Title

The Importance of Context: Children of Immigrants in the United Kingdom

Author

Nathan Isaac Hoffmann

nathanihoff@ucla.edu

Doctoral Student

Department of Sociology

University of California, Los Angeles

Date

6 August 2020

Abstract

Numerous studies of the United Kingdom demonstrate that outcomes for children of immigrants vary by ethnicity, but few test mechanisms to explain these results or engage with the significant heterogeneity within ethnic groups. Immigration scholarship in the United States has fruitfully harnessed models of group-level contextual effects in explaining individual outcomes. The first to implement such a methodology in the United Kingdom, this study elucidates the group-level factors most salient for verbal and quantitative cognitive achievement, socioemotional development, and likelihood of obesity for children of immigrants in the Millennium Cohort Study. By harnessing a range of indicators of both sending- and receiving-country context in three-level growth models, this paper finds that group-level average education, proportion with refugee status, and measured discrimination are significantly associated with the outcomes of children of immigrants, even in models controlling for individual factors. Furthermore, although sending-country values are insignificant for achievement and development, such values are significantly associated with the likelihood of childhood obesity.

Keywords

immigration, contextual effects, children, United Kingdom, education, health

Introduction

Studies of immigrant groups in the United Kingdom have established that children of immigrants experience ethnically disparate trajectories in a variety of outcomes, including education (DfES, 2006; Hoffmann, 2018; Meunier et al., 2013; Strand, 2014), socioemotional development (Jackson et al., 2012), and health (Giunti & Oncini, 2019; Martinson et al., 2012). Although these disparities are well documented, few studies have analyzed the group-level characteristics that empower certain groups to do better while others fall behind. Lumping immigrant groups together by ethnicity misses out on considerable heterogeneity within these groups. Furthermore, such an approach disregards the explanatory importance of group-level factors at the national level. An analysis focusing on contextual effects can help fill this gap. Rather than seek to determine which *groups* do well, it asks which group-level *factors* explain certain individuals' success while others fall behind. Such an analysis allows for more policy-relevant research, avoids simple description, and sidesteps reification of conceptually flimsy ethnic categories.

With their seminal paper on segmented assimilation, Portes and Zhou (1993) emphasized the different paths immigrants might take depending on the interaction between individual characteristics and larger structural factors. Numerous quantitative studies have followed that try to isolate these “contextual effects” of immigration based on favorable or unfavorable modes of incorporation for specific immigrant groups (Haller et al., 2011; Portes et al., 2005; Portes & Fernández-Kelly, 2008; Portes & MacLeod, 1996). Recent work by Luthra, Soehl, and Waldinger (Luthra et al., 2018a, 2018b) provides the most rigorous test of such contextual effects yet. Unlike previous studies of contextual effects that pit ethnic groups against each other in a sort of “ethnoracial Olympics — this one excels, that one lags behind,” (Luthra et al., 2018b, p. 13), they use multilevel models to isolate important group-level factors of both sending- and receiving-

country context. Despite their advancements in research design, they obtain few significant results for group-level variables.

The present study builds on theirs by extending it to the United Kingdom and by assessing not only cross-sectional effects, but also effects over time: three-level hierarchical models estimate group-level effects on intercept and slope of longitudinal outcomes for cognitive achievement, socioemotional development, and likelihood of obesity of children of immigrants in the United Kingdom. Age-specific outcomes are nested within individuals, who are nested within countries of parents' origin. Individual data comes from nearly 15,000 children in the Millennium Cohort Study, a longitudinal survey representative of the United Kingdom as a whole and with nearly 2,000 children of immigrants (Centre for Longitudinal Studies, 2019). This paper assesses the effects of five contextual factors: “ethnic capital”, informed by the average education of an immigrant group; governmental reception, based on proportion admitted as refugees; societal reception, measured by likelihood of ethnic discrimination in audit studies; colonial history; and sending-country values, from the World Values Survey (Robert Inglehart et al., 2014).

Hence this study breaks new ground in two ways: by refining Luthra et al.'s (2018b) method by incorporating effects over time, and by testing a popular theory of immigrant incorporation in a new national context. The United Kingdom provides an ideal test case for these contextual effects over time. Although not considered a historic “country of immigration,” in recent decades immigrants and their descendants have grown to constitute a significant portion of the population, rendering the country subject to what Alba, Sloan and Sperling (2011) call the “integration imperative.” Contextual effects are an appropriate model here because, as Vermeulen (2010) argues, the segmented assimilation theory they are a part of travels fairly well across the Atlantic. Although the specific mechanisms might be different, European societies' immigrant

populations are facing different trajectories depending on the interaction between individual and contextual factors, and these are vital to explain. Finally, few other countries have the rich longitudinal survey data necessary to fit the requisite three-level hierarchical models.

Results indicate that ignoring effects over time — as Luthra et al. (2018b) did — misses the bulk of the significance of these group-level factors, at least in the British context. This paper shows that group characteristics are significantly associated with outcome trajectories, even when individual controls are included. I find that group-level average education, proportion of an immigrant group with refugee status, and risk of discrimination significantly affect the educational and developmental outcomes of children of immigrants, even in models controlling for individual factors. Furthermore, although sending-country values are not statistically significant for achievement and development, such values are significantly associated with likelihood of childhood obesity.

Background

Contextual Effects

With their theory of segmented assimilation, Portes and Zhou (1993) ushered in a new era of immigration research focusing on contextual effects. Whereas previous research on immigrant incorporation in the U.S. implied an inevitable “straight-line” trajectory toward the majority culture (Gordon, 1964; Warner & Srole, 1945), Portes and Zhou emphasized the different paths immigrants might take depending on the interaction between individual characteristics and larger structural factors. Although family socioeconomic status and individual resources are certainly important determinants of the outcomes of immigrants and their descendants, “the context that immigrants find upon arrival in their new country plays a decisive role in the course that their

offspring's lives will follow” (Portes & Zhou, 1993, p. 82). Making reference to the concept of “modes of incorporation” first described in *Immigrant America* (Portes & Rumbaut, 1990/2014), the authors outline the fateful interaction of government policy, societal reception, and characteristics of the immigrant community.

Numerous studies have followed attempting to quantitatively operationalize contextual effects. Although most have been limited to immigrants in the U.S. (Haller et al., 2011; R. Lee, 2018; Luthra et al., 2018a, 2018b; Portes et al., 2005; Portes & Fernández-Kelly, 2008; Portes & MacLeod, 1996; Waldinger & Catron, 2016; Xie & Greenman, 2011), studies of Europe have also incorporated contextual effects, especially in education research (Kanas & van Tubergen, 2009; Levels et al., 2008). Early work in contextual effects, especially that led by Portes, compared outcomes of immigrant groups that were *a priori* classified as subject to advantaged, disadvantaged, or neutral modes of incorporation (Haller et al., 2011; Portes et al., 2005; Portes & Fernández-Kelly, 2008; Portes & MacLeod, 1996; Portes & Rumbaut, 2001). As Waldinger and Catron (2016, p. 24) point out, however, this work lacks systematicity; “comparisons are made to a jumble of heterogeneous nationalities [. . .]. Consequently, the hypothesis concerning the impact of differences in mode of incorporation has never been appropriately tested.” The authors attempt to fill this gap with 627 comparison between nationalities in the Children of Immigrants Longitudinal Survey, using ranking of modes of incorporation for each nationality from *Immigrant America* (Portes & Rumbaut, 1990/2014), but find results inconsistent with Portes’s theory or null. They push for future work that “uses variables instead of names and disaggregates the different features that a nationality-oriented approach inevitably conflates” (Waldinger & Catron, 2016, p. 47).

Luthra, Soehl, and Waldinger (Luthra et al., 2018a, 2018b) perform just such types of analyses in their recent work. In “Reconceptualizing Context” (Luthra et al., 2018a) they rely data on immigrants in New York City and Los Angeles in 1998 to 2004 to assess effects of group-level favorable visa category prevalence, average years of schooling, and skin colorism on the educational attainment of the second generation, finding significant results for only the latter two. Importantly, they find that this multidimensional analysis, unlike earlier quantitative work, better explains the second generation’s outcomes. In *Origins and Destinations* (Luthra et al., 2018b) they build on this analysis, also incorporating sending-country values as a measure of context of emigration and a variety of other outcome measures, including citizenship acquisition and transnational ties. They highlight that their multilevel models allow the adjudication between two popular theories of immigrant incorporation’s “central axis of variation: did it lie *between* groups, as contended by segmented assimilation, or among individuals *within* groups, as argued by neo-assimilation theory?” (Luthra et al., 2018b, p. 15). Although their models find that educational attainment is significantly associated with group-level education and secular sending-country values, few other group-level factors are significant for this or other outcomes. They conclude that “taken as a sum, individual-level variables are more than twice as important as group-level variables,” at least for education (Luthra et al., 2018b, p. 15). Although their analysis was pathbreaking, it ignores how the relevance of group-level factors might change over time. They were constrained by the availability of high-quality data on immigrants in the United States, with two cross-sectional studies constituting the only data with enough information on both children and parents. The United Kingdom, however, enjoys a legacy of rich longitudinal data, allowing an important extension of Luthra and colleagues’ methods in a national context where immigration is increasingly important.

Children of Immigrants in the UK

The population of immigrants and their descendants in the United Kingdom is growing significantly. From 2004 to 2018, the foreign-born residents in the United Kingdom increased from 5.3 million to 9.3 million, out of a total population of 65 million (Vargas-Silva & Rienzo, 2019). Post-colonial immigrants constitute a large proportion of that subset, with the top ten countries of emigration including India, Pakistan, Bangladesh, and South Africa. The rise of European Union immigration is evident as well, with Poland ranking as the number-one country of birth for immigrants in the United Kingdom today, constituting 9.5% of the foreign-born population (ONS, 2018b). Romania, Germany, the Republic of Ireland (also a country with a complicated history of immigration to the United Kingdom), and Italy make the top ten as well. We also see a rise of children of immigrants: from 2010 to 2018, the percentage of pupils in English schools speaking English as an additional language rose from 14% to 20% (DfE, 2010, 2018), and in 2017 21% of births in England and Wales were to two parents born outside of the United Kingdom (ONS, 2018a), up from 17% in 2008 (ONS, 2011). With increasing numbers of immigrants and declining fertility rates of White British people, the proportion of the population from immigrant backgrounds is only likely to grow (Vertovec, 2007).

Children of immigrants in the United Kingdom show disparities in a number of outcomes. In education, some studies have shown achievement gaps for pupils identifying as Black Caribbean (Coard, 1971; Gillborn, 2008; Strand, 2012), Pakistani, and Bangladeshi (DfES, 2006; Gillborn & Mirza, 2000). Other studies show that these gaps narrow or become insignificant by adolescence, at least in models with statistical controls (Hoffmann, 2018; Strand et al., 2015). In addition, Indian and Chinese children of immigrants might even exceed the educational outcomes of other children

(Archer & Francis, 2007; DfES, 2006; Hoffmann, 2018). Health and development disparities may be more entrenched, however; although the “healthy immigrant effect” holds true for some groups (Kennedy et al., 2015), children of ethnic minority immigrants in the UK experience higher risks of obesity (Martinson et al., 2012) and poorer mental health (Jackson et al., 2012), even through adolescence, although these effects may be more pronounced for lower-SES, less integrated families (Giunti & Oncini, 2019). In analyzing these and the above measures, researchers have too often focused on *which* groups are doing well rather than *why*. This paper’s multilevel models address the mechanisms behind such disparities.

Hypotheses

This study tests the significance of five contextual effects in relation to verbal and quantitative cognitive achievement, socioemotional development, and likelihood of obesity. This section outlines these five measures of context, the rationale for their inclusion, and predictions for how they might affect the outcomes of interest.

First I test a measure of “ethnic capital.” Building on the concepts of “human capital” in economics (Becker, 1962) and “social capital” in sociology (Coleman, 1988), Borjas (1992, p. 125) defines ethnic capital as “the average human capital stock of the ethnic group,” which he operationalizes as mean education, wages, or occupational prestige of the group. His paper investigates the effect of the ethnic capital of the father’s generation on the social mobility of the next. He finds that, in the U.S., “the intergenerational progress of workers belonging to ethnic groups that have relatively low levels of human capital is retarded by the low average quality of the group” (Borjas, 1992, p. 124); the group-level average may affect outcomes even when controlling for individual or family attributes. In *The Asian American Achievement Paradox*, Lee

and Zhou (2015) look at a more positive side of ethnic capital, incorporating the concept to explain how Asian Americans from families of lower human capital can benefit from the overall high levels of education and occupational prestige of the ethnic group as a whole. Such ethnic capital allows the development of “institutions, often through the ethnic community, where ethnic resources are generated and mobilized” (J. Lee & Zhou, 2015, p. 20). Even families without many resources of their own have access to such institutions, assisting their children’s social mobility.

The concept of ethnic capital has also been useful in the United Kingdom for explaining intergenerational mobility in immigrant families, although thus far more in qualitative work than quantitative. Modood (2004, p. 100) highlights that ethnic capital’s dimensions of “relationships, norms and norms enforcement” are useful in explaining university entry rates for different ethnic groups. Shah, Dwyer, and Modood (2010, pp. 1122–1123) build on Modood’s work, finding the concept of ethnic capital useful in explaining “why young British Pakistanis predominantly from working-class families do better than their white working-class peers in entering higher education.” Archer and Francis (2007) use the analogous concept of “family capital” to explain the generally high achievement of Chinese students, emphasizing the importance of community organizations, similarly to Lee and Zhou (2015).

This paper supplements such ethnographic work in the British context with a statistical analysis based on work by Luthra et al. (2018a, 2018b). Like them, I use a measure of average group-level education to represent ethnic capital. For my first hypothesis, I predict that higher levels of ethnic capital will promote more desirable outcomes for children in that group.

H1: Children from national groups with higher average levels of education in the United Kingdom will exhibit higher achievement scores, lower levels of developmental difficulties, and lower rates of obesity.

Government reception has been a central axis of “mode of incorporation” as first formulated by Portes and Rumbaut (1990/2014). Luthra et al. (2018b) measure such reception by constructing a scale using the proportion of 1990 census respondents for a given national group that have refugee status (to signify favorable reception) as well as proportion legalized under IRCA (to represent unfavorable reception). Since undocumented immigration is much less significant in the United Kingdom than in the United States and little reliable data on undocumented immigrants exists (Connor & Passel, 2019), I focus only on refugee numbers. As in many Western countries, the vast majority of individuals granted refugee status enter the United Kingdom as asylum seekers (Sturge, 2020). While awaiting decision on their application, asylum seekers who opt for government-provided housing are dispersed to isolated, deprived areas of England (Phillips, 2006), which some scholars argue explains the poor health outcomes of these groups (Bakker et al., 2016; Cebulla et al., 2010). Once their application is decided, asylum seekers have 28 days to leave this housing; although those who receive a positive decision are eligible for social housing and other public services, many face housing precarity and periods of homelessness (Cheung & Phillimore, 2017). Refugees also tend to have little wealth and low education levels (Cebulla et al., 2010), factors associated with poor health (Spencer, 2000) and education (Mortimore & Whitty, 1997) outcomes for children in the United Kingdom. Some centralized integration services for refugees provide language and employment training existed until 2010, when they were cut as part of austerity initiatives (Cheung & Phillimore, 2017). Hence I expect that in my period of study academic outcomes will improve over time, although perhaps not health and development.

H2a: Although children from groups with more refugees will have lower cognitive achievement scores at early ages, they will close the gap by adolescence.

H2b: Children from groups with higher proportions of refugees will exhibit higher rates of obesity and more socioemotional developmental difficulties.

Luthra et al. use a measure of average skin color to capture Portes and Rumbaut's (1990/2014) "societal reception," arguing that "if the biases associated with colorism entail systematically unequal forms of treatment, then population-wide averages in the lightness or darkness of skin color should create systematic intergroup effects" (Luthra et al., 2018b, p. 95). Skin color may be a less salient stratifying characteristic in the United Kingdom, so I instead focus on a measure of discrimination likelihood from Di Stasio and Heath's (2019) meta-analysis of field or audit studies. The authors combine data from 11 British experiments on ethnic discrimination in the labor market between 1969 and 2017. Such "societal reception" in the labor market likely translates to outcomes for children in these ethnic groups; there is clear evidence that racial discrimination is linked to lower achievement (Archer, 2003) and worse health outcomes in the United Kingdom (Karlsen & Nazroo, 2002). Hence I expect that this measure will be associated with poorer outcomes.

H3: Groups subject to higher likelihood of labor market discrimination will also see lower achievement scores, greater socioemotional difficulties, and higher likelihood of obesity.

An important group-level factor with much more salience in the United Kingdom than the United States is colonial legacy. With most of the significant immigrant groups to the United Kingdom coming from former colonial holdings, the question arises as to how such ties impact children in these groups. Some scholars argue that Britain has failed to incorporate its postcolonial subjects and that they are subject to unique discrimination and structural disadvantage (Gilroy, 2004). The importance of colonial legacy is laid bare by same-group comparisons across countries. For example, Tienda (2005, p. 44) writes that "[o]ne important puzzle that emerges from a comparison of minority and immigrant youth in the United States and United Kingdom concerns the plight of Caribbean Blacks, who in relative terms fare poorly in the United Kingdom but not in the United States." Although many factors are certainly at work in contributing to this disparity,

colonial legacy is one important dimension of difference that may contribute to poorer outcomes for Black Caribbean children in the United Kingdom. I thus expect former colonial ties to have negative effects.

H4: The children of parents from former colonial holdings will have lower achievement scores, more socioemotional difficulties, and higher likelihood of obesity.

Lastly, I incorporate “context of emigration” by testing a measure of culture of the parents’ sending country. Much previous work on contextual effects ignores variation across sending countries, but Waldinger and Catron (2016, p. 48) argue that “the relevant contexts are not limited to the exogenous factors confronted in the society of reception but extend to the endogenous contextual influence deriving from the society of origin.” Although children born to immigrant parents often are not immersed in their parents’ national culture, “parental influences are conditioned by the home country environment in which they grew up” (Waldinger & Catron, 2016, p. 48) and hence the national environment of the parents may exert an independent effect on children’s outcomes. Following Luthra et al. (2018b), I conceive of variations in sending-country cultures as variations in values and rely on the World Values Survey (Robert Inglehart et al., 2014). This survey’s composite measures are ideal because they provide “a parsimonious yet comprehensive measure of sending-country culture that [. . .] exert[s] an impact across a variety of domains” (Luthra et al., 2018b, p. 54).

Welzel (2013) argues that two composite scales are most relevant for the World Values Survey. Essential to the rise of modern democratic societies is the spread of “emancipatory values” that give people a sense of control over their own lives. These are counterposed with “protective values” that represent more traditional cultures. The other dimension is between sacred and secular values. For example, Sweden ranks high on both secular and emancipative values, while Libya ranks low on each, falling toward the protective, sacred corner of the two-

dimensional value space. Luthra et al. (2018b) found that children of parents from more secular countries tended to have more favorable outcomes, while the emancipatory-protective dimension was not significant in their models with controls. I use their findings as a baseline hypothesis:

H5a: Children of parents from more secular countries will enjoy higher cognitive test scores, less socioemotional difficulties, and lower rates of obesity.

H5b: The emancipatory-protective value dimension will be insignificant in the full models.

Data and Methods

The data for this study come from the Millennium Cohort Study (MCS), which began with nearly 20,000 children born in the United Kingdom around the year 2000 and has now collected data in six survey waves (Centre for Longitudinal Studies, 2019). Outcomes of interest include *verbal and quantitative cognitive test scores* (

Table 1); *socioemotional development* measured by the Strengths and Difficulties Questionnaire's (SDQ) total difficulties score that ranges from 0 to 40, with a standard deviation of about 5 and higher numbers implying more difficulties (Youth in Mind, 2012); and a binary indicator for *obesity*. Verbal and quantitative scores are standardized to have a mean of 50 and a standard deviation of 10 within each survey wave. Outcomes are available at ages 3, 5, 7, 11, and 14, except for quantitative score, which is not present at age 14. The sample sizes vary by outcome, with 14,795 individuals for verbal scores, 14,793 for quantitative scores, 14,814 for SDQ, and 14,795 for obesity.

[TABLE 1 ABOUT HERE]

Although not all individuals provide outcomes for each wave, such missing data are handled well by multilevel models for change (Singer & Willett, 2003). Analysis proceeds in two steps, each using hierarchical models fit using restricted maximum likelihood estimation with the

lme4 package in R. First, in a similar implementation to that of Luthra et al. (2018a, 2018b), two-level models are fit to cross-sectional data at ages 3 and 11. In these, individual outcomes are at level 1 and parents' country of birth are at level 2. In the second set of analyses, three-level models go beyond the work of Luthra and colleagues by incorporating measures over time. In these, person-period outcomes are at level 1, which are clustered within individuals at level 2, assigned to parents' country of birth at level 3. All models include individual or group explanatory variables and controls at each level.

The birthplace of the main parent respondent (usually mother) is used in most cases to determine immigrant group; when the main parent is born in the UK and the partner is born abroad, partner's birthplace is used. Due to the construction of some of the contextual variables (see below), only countries identifiable in the British Labour Force Survey (LFS) are included, resulting in over 2,000 children of immigrants from 118 origin countries available in the MCS for analysis. Most group-level measures of context are averaged over multiple years to reduce measurement error from the LFS and to operationalize the idea that societal perceptions of immigrants groups take time to develop.

I use four measures of context of reception to test the hypotheses from the previous section. *Average age left full-time education* takes an average of weighted values from the LFS for each immigrant group, using the years 1988-2000. Taking yearly UNHCR statistics of permanent and temporary refugees by country of origin, *proportion with refugee status* divides this number by total number of immigrants by country of origin estimated from the LFS. The average is taken over 1988-2000 for non-missing values. *Discrimination* relies on log relative risk-ratio of discrimination likelihood estimates from Di Stasio and Heath's (2019) metanalysis of field experiments (also known as audit studies). Since these studies cover only a limited number of

ethnicities, Muslim-majority countries are assigned the “Pakistani” risk-ratio; Japan, Korea, Singapore, and Taiwan receive the “Chinese” risk-ratio; and other Asian countries receive the (South) “Asian” risk-ratio. The meta-analysis contains separate estimates for Black Caribbean, African, and white non-British that I use in my analysis, and white British-born is the reference category for all risk-ratios. Lastly, a categorical variable for former British colony, not a British former colony, or the United Kingdom (reference category) constitutes a measure of *colonial history*.

Context of emigration is measured using sending-country values based on the World Values Survey (Robert Inglehart et al., 2014). I use Welzel’s (2013) measures refined from the original scales formulated by Inglehart and Welzel (2005). *Sacred-vs.-Secular Values (SVI)* measures a country’s distance to secular or sacred values, with high numbers representing a more secular country. High values of *Protective-vs.-Emancipative Values (EVI)*, on the other hand, represent higher levels of motivational empowerment, as opposed to deference to authority. Both SVI and EVI are composite measures based on average responses to a number of survey questions. These two variables are averaged over all available surveys for 1981-2014 and standardized to have a mean of 0 and range from -2 to 2, then centered at the values for the United Kingdom. These measures are available for 108 countries, but 37 of the 118 MCS countries were still missing SVI and 36 were missing EVI. (At the individual level, EVI was missing for 2.29 percent of respondents and SVI was missing for 2.30 percent.) These scores were multiply imputed using predictive mean matching in R’s *mice* package, using 20 imputed data sets (see Online Appendix for mean imputed values). Following Luthra et al.’s (2018b) method for imputing values, predictors include the country-level variables above; World Bank data on GDP, high-tech exports, GINI index, female-to-male labor force participation rate, contraceptive prevalence, and research

and development expenditure; Barro-Lee (2013) estimates of average educational attainment; Human Development Index (HDI) as reported by the UN; and Polity IV scores for level of democracy.

Finally, a number of individual controls enter the multilevel models. Four are time-invariant: *sex* is a binary indicator with male as the reference category, *sampling stratum* is a nine-category variable representing the original assignment in stratified random sampling (including advantaged and disadvantaged regions), *oldest child* is a binary indicator for being first-born child in the family, and *age parents left full-time education* captures the highest value, between the two parents, over all available survey waves. The remaining individual controls vary by survey wave. The 13-category *region of residence* captures if the interview of the current survey was conducted in Wales, Scotland, Northern Ireland, or one of nine English regions. *Income quintile* is a five-category variable ranking income based on the weighted sample for a given survey wave. Five-category *occupational class* captures the more-skilled between the two parents, measured by the National Statistics Socio-economic Classification (NS-SEC). *Home language environment* indicates whether the language spoken in the home is English only, no English, or multilingual. I also include the number of *siblings* and a categorical *parents* variable for where there are one or two parents/caregivers in the house.

Findings

Descriptive results

Using ethnicity to group outcomes hides considerable heterogeneity between nationalities. **Figure 1** uses a typical grouping, showing the trajectories of outcomes for Black, South Asian, and White (non-British) children of immigrants alongside those of White British children. By adolescence,

most differences appear small. However, compare these to the outcomes for one ethnicity disaggregated by national group, shown in **Figure 2**. Here we see that children of immigrants classified as “White” by most studies are a heterogeneous group. Whereas children of immigrants from Germany have high test scores and fairly low risks of developmental difficulties and obesity, those with parents from Yemen tend to have somewhat lower quantitative test scores, more socioemotional difficulties, and a high likelihood of obesity. National-origin decomposition of other ethnic groups reveals similar heterogeneity. Multilevel models allow not only the disaggregation of these outcomes by national group rather than ethnic, but also empowers the analysis of group-level factors that may be contributing to these macroscopic divergences.

[FIGURE 1 ABOUT HERE]

[FIGURE 2 ABOUT HERE]

Multilevel models

Drawing on cross-sectional data, the first multilevel models (results in Online Appendix) have only two levels: individuals clustered within countries of parents’ origin. I compare models for outcomes at ages 3 and 11. When individual controls are included, most group-level variables are rendered insignificant. This near-replication of Luthra et al.’s (2018b) mostly null results in cross-sectional data, however, misses the complexities that emerge when their framework is extended to longitudinal data.

The next four figures represent the three-level models. (Full regression tables are located in the Online Appendix.) The restricted models include only group-level independent variables, whereas the full models add individual controls. Here I focus on the full models. The *Age* variable is interacted with all other variables and allowed to vary by subject, resulting in random-intercept,

random-slope models; its interaction with group-level factors (e.g. “Age*SVI”) demonstrates their effects on the slope of the individual growth model for a given outcome.

For verbal scores (**Error! Reference source not found.**), only the proportion refugees retains a significant effect on starting verbal score once individual controls are included, implying that children of immigrants from groups with more refugees tend to perform worse on their verbal test at age 3. More group-level factors have significant effects on the slope of the verbal trajectory, however. Groups with a greater share of refugees and without a colonial history get a boost to their rate of progress. Other factors are marginally significant: groups at greater risk of discrimination and those with a colonial history may also have children with a quicker rate of progression.

[FIGURE 3 ABOUT HERE]

[FIGURE 4 ABOUT HERE]

Figure 4 shows the models for quantitative scores. Although the restricted quantitative model is similar to the restricted verbal model, the full model with individual controls leaves only one variable significant: the average age left full-time education. Children of immigrants from more highly educated groups tend to have higher age-3 scores, but they also tend to have a less steep slope in their trajectory. This implies that any early advantage in quantitative skills dissipates as children progress through schooling.

Moving on to non-academic measures, the full model for SDQ total difficulties scores leaves age-3 outcomes entirely unaffected by group-level factors, as shown in **Figure 5**. For slope, however, the discrimination ratio has a significant positive effect: immigrant groups more likely to face discrimination are also more likely to have children who develop socioemotional difficulties as they age. Two other variables are marginally significant for slope: groups with a higher proportion refugees have children with less developmental difficulties as they age, and

those from countries with more emancipatory values have more difficulties. Finally, the full multilevel linear probability model for obesity shows few significant effects for group-level variables (**Figure 6**). The exception is for sending-country values: children of immigrants from countries with higher SVI (more secular) and lower EVI (less emancipatory) have a slightly steeper slope; these children experience increasing risk of obesity as they age.

[FIGURE 5 ABOUT HERE]

[FIGURE 6 ABOUT HERE]

Simulations

Simulations further show that group characteristics significantly affect outcome trajectories, even when individual controls are included (**Figure 7**). Each of these plots depicts the predicted outcomes for a typical (mean or modal, depending on the variable) child of immigrants in the dataset, varying only one group-level factor from its minimum to its maximum in the data. The most significant group-level factor from the full models is chosen to vary. These simulations are computed for each of the 20 models estimated from imputed data and then averaged together to yield the results shown in the figure. We see that groups with the highest proportion of refugees are expected to begin far below the average verbal score of 50, but by age 14 tend to catch up. Quantitative scores show only slight differences between the two groups (recalling that the standard deviation is 10 for these scores). Obesity likelihood predictions show that children of immigrants from more secular countries, such as the United States and nations of western Europe, tend to have higher rates of obesity at older ages, jumping from 5% to over 15% probability. Finally, SDQ scores show that children of groups more likely to experience discrimination tend to have more socioemotional developmental difficulties, compared to groups at low risk of discrimination (however these differences are small: about one fifth of a standard deviation).

[FIGURE 7 ABOUT HERE]**Discussion and Conclusion**

The full models and simulations give support for a number of this paper's hypotheses. First, regarding ethnic capital — measured by *average age left full-time education* — the models show coefficients in the expected favorable direction for each outcome, as predicted by H1. However only the coefficient in the model for quantitative scores remains significant in the final model. The results support the idea that children from groups benefiting from higher levels of ethnic capital achieve higher quantitative scores. But the negative sign on the slope coefficient for ethnic capital shows that this effect diminishes at higher ages. These results are somewhat in line with work both in the United States and United Kingdom on the ethnic capital of high-achieving groups; whereas Lee and Zhou (2015) demonstrate the importance of ethnic capital for educational outcomes of Asian Americans and Archer and Francis (2007) do similarly for British Chinese, my results indicate that group-level education may be important for the educational outcomes of many other ethnic groups in the United Kingdom, albeit more at younger ages than older.

The second set of hypotheses concerned governmental reception, as measured by proportion with refugee status. Hypothesis 2a addressed cognitive achievement scores, and the full model for verbal scores gives support that groups with high proportions of refugees begin at a disadvantage but catch up over time. The poverty and trauma that many refugee groups have experienced likely impact these early scores, and the resources provided during resettlement may explain the narrowing of the gap over time. For quantitative scores, however, the proportion refugees is significant only in the restricted model; this measure of governmental reception does not appear important for quantitative scores once individual factors are accounted for. Hypothesis

2b predicted that groups with higher proportions of refugees would have higher rates of obesity and more socioemotional difficulties. Although the restricted model for obesity supports this hypothesis, coefficients in the full models for both SDQ and obesity are all insignificant. For most outcomes, individual factors explain much more of the variation than does proportion refugee status. One limitation in this analysis is that there is no measure of *individual* refugee status in the MCS; hence this measure may confound group- and individual-level attributes.

Moving on to discrimination likelihood, my third hypothesis predicted that groups subject to more discrimination would have less favorable outcomes for all variables considered. Although models without controls indicate that higher likelihood of discrimination is associated with lower verbal and quantitative scores, in the full models this variable does not have a significant effect on the intercept for any of the outcomes. It remains significant at the 5-percent level only for the slope of verbal scores, but in the positive direction. Despite evidence that racial discrimination is linked to lower achievement (Archer, 2003), groups with higher likelihood of discrimination in fact do *better* in verbal scores over time, according to this model. This may have something to do with the generally high levels of academic achievement of ethnic minorities in the United Kingdom at older ages (Hoffmann, 2018). Shah et al. (2010) suggest that ethnic minority families see education as a more sure path of social mobility in a society that places them at structural risk of discrimination; this positive slope value may represent such agentic resistance to discriminatory barriers.

The fourth hypothesis expected poorer outcomes for children from groups with former colonial ties to the British Empire. This categorical variable was insignificant at the 5-percent level in all models except for verbal scores: in both the restricted and full models, there was a significant positive effect on the slope for children with parents born abroad in countries with no British colonial links. This is relative to children with British-born parents or children with parents born

in former colonial holdings, for which the models suggest no significant difference. Hence there is not good support for H4 across any of the outcomes: despite other work pointing to the importance of postcolonialism (Gilroy, 2004), having parents born in a country with former colonial ties is not associated with undesirable outcomes in these models.

The last set of hypotheses dealt with sending-country values. I expected children of parents from more secular countries (higher SVI) to generally have better outcomes (H5a), and for the protective-vs.-emancipative (EVI) dimension to be insignificant (H5b). This was not the case in the models: both SVI and EVI were insignificant for both intercept and slope in all models except for obesity. In these, children with parents from more secular countries had *higher* slopes for obesity in the full model, and the EVI dimension was also significant, with more emancipatory values connected to lower rates of obesity at older ages. It is difficult to say what is driving these results, but diet may be a contributing factor. For example, it is well known that the “Western diet” is associated with higher rates of obesity (Kanoski & Davidson, 2011). Parents from less secular countries may be less likely to adopt this Western diet for their children. At the same time, it is difficult to say why countries with more emancipative values would see lower likelihood of obesity, but perhaps the highly emancipative Nordic countries, whose diets promote relatively low rates of obesity (Kanerva et al., 2013), are driving the trend. Future work should further investigate this trend.

In conclusion, the context of reception — measured by group education, proportion refugee, and likelihood of discrimination — appears more important than sending-country values for the academic and developmental outcomes of children, both at age 3 and over time. Sending-country values do exert their influence marginally in the socioemotional development models and significantly in the model for obesity. Specifically, for verbal scores, refugee groups appear

initially disadvantaged but catch up over time. Group-level education or ethnic capital may provide advantages at first in quantitative skills but not in the long run. As for socioemotional development, there seems to be no difference at younger ages, but groups at higher risk for discrimination have more difficulties as they age. Finally, we see a higher risk of obesity over time for groups from more secular and protective cultures.

This study highlights the importance of disaggregating group-level factors into their component parts. Studies of contextual effects in the past have grouped children of immigrants by parent's nationality, but traditional analyses of this type (e.g. Portes et al., 2005; Portes & MacLeod, 1996) sort immigrant groups *a priori* into advantaged, disadvantage, and neutral modes of incorporation. Such categorizing, although more illuminative than classifying by ethnicity, hides important variation between national groups, as highlighted in this paper's descriptive statistics. Disaggregating nationality into discrete components of context of reception and of emigration allows adjudication of their relative importance in the incorporation process without *a priori* assertion of level of advantage. In contrast to Luthra et al. (2018a, 2018b), however, who found a much greater role for individual factors compared to group-level ones, this study shows that group-level factors *do* matter, as illustrated by **Figure 7**. Such importance is evident when the scope of study is extended across time and to factors besides education.

This study is characterized by some limitations that future studies should try to overcome. First, without an individual-level measure of refugee status, models may confound individual- and group-level effects for refugees. Hence a more reliable measure of governmental reception could be considered in future studies. Secondly, although multilevel models are excellent for disaggregating nested variables, they do not provide a causal analysis (Gelman, 2012). A natural experiment could be a promising source of causal insight for some group-level variables, such as

a sudden change in refugee policy, but most of these group-level variables are slow to change. Cross-national research could better perhaps isolate these effects — is a group level factor that is important in one country also relevant in another? — but comparable cross-national data on immigrants is rare. Lastly, future studies could look at a range of other outcomes to which group-level factors might be linked, such as entry to higher education, occupation, mortality, and other measures of health.

Acknowledgements

I give my deepest thanks to Roger Waldinger, Ka-Yuet Liu, Jennie Brand, Michael Gaddis, the members of the Migration Working Group and the Stratification, Inequality, and Mobility Working Group at UCLA for all of their valuable feedback on previous versions of this paper.

Disclosure statement

No potential conflict of interest was reported by the author.

References

- Alba, R., Sloan, J., & Sperling, J. (2011). The Integration Imperative: The Children of Low-Status Immigrants in the Schools of Wealthy Societies. *Annual Review of Sociology*, 37(1), 395–415. <https://doi.org/10.1146/annurev-soc-081309-150219>
- Archer, L. (2003). *Race, masculinity and schooling: Muslim boys and education*. Open University Press.
- Archer, L., & Francis, B. (2007). *Understanding minority ethnic achievement: Race, gender, class and “success.”* Routledge.
- Bakker, L., Cheung, S. Y., & Phillimore, J. (2016). The Asylum-Integration Paradox: Comparing Asylum Support Systems and Refugee Integration in The Netherlands and the UK. *International Migration*, 54(4), 118–132. <https://doi.org/10.1111/imig.12251>
- Barro, R. J., & Lee, J. W. (2013). A new data set of educational attainment in the world, 1950–2010. *Journal of Development Economics*, 104, 184–198. <https://doi.org/10.1016/j.jdeveco.2012.10.001>
- Becker, G. S. (1962). Investment in Human Capital: A Theoretical Analysis. *Journal of Political Economy*, 70(5), 9–49.
- Borjas, G. J. (1992). Ethnic Capital and Intergenerational Mobility. *The Quarterly Journal of Economics*, 107(1), 123–150. <https://doi.org/10.2307/2118325>
- Cebulla, A., Daniel, M., & Zurawan, A. (2010). *Spotlight on refugee integration: Findings from the Survey of New Refugees in the United Kingdom* (Research Report No. 97). Home Office.
- Centre for Longitudinal Studies. (2019). *Welcome to the Millennium Cohort Study*. <https://cls.ucl.ac.uk/cls-studies/millennium-cohort-study/>
- Cheung, S. Y., & Phillimore, J. (2017). Gender and Refugee Integration: A Quantitative Analysis of Integration and Social Policy Outcomes. *Journal of Social Policy*, 46(2), 211–230. <https://doi.org/10.1017/S0047279416000775>
- Coard, B. (1971). *How the West Indian child is made educationally subnormal in the British school system: The scandal of the black child in schools in Britain*. New Beacon for the Caribbean Education and Community Workers’ Association.
- Coleman, J. S. (1988). Social Capital in the Creation of Human Capital. *American Journal of Sociology*, 94, S95–S120. <https://doi.org/10.1086/228943>
- Connor, P., & Passel, J. S. (2019). *Europe’s Unauthorized Immigrant Population Peaks in 2016, Then Levels Off*. Pew Research Center. <https://www.pewresearch.org/global/2019/11/13/europes-unauthorized-immigrant-population-peaks-in-2016-then-levels-off/>
- DfE. (2010). *Schools, pupils and their characteristics: January 2010*. Department for Education. <https://www.gov.uk/government/statistics/schools-pupils-and-their-characteristics-january-2010>
- DfE. (2018). *Schools, pupils and their characteristics: January 2018*. Department for Education.
- DfES. (2006). *Ethnicity and Education: The Evidence on Minority Ethnic Pupils aged 5–16*. Department for Education and Skills.
- Di Stasio, V., & Heath, A. (2019). *Are employers in Britain discriminating against ethnic minorities?* The GEMM Project.
- Gelman, A. (2012). Multilevel (Hierarchical) Modeling: What It Can and Cannot Do. *Technometrics*, 48(3), 432–435. <https://doi.org/10.1198/004017005000000661>

- Gillborn, D. (2008). Coincidence or Conspiracy? Whiteness, Policy and the Persistence of the Black/White Achievement Gap. *Educational Review*, 60(3), 229–248.
<https://doi.org/10.1080/00131910802195745>
- Gillborn, D., & Mirza, H. S. (2000). *Mapping Race, Class and Gender: A synthesis of research evidence*. Ofsted.
- Gilroy, P. (2004). *After Empire: Melancholia Or Convivial Culture?* Routledge.
- Giunti, S., & Oncini, F. (2019). Language Use and Children’s BMI Growth among Second-Generation Immigrants in the United Kingdom. *International Migration Review*, 53(4), 1107–1120. <https://doi.org/10.1177/0197918318798336>
- Gordon, M. M. (1964). *Assimilation in American Life*. Oxford University Press.
- Haller, W., Portes, A., & Lynch, S. M. (2011). Dreams Fulfilled, Dreams Shattered: Determinants of Segmented Assimilation in the Second Generation. *Social Forces*, 89(3), 733–762. JSTOR.
- Hoffmann, N. I. (2018). Cognitive achievement of children of immigrants: Evidence from the Millennium Cohort Study and the 1970 British Cohort Study. *British Educational Research Journal*, 44(6), 1005–1028. <https://doi.org/10.1002/berj.3476>
- Inglehart, Robert, Haerpfer, C., Moreno, A., Welzel, C., & Kizilova, K. (2014). *World Values Survey: All Rounds—Country-Pooled Datafile Version* [Data set]. JD Systems Institute. <http://www.worldvaluessurvey.org/WVSDocumentationWVL.jsp>
- Inglehart, Ronald, & Welzel, C. (2005). *Modernization, cultural change, and democracy: The human development sequence*. Cambridge University Press.
- Jackson, M. I., Kiernan, K., & McLanahan, S. (2012). Immigrant–Native Differences in Child Health: Does Maternal Education Narrow or Widen the Gap? *Child Development*, 83(5), 1501–1509. <https://doi.org/10.1111/j.1467-8624.2012.01811.x>
- Kanas, A., & van Tubergen, F. (2009). The Impact of Origin and Host Country Schooling on the Economic Performance of Immigrants. *Social Forces*, 88(2), 893–915. JSTOR.
- Kanerva, N., Kaartinen, N. E., Schwab, U., Lahti-Koski, M., & Männistö, S. (2013). Adherence to the Baltic Sea diet consumed in the Nordic countries is associated with lower abdominal obesity. *British Journal of Nutrition*, 109(3), 520–528.
<https://doi.org/10.1017/S0007114512001262>
- Kanoski, S. E., & Davidson, T. L. (2011). Western diet consumption and cognitive impairment: Links to hippocampal dysfunction and obesity. *Physiology & Behavior*, 103(1), 59–68.
<https://doi.org/10.1016/j.physbeh.2010.12.003>
- Karlsen, S., & Nazroo, J. Y. (2002). Relation Between Racial Discrimination, Social Class, and Health Among Ethnic Minority Groups. *American Journal of Public Health*, 92(4), 624–631. <https://doi.org/10.2105/AJPH.92.4.624>
- Kennedy, S., Kidd, M. P., McDonald, J. T., & Biddle, N. (2015). The Healthy Immigrant Effect: Patterns and Evidence from Four Countries. *Journal of International Migration and Integration*, 16(2), 317–332. <https://doi.org/10.1007/s12134-014-0340-x>
- Lee, J., & Zhou, M. (2015). *The Asian American achievement paradox*. Russell Sage Foundation.
- Lee, R. (2018). How are the Children of Immigrants Assimilating? The Effects of Individual, Neighborhood, Coethnic Community, and National Origin Group Characteristics on Education in San Diego. *International Journal of Sociology of Education*, 7(2), 123.
<https://doi.org/10.17583/rise.2018.2354>

- Levels, M., Dronkers, J., & Kraaykamp, G. (2008). Immigrant Children's Educational Achievement in Western Countries: Origin, Destination, and Community Effects on Mathematical Performance. *American Sociological Review*, 73(5), 835–853. <https://doi.org/10.1177/000312240807300507>
- Luthra, R., Soehl, T., & Waldinger, R. (2018a). Reconceptualizing Context: A Multilevel Model of the Context of Reception and Second-Generation Educational Attainment. *International Migration Review*, 52(3), 898–928. <https://doi.org/10.1177/0197918318781837>
- Luthra, R., Soehl, T., & Waldinger, R. (2018b). *Origins and Destinations: The Making of the Second Generation*. Russell Sage Foundation.
- Martinson, M. L., McLanahan, S., & Brooks-Gunn, J. (2012). Race/Ethnic and Nativity Disparities in Child Overweight in the United States and England. *The ANNALS of the American Academy of Political and Social Science*, 643(1), 219–238. <https://doi.org/10.1177/0002716212445750>
- Meunier, M., de Coulon, A., Marcenaro-Gutierrez, O., & Vignoles, A. (2013). A longitudinal analysis of UK second-generation disadvantaged immigrants. *Education Economics*, 21(2), 105–134. <https://doi.org/10.1080/09645292.2011.568605>
- Modood, T. (2004). Capitals, ethnic identity and educational qualifications. *Cultural Trends*, 13(2), 87–105. <https://doi.org/10.1080/0954896042000267170>
- Mortimore, P., & Whitty, G. (1997). *Can school improvement overcome the effects of disadvantage?* (Rev.). Institute of Education, University of London.
- ONS. (2011). *Parents' country of birth 2010*. Office for National Statistics.
- ONS. (2018a). *Parents' country of birth 2017*. Office for National Statistics. <https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/livebirths/bulletins/parentscountryofbirthenglandandwales/2017>
- ONS. (2018b). *Population of the United Kingdom by country of birth and nationality: July 2018 to June 2018*. Office for National Statistics. <https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/internationalmigration/datasets/populationoftheunitedkingdombycountryofbirthandnationality>
- Phillips, D. (2006). Moving Towards Integration: The Housing of Asylum Seekers and Refugees in Britain. *Housing Studies*, 21(4), 539–553. <https://doi.org/10.1080/02673030600709074>
- Portes, A., & Fernández-Kelly, P. (2008). No Margin for Error: Educational and Occupational Achievement among Disadvantaged Children of Immigrants. *The ANNALS of the American Academy of Political and Social Science*, 620(1), 12–36. <https://doi.org/10.1177/0002716208322577>
- Portes, A., Fernández-Kelly, P., & Haller, W. (2005). Segmented assimilation on the ground: The new second generation in early adulthood. *Ethnic and Racial Studies*, 28(6), 1000–1040. <https://doi.org/10.1080/01419870500224117>
- Portes, A., & MacLeod, D. (1996). Educational Progress of Children of Immigrants: The Roles of Class, Ethnicity, and School Context. *Sociology of Education*, 69(4), 255–275. JSTOR. <https://doi.org/10.2307/2112714>
- Portes, A., & Rumbaut, R. G. (2001). *Legacies: The Story of the Immigrant Second Generation*. University of California Press.
- Portes, A., & Rumbaut, R. G. (2014). *Immigrant America: A Portrait*. University of California Press. (Original work published 1990)

- Portes, A., & Zhou, M. (1993). The New Second Generation: Segmented Assimilation and Its Variants. *Annals of the American Academy of Political and Social Science*, 530, 74–96.
- Shah, B., Dwyer, C., & Modood, T. (2010). Explaining Educational Achievement and Career Aspirations among Young British Pakistanis: Mobilizing ‘Ethnic Capital’? *Sociology*, 44(6), 1109–1127. <https://doi.org/10.1177/0038038510381606>
- Singer, J. D., & Willett, J. B. (2003). *Applied Longitudinal Data Analysis: Modeling Change and Event Occurrence*. Oxford University Press.
- Spencer, N. (2000). *Poverty and child health* (2nd ed.). Radcliffe Medical Press.
- Strand, S. (2012). The White British–Black Caribbean achievement gap: Tests, tiers and teacher expectations. *British Educational Research Journal*, 38(1), 75–101. <https://doi.org/10.1080/01411926.2010.526702>
- Strand, S. (2014). School effects and ethnic, gender and socio-economic gaps in educational achievement at age 11. *Oxford Review of Education*, 40(2), 223–245. <https://doi.org/10.1080/03054985.2014.891980>
- Strand, S., Malmberg, L., & Hall, J. (2015). *English as an Additional Language (EAL) and educational achievement in England: An analysis of the National Pupil Database*. University of Oxford Department of Education.
- Sturge, G. (2020, March 17). *Asylum Statistics*. House of Commons Library. <https://commonslibrary.parliament.uk/research-briefings/sn01403/>
- Tienda, M. (2005). Growing Up Ethnic in the United Kingdom and the United States: Comparative Contexts for Youth Development. In M. Rutter & M. Tienda (Eds.), *Ethnicity and Causal Mechanisms* (pp. 21–49). Cambridge University Press.
- Vargas-Silva, C., & Rienzo, C. (2019, October 12). *Migrants in the UK: An Overview*. Migration Observatory. <https://migrationobservatory.ox.ac.uk/resources/briefings/migrants-in-the-uk-an-overview/>
- Vermeulen, H. (2010). Segmented assimilation and cross-national comparative research on the integration of immigrants and their children. *Ethnic and Racial Studies*, 33(7), 1214–1230. <https://doi.org/10.1080/01419871003615306>
- Vertovec, S. (2007). Super-diversity and its implications. *Ethnic and Racial Studies*, 30(6), 1024–1054. <https://doi.org/10.1080/01419870701599465>
- Waldinger, R., & Catron, P. (2016). Modes of incorporation: A conceptual and empirical critique. *Journal of Ethnic and Migration Studies*, 42(1), 23–53. <https://doi.org/10.1080/1369183X.2015.1113742>
- Warner, W. L., & Srole, L. (1945). *The social systems of American ethnic groups*. Oxford University Press.
- Welzel, C. (2013). *Freedom Rising: Human Empowerment And The Quest For Emancipation*. Cambridge University Press.
- Xie, Y., & Greenman, E. (2011). The social context of assimilation: Testing implications of segmented assimilation theory. *Social Science Research*, 40(3), 965–984. <https://doi.org/10.1016/j.ssresearch.2011.01.004>
- Youth in Mind. (2012). *Information for researchers and professionals about the Strengths & Difficulties Questionnaires*. <https://www.sdqinfo.com/>

Tables

	Wave 2 (age 3)	Wave 3 (age 5)	Wave 4 (age 7)	Wave 5 (age 11)	Wave 6 (age 14)
Verbal assessments					
BAS Naming Vocabulary	X	X			
BAS Word Reading			X		
BAS Verbal Similarities				X	
Word Activity					X
Quantitative assessments					
BSR Numbers/Counting	X				
BAS Pattern Construction		X	(X)		
NFER Number Skills			X		
CANTAB Spatial Working Memory Task				X	

Table 1. Assessments in the MCS. Since two quantitative assessments were administered at age 7, I use only NFER Number Skills in the following analysis to continue the trend of different assessments administered in each wave.

Figures

Figure 1. MCS outcomes by ethnicity at ages 3, 5, 7, 11, and 14 (except for quantitative data). All groups except White British include only children of immigrants. Survey weights included for all measures.

Figure 2. MCS outcomes by children of parents from Germany, Turkey, and Yemen at ages 3, 5, 7, 11, and 14 (except for quantitative data). Survey weights included for all measures.

Figure 3. Verbal score 3-level models with 95% confidence intervals, using MCS waves 2 through 6. Blue indicates significant at the 95% level, black is significant at the 90% level, and gray is insignificant. The restricted model contains no individual controls, while the full model contains controls for sex, sampling stratum, oldest child, age parents left full-time education, region of residence, income quintile, occupational class, home language environment, number of siblings, and family structure.

Figure 4. Quantitative score 3-level models with 95% confidence intervals, using MCS waves 2 through 5. Blue indicates significant at the 95% level, black is significant at the 90% level, and gray is insignificant. The restricted model contains no individual controls, while the full model contains controls for sex, sampling stratum, oldest child, age parents left full-time education, region of residence, income quintile, occupational class, home language environment, number of siblings, and family structure.

Figure 5

Figure 5. Socioemotional Difficulties Total Difficulties Score 3-level models with 95% confidence intervals, using MCS waves 2 through 6. Blue indicates significant at the 95% level, black is significant at the 90% level, and gray is insignificant. The restricted model contains no individual controls, while the full model contains controls for sex, sampling stratum, oldest child, age parents left full-time education, region of residence, income quintile, occupational class, home language environment, number of siblings, and family structure.

Figure 6

Figure 6. Obesity 3-level probability models with 95% confidence intervals, using MCS waves 2 through 6. Blue indicates significant at the 95% level, black is significant at the 90% level, and gray is insignificant. The restricted model contains no individual controls, while the full model contains controls for sex, sampling stratum, oldest child, age parents left full-time education, region of residence, income quintile, occupational class, home language environment, number of siblings, and family structure.

Figure 7. Simulations of verbal, quantitative, obesity, and development score using MCS Study data from ages 3, 5, 7, 9, 11, and 14.