(2.11)	(0.48)
E. European %	-0.16	-0.31	1.78	-0.24	0.14	-0.42*
	(0.76)	(0.22)	(2.88)	(0.19)	(0.50)	(0.19)
Muslim Country %	1.57**	0.33	1.58*	0.44*	4.59	0.83***
	(0.51)	(0.26)	(0.72)	(0.22)	(15.28)	(0.24)
Constant	5.56***	6.17***	5.56***	6.20***	5.81***	6.41***
	(0.31)	(0.25)	(0.32)	(0.24)	(0.32)	(0.28)
Observations	4,422	4,345	4,451	4,695	4,668	4,647

Log Likelihood	-8,569.83	-8,429.91	-8,669.72	-9,145.07	-9,110.18	-9,087.97
Akaike Inf. Crit.	17,177.66	16,897.81	17,377.44	18,328.15	18,258.35	18,213.95
Bayesian Inf. Crit.	17,299.15	17,018.97	17,499.06	18,450.78	18,380.87	18,336.38

Notes: *p<0.05; **p<0.01; ***p<0.001. All continuous IVs standardized to be on 0 - 1, min-max scale. Higher values in the dependent variable indicate greater hostility. Low Western Europe <= 0.74; High Western Europe >= 1.67. Low Eastern Europe <= 0.81; High Eastern Europe >= 2.15. Low Muslim country <=0.26; High Muslim country >=1.72.

Table A12: Linear mixed models for low and high immigrant areas by origin region (full)

	Low WE	High WE	Low EE	High EE	Low M	High M
Openness	-0.33*	-0.55***	-0.51**	-0.64***	-0.82***	-0.56***
	(0.16)	(0.15)	(0.16)	(0.15)	(0.16)	(0.15)
Conscientiousness	0.78***	0.60***	0.90***	0.74***	0.56***	0.58***
	(0.16)	(0.14)	(0.15)	(0.14)	(0.15)	(0.14)
Extraversion	0.01	-0.16	0.17	-0.13	0.17	-0.26*
	(0.13)	(0.11)	(0.13)	(0.12)	(0.12)	(0.12)
Agreeableness	-0.24	-0.02	-0.23	-0.14	0.02	0.14
	(0.17)	(0.15)	(0.17)	(0.15)	(0.16)	(0.15)
Neuroticism	0.53***	0.45***	0.47***	0.46***	0.42**	0.42***
	(0.14)	(0.13)	(0.13)	(0.13)	(0.13)	(0.13)
Male	-0.09	-0.09	-0.08	-0.01	-0.07	-0.12*
	(0.06)	(0.05)	(0.06)	(0.05)	(0.06)	(0.05)
Age	-0.08	0.44**	-0.20	0.33*	-0.32*	0.24
	(0.16)	(0.14)	(0.16)	(0.14)	(0.16)	(0.14)
Education	-0.96***	-1.25***	-0.94***	-1.20***	-1.04***	-1.27***
	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)
Income	-0.19	-0.33**	-0.44***	-0.35***	-0.29*	-0.28**
	(0.13)	(0.10)	(0.13)	(0.11)	(0.12)	(0.11)
Left-Right	1.98***	2.35***	2.07***	2.33***	2.17***	2.32***
	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)	(0.14)
Conservative	0.09	-0.02	0.14	-0.08	0.07	0.04
	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)
Labour	-0.15*	-0.31***	-0.13	-0.30***	-0.10	-0.21**
	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)	(0.07)
Libdem	-0.73***	-0.62***	-0.64***	-0.64***	-0.63***	-0.52***
	(0.12)	(0.10)	(0.11)	(0.10)	(0.11)	(0.11)
UKIP	1.05***	0.91***	1.29***	1.01***	1.29***	0.93***
	(0.12)	(0.12)	(0.12)	(0.12)	(0.11)	(0.12)
Green	-0.55*	-0.32*	-0.64**	-0.44**	-0.57**	-0.61***
	(0.22)	(0.15)	(0.20)	(0.15)	(0.21)	(0.15)
Population	-0.34	-0.13	-0.36	0.30	-0.08	-0.19
	(0.42)	(0.34)	(0.32)	(0.36)	(0.29)	(0.24)
Unemployment	0.05	-0.02	0.35	-0.41	0.10	-0.42
	(0.28)	(0.27)	(0.27)	(0.22)	(0.28)	(0.28)
Median Pay	-0.01	0.36	-0.38	0.49	-0.15	0.06

	(0.50)	(0.23)	(0.34)	(0.25)	(0.38)	(0.37)
Highly Qualified %	-0.72	-0.95**	-0.30	-1.11***	-0.55	-0.80
	(0.55)	(0.29)	(0.40)	(0.30)	(0.42)	(0.41)
W. European %	1.90	-0.19	-0.75	-0.26	-2.09	-0.45
	(5.96)	(0.37)	(2.24)	(0.41)	(1.78)	(0.48)
E. European %	-0.39	-0.11	-0.40	-0.16	-0.12	-0.43*
	(0.77)	(0.18)	(2.62)	(0.16)	(0.43)	(0.18)
Muslim Country %	1.51**	0.06	1.61*	0.20	2.70	0.57*
	(0.51)	(0.22)	(0.65)	(0.19)	(12.58)	(0.24)
Constant	3.98***	4.03***	3.90***	4.15***	4.28***	4.39***
	(0.34)	(0.25)	(0.32)	(0.25)	(0.31)	(0.29)
Observations	3,622	3,807	3,728	4,028	3,887	3,960
Log Likelihood	-6,795.74	-6,973.91	-6,962.47	-7,444.44	-7,284.73	-7,338.94
Akaike Inf. Crit.	13,641.49	13,997.82	13,974.94	14,938.88	14,619.47	14,727.88
Bayesian Inf. Crit.	13,796.36	14,153.93	14,130.53	15,096.40	14,776.10	14,884.98

Notes: *p<0.05; **p<0.01; ***p<0.001. All continuous IVs standardized to be on 0 - 1, min-max scale. Higher values in the dependent variable indicate greater hostility. Low Western Europe <= 0.74; High Western Europe >= 1.67. Low Eastern Europe <= 0.81; High Eastern Europe >= 2.15. Low Muslim country <=0.26; High Muslim country >=1.72.