RESEARCH ARTICLE

Nonlinear relationships between human development and international student mobility: The prominent role of employment prospects and cultural and linguistic ties

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Abstract

Higher education is a key global market and considerable literature has focused on investigating the determinants of international student mobility (ISM). However, less is known about the extent to which the relative influence of these factors is moderated by local conditions and vary across origin countries. Drawing on a unique data set of undergraduate applications from the UK Colleges and Admissions Service, we analyse variations in the contextual determinants of ISM flows to the United Kingdom across countries of origin over a 10-year period (2009–2019). We run a suite of negative binomial gravity models to understand the key influences of ISM and uncover the spatial heterogeneity of these influences. Our findings reveal a nonlinear relationship between the level of development of origin countries and ISM flows. Although countries from higher development levels are more likely to send students to the United Kingdom, there appears to be a dip in applications at the mid-levels of development. Given the nonlinearity of this relationship, we seek to understand how countries across different levels of development respond to the typical factors that are seen to influence flows of international students. We also see substantial heterogeneity of the influence of different factors for origin countries, with some countries being influenced by employment opportunities and others by cultural and linguistic ties. However, this variation is not necessarily determined by the countries' level of development. Our findings have implications for policy makers, educators and researchers seeking to navigate and influence global student mobility trends. Our study highlights the need for tailored strategies to attract and retain international students from specific origin countries, recognising the multifaceted nature of ISM determinants.

KEYWORDS
applied demography, higher education, international student mobility, negative binomial gravity model

1 | INTRODUCTION

The number of students studying abroad has been rising consistently worldwide, reaching 5.8 million in 2018, a 33% increase from 2012 (UNESCO, 2021). Among popular destinations for international students, the United Kingdom ranks second after the United States in the total count of international students studying in the country. In 2019, the United Kingdom accounted for 8% of the global market share of international students, with around 19% of its total student population being from overseas (OECD, 2021, 2022). The contribution of international students to the UK economy was estimated at £28.9 billion in 2019, as reported by Hepi & UUKi (2021). Funding from international students is also a key to the viability of many UK Higher Education Institutions (HEIs),[1] with tuition fees of international students a major source of income for many universities. In the 2021/22 academic year, research income from academic fees from international students constituted a total of 21% of all total research income at UK universities (Bolton et al., 2023). As international student mobility (ISM) has increased, there has been a notable increase in the volume of research seeking to understand the determinants of these types of mobility. However, despite this growth, there is a gap in the empirical literature focusing on how the determinants which shape ISM into the United Kingdom vary by country of origin.

The factors that influence whether an individual decides to move abroad for higher education are varied and complex, oftentimes relying on a number of competing factors. A key set of theories on student mobility include the push–pull framework, where 'push' can be seen as a proxy for demand and 'pull' can be seen as a proxy for supply. 'Push' theories often focus on the relative economic opportunities afforded at the origin versus the destination such as relative gross domestic product (GDP) per capita (Bertoli & Moraga, 2013; McMahon, 1992; Zheng, 2014) and perceived prestige of an overseas education (Mazzarol & Soutar, 2002; Perkins & Neumayer, 2014; Weber & Van Mol, 2023). 'Pull' theories, on the other hand, consider factors that are particular to that destination such as: cost of living and studying (Mazzarol & Soutar, 2002); communities from the origin country in the potential destination (Beine et al., 2014; Mazzarol & Soutar, 2002); colonial relationships and cultural and linguistic ties (Beine et al., 2014; Massey et al., 1993; Weber & Van Mol, 2023).

A number of studies have uncovered influences that are particular to the United Kingdom as a destination. There has been mixed evidence surrounding the relative wealth of the origin country compared to the United Kingdom, with Zheng (2014) finding a negative association between origin country GDP per capita and the volume of international students to the United Kingdom. However, Naidoo (2007) found that there was a positive association between the income of the origin country and flows of international students. In relation to employment, however, Chien (2020) the prospect of improved employment opportunities is an important motivator in

wanting to study in the United Kingdom. However, understanding of the motivations to study into the United Kingdom specifically is an understudied field.

There are reasons to assume that these factors will operate in a heterogenous way across different origin countries and to not expect homogeneity in the relationships between ISM flows and these key contextual factors. We know from De Haas' (2010) theory of migration that there is a nonlinear relationship between economic development and net migration, where initially development increases levels of emigration, but once a country reaches a certain level of development, countries will transform into net immigration countries. In relation to ISM specifically, Weber & Van Mol (2023) identify that ISM similarly follows this nonlinear relationship, showing that global ISM have followed an inverted U-shape since 2007. From this finding, the authors assert that students from lower-developed countries tend to study in other lower-developed countries and students from highly developed countries to tend to study in other highly developed countries. We hypothesize that at different development levels, the factors that influence flows may vary. It could be expected that if countries at different development levels have greater or lesser tendency to send international students to the United Kingdom, then where countries do send students the influences of these flows will vary.

In this study, we empirically assess the impact of different determinants of ISM flows into the United Kingdom and consider in more detail the complexity of how these determinants vary in specific countries of origin. By examining how country-specific flows and motivations operate at a system level, new insights can be garnered on the decision-making process of undergraduate students from a variety of countries across development levels. Through this, we address the gap in the literature, which overlooks how the important influences of ISM vary in different country contexts.

This study uses data on successful applications of internationally mobile students over the 10-year period of 2009–2019. This decade allows us to consider these flows into the United Kingdom using both the pre-COVID and pre-Brexit time period. We assemble a unique data set of origin–destination data drawing on international student flows provided by the UK Colleges and Admissions Service (UCAS) and other ancillary data sources from the World Bank, CEPII Gravity Database, UNESCO and the Academic Ranking of World Universities (ARWU). In the United Kingdom, UCAS act as the main route for applications from students who want to study an undergraduate degree at a UK HEI and is the largest channel for ISM into the United Kingdom (UCAS, 2020). These data will be modelled in a suite of hierarchical gravity models to determine the extent and direction of key economic and social determinants of ISM, and uncover how these factors operate in unique and heterogeneous ways across countries at different levels of development.

Within this context, this study seeks to answer three key research questions:

1) What is the relationship between development level and flows of internationally mobile students into the United Kingdom?

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[1]In this context, an established HEI is one recognised as a university within the UCAS scheme (Singleton, 2010). In addition, universities that are not recognised as an official HEI by the Office for Students (OfS) have been removed (Office for Students, 2019).

2) What have been the key contextual factors influencing annual ISM flows into the UK between 2009 and 2019?

3) How do these factors vary in influence by development level and country of origin?

The study is structured into five main sections. The next section discusses the literature around development and migration, and how this relates to ISM before discussing the existing evidence on key determinants of ISM. We then discuss the data used for these analyses before describing our methodology, relaying on the use of hierarchical gravity models. We then present and discuss the results. We finally conclude by identifying the key findings of the study and the implications of our findings for future research.

2 | BACKGROUND

2.1 | Global patterns of internationally mobile students

An internationally mobile student can be defined as an individual who crosses an international border with the singular objective of participating in educational activities (UNESCO, 2015). As the world has become more globalized, there has been seen to be an increased process of internationalization of the higher education sector, whereby the delivery and functions of higher education at institutional and national levels have been integrated with increased international, intercultural and global dimensions (Knight, 2008). Part of this internationalization has been the increasing physical mobility of students across countries, the integration of research, the use of English as the lingua franca for the scientific community and the use of information technology that allows further dissemination of knowledge (Altbach & Knight, 2007; Teichler, 2017). These processes have led to increased movement and competition for international students by institutions and countries, with countries such as the United Kingdom enacting specific targeting and marketization policies to grow their international student body (Lomer, 2018; Rowe et al., 2013). Within this increasingly internationalized system, there have tended to be clear corridors of mobility from particular origin countries and towards particular destinations; with English-speaking countries tending to be the most attractive destinations for international students. Data from OECD (2018) shows that the United States, United Kingdom and Australia were the top three destinations for international students in 2018 by total count. Meanwhile, students from Asia made up the largest group of international students enrolled in overseas higher education, 57% of all mobile students across the OECD. Within this, China and India alone made up 30% of all mobile students in OECD countries. European international students made up the second largest group, constituting 23% of all mobile students in OECD countries (Ibid.) Students from Africa, the Americas and Oceania made up a smaller share of international flows, with the OECD highlighting the tendency for students from these regions to study locally.

Within the global context of higher education, the United Kingdom is a highly developed country where higher education is expensive for international students, with the average course fees for an international student being around £22,200 per year (British Council, 2023). In conjunction with the cost of UK higher education, there is an established tendency of highly developed countries attracting students from other highly developed countries (Shields, 2013; Weber & Van Mol, 2023). The result of these relationships is that the United Kingdom tends to attract students from highly developed countries. During 2019, the OECD (2021) reported that 49% of internationally mobile students studying in the United Kingdom were from high-income countries, 36.5% from upper and middle-income countries and 14% from lower and middle-income countries.

For the United Kingdom, there has been a continuous growth in the number of international students and this particularly persisted throughout the period of 2009–2019. Higher education in the United Kingdom has become increasingly marketized in the past few decades, beyond that of any other comparable country (Brown & Carasso, 2013; Holmwood, 2016; Scullion & Nixon, 2011). The impact of this marketization has been an increased reliance on tuition fee income to fund teaching and research activities, leading to an increase in recruitment of students to fund this gap (Brown & Carasso, 2013). As such, international students are a fundamental component of the financial functioning of UK HEIs. Therefore, increases in international student numbers are driven in part by a series of UK government and institution-based internationalization policies, which allow and encourage the country and HEIs to compete in the global education market (Lomer, 2018).

UCAS (2019) reported that the numbers of non-UK applicants and acceptances to UK HE increased in every year since 2012. These increases were largely driven by increased numbers of applications from Chinese and Indian students, as well as emerging markets such as Ghana, South Africa, Egypt and Nigeria. Traditionally, the key countries of origin that sent students to the United Kingdom between 2009 and 2019 have been Mainland China, Hong Kong,[2] Malaysia, France and India (UCAS, 2019). Of these in 2019, Mainland China made up 19% of international undergraduate student flows, Hong Kong 5.2%, France 4.2%, India 4% and Malaysia 4%. These countries were followed by Poland, Romania, Italy, Cyprus and the United States. Patterns for the United Kingdom are similar to that of the general global trends, with countries that have tended to send more students abroad being key countries of origin for the United Kingdom.

It is worth noting that postgraduate study is also a core component of the market for international students, both globally and in the United Kingdom. Around 45% of international students studying in the United Kingdom are studying a postgraduate degree (UCAS, 2024). Additionally, 64% of all full-time postgraduate students were international in the 2021/22 academic year. Within

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[2]In the UCAS data, Hong Kong is processed as a separate domicile to China and as such we have kept it separate.

this, the key countries of origin are similar to that of undergraduates, although India is the top sender of students to the United Kingdom, followed by China (HESA, 2023). These figures indicate how vital international students are to postgraduate programmes in UK HEIs and how they contribute a large source of postgraduate income.

Clearly, the United Kingdom has some diversity in its international student population but largely attracts students from economically developed countries. Additionally, the countries which it has tended to attract students from have varying relationships with the United Kingdom in terms of culture and language. It is therefore expected that the determinants for each of these countries may be different from others and will not all be driven to study in the United Kingdom by the same forces.

2.2 | Influences of ISM

A broad range of factors are said to influence ISM flows. De Haas (2021) identifies student mobility as an important influence on migration, where migration is used as a mechanism to increase wealth and status. In support of this, there are numerous 'push' factors that influence flows of international students and are primarily related to the relative opportunities at the origin country versus abroad. The negative impact of per capita income at the origin country on outward student flows is well documented, where origin countries with lower GDP per capita typically having larger outflows of internationally mobile students (Bertoli & Moraga, 2013; McMahon, 1992; Zheng, 2014). Additionally, richer countries have tended to be more attractive destinations for internationally mobile students (Caruso & de Wit, 2015; Dreher & Poutvaara, 2005; Wei, 2013). Local levels of unemployment (Castles & Miller, 2009) and the perceived prestige of an overseas education (Mazzarol & Soutar, 2002; Perkins & Neumayer, 2014; Weber & Van Mol, 2023) also represent key factors triggering international student flows to particular destination countries. In choosing a study destination, the direct costs of education, including living expenses or course fees, is also a key factor. Mazzarol and Soutar (2002) found that course fees are an important factor for students deciding where they will study and may deter students from moving to a certain destination— particularly if they are from a lower-income country.

Influences on ISM also extend beyond relative opportunities to include historic connections and networks that may exist between places. Network theories of migration identify that established networks increase the likelihood of movement between two places as they lower the costs and risks of migrations, whilst also increasing the expecting returns (Massey et al., 1993). Massey et al. (1998) uses the term 'cumulative causation', which refers to the tendency of migratory movements to become self-sustaining where group or institutional meso-structures have developed to facilitate migration. For example, existing networks at the destination country have been found to be an important influence on the outward movement of international students (Beine et al., 2014; Mazzarol & Soutar, 2002). Trade networks can also play an important role in the movement of people between places.

Zheng (2014) showed that bilateral trade flows determine the volume of students from developed countries studying in the United Kingdom. Historic networks have also been captured through the identification of shared colonial links between countries via shared cultural and linguistic connections (Beine et al., 2014; Castles & Miller, 2009; Massey et al., 1993; Weber & Van Mol, 2023). Shared language has been shown to be a particular influence on migration (Lewer & van den Berg, 2008) and, in the context of ISM, common language is important to overcome barriers in teaching and learning.

The discussion in this section offers a robust foundation to consider the complex nexus of factors influencing the study of ISM flows. However, prior empirical work has assumed that ISM flows from different countries are influenced by similar sets of factors. Within this context, this study utilizes both a large sample size and comprehensive representation of origin countries. We meticulously examine the unique interplay of various factors in each origin country, presenting an ambitious expansion to the existing literature. This approach augments the current body of knowledge by emphasizing the distinct ways in which these factors are manifest and operationalized across different countries of origin.

2.3 | Development and ISM

Often research on ISM has used the 'push–pull' framework to understand the influences of ISM. However, something that is overlooked in the field of ISM is the established association between development and international migration (Charles-Edwards et al., 2023; de Haas, 2010), which have remained relatively absent in empirical studies of ISM. Migration transition theories highlight how the relationship between development and outmigration is curvilinear and that development often coincides with rapid increases in migration and that the relationship between net emigration and economic development is a J-shaped or inverted U-shaped curve. Although countries that are less developed tend to have low levels of outmigration, as they develop, levels of migration often increase as wealth and structural opportunities to migrate increase. Countries will tend to reach a saturation point of development where they will tend to see lower levels of outmigration and become net immigration countries (de Haas, 2007, 2010).

Consideration of these theories for understanding the levels of spatial country-specific patterns of ISM have remained underutilized. Although some studies to take a dichotomous perspective of developed/developing countries (Kondakci, 2011; Perkins & Neumayer, 2014; Wei, 2013), research into ISM rarely considers how rates of development of the origin country impacts the rates of mobility. Weber & Van Mol, 2023 contribute significantly to the literature, showing that migration transition theories can be applied to ISM. The authors consider global ISM flows between 2003 and 2018 and exemplify that ISM follows a similar nonlinear relationship with development and that there is an inverse U-shape for outmigration of international students.

The role of migration transition theories in aiding the understanding of the determinants of international student flows into the United Kingdom is relevant given the position of the United Kingdom as a large receiver of international students. Although the United Kingdom accepts a large proportion of its students from highly-developed economies, it also draws from a range of upper-middle and lower-middle income countries and increasingly lower income countries. Two key emerging markets for UK higher education are Nigeria and India (UCAS, 2021), which both sit in the lower-middle and lower levels of economic development. However, the traditional markets of Mainland China, Hong Kong, Malaysia and France sit in higher levels of economic development. Given this diversity, assuming that a common set of influences is relevant for all of these countries seems to ignore this complexity. Additionally, by understanding how specific origin countries within development levels react to the common influences of ISM, we can begin to understand the unique combinations of factors which affect these countries and if these do vary depending on a countries' level of development. Empirical analyses of the unique origin country influences has not been completed before in the study of ISM and the United Kingdom is a useful test case for this given the diversity and size of the flows that it attracts.

3 | DATA

The data used for this study were supplied by the UCAS to capture origin–destination student migration flows. UCAS are an independent charity and act as a facilitator for applications to UK universities and are the main route of applications to UK HE. Data were supplied as counts of students from origin countries who accepted a place to study at a UK HEI in a given year through UCAS' application service. UCAS collect data on their applicants each year, including their country of domicile. The drawback of these data are that they only account for those who apply using UCAS, therefore excluding those who apply through other centres and agents. However, UCAS data do account for 95% of all European Union (EU) entrants and 60% of all non-EU entrants (UCAS, 2019). A range of other measures were gathered from a range of ancillary data sources that are shown in Table 1. These measures were integrated alongside the UCAS data to create a unique database of origin–destination flows augmented by characteristics of both the origin country and the United Kingdom for each year between 2009 and 2019.

Where data were not available for a particular country or year, two strategies were taken. If there were sufficient data for the other years for that origin country, the mean for the other years were taken for that variable. If there were no data at all for a variable, that origin country was removed from the data set. In addition, any countries that had a count of students less than three in a given year were removed in line with UCAS' terms of use. We also removed all applications that were not for a recognized UK HEI. After these changes, we were left with 157 origin countries from an original 245.

4 | METHODS

Our methodological framework comprises three stages. First, we seek to understand the relationship between levels of origin country development and student applications into the United Kingdom to assess for a curvilinear relationship. Second, we build a global multilevel model to estimate the effects of key determinants of ISM into the United Kingdom between the years of 2009 and 2019. Finally, we implement a suite of multilevel models with varying slopes for each of the explanatory variables to understand how these relationships are heterogenous across origin countries.

4.1 | Measuring the relationship between development and international student flows into the United Kingdom

The first stage of the analysis is to understand the relationship between international student flows and the level of development of the origin country. Given previous research by Weber & Van Mol (2023), who found that global ISM patterns do follow the same inverted U-shaped as predicted by migration transition theories, it was important to see if this same pattern occurred when looking at the United Kingdom as the sole destination. The relationship between these variables is analysing using a non-parametric regression based on a loess curve, allowing us to see the nonlinear relationship in the data (Gijbels & Prosdocimi, 2010). We also build a bivariate map looking at the level of development and size of outward student flows to show the geographical distribution of these relationships. We are then able to see whether flows into the United Kingdom follow the same pattern as general migration trends and international student migration trends at large, as well as how this varies spatially.

4.2 | Understanding global governing relationships and varying associations by origin country and development level

The distribution of the count data of student flows are right-skewed and over-dispersed. Given this distribution, a negative binomial regression model (NBRM) was used (see Rowe, 2021). Although pseudo-maximum estimations or Poisson regression models (e.g., Abbott & Silles, 2016; Flowerdew, 2010; Manzoor et al., 2021) have been used in previous research implementing migration gravity models; these types of models rely on the restrictive assumption that the conditional variance of the dependent variable is equal to the mean, leading to overdispersion (Cameron & Trivedi, 1998; Hilbe, 2011; Rowe, et al., 2013). NBRM is a more appropriate option as it relaxes the assumption of equidispersion, while also being able to handle overdispersed and right-skewed count data (Rowe, et al., 2013, 2021). The use of gravity models within the context of understanding international student flows is well established; however, the application of NBRM models is less frequent, with the exception of Cullinan and Duggan (2016) and Weber and Van Mol (2023).

TABLE 1   Data and sources.

Variable name	Variable description	Source
Distance ij	Bilateral population-weighted distance between the two most populated cities in the origin and destination using CES formulation with $\theta = -1$.	CEPII Gravity Database (2021)
Population size i	Unilateral measure for the size of the population (in thousands) for origin country in a given year	CEPII Gravity Database (2021)
Population size j	Unilateral measure for the size of the population (in thousands) for the United Kingdom in a given year	CEPII Gravity Database (2021)
GDP per capita i	GDP per capita for origin country in a given year in current thousands of US\$	CEPII Gravity Database (2021)
GDP per capita j	GDP per capita for United Kingdom in a given year in current thousands of US\$	CEPII Gravity Database (2021)
Unemployment i	Unemployment per cent for the total labour force for a given year, modelling using ILO estimate.	World Bank (2022)
Unemployment j	Unemployment per cent for the total labour force for a given year, modelling using ILO estimate.	World Bank (2022)
No. of high-ranking universities i	Whether the origin country had domestic universities in the Top 200 of the ARWU (Shanghai) ranking in that year – 0/1	Shanghai Ranking (2022)
Shared common language ij	Shared common language between origin country and the United Kingdom – 0/1	CEPII Gravity Database (2021)
Size of origin country population in UK ij	The percentage of the UK population who are from the origin country.	UNESCO (2015)
Colonial relationship ij	Existence of a colonial relationship between the origin country and the United Kingdom – 0/1	CEPII Gravity Database (2021)
EU member i[a]	Origin country membership of the EU – 0/1	
HDI Level i	Level of HDI for a particular country in a particular year (V high, high, medium, low)	UN Human Development Resource (2023)
HDI Scale i	Level of human development from 0 to 1	UN Human Development Resource (2023)
Age of population	Unilateral measure of the percentage of the population that is aged 15–24 years in a given year	Eurostat (2022)
Trade	Bilateral trade flows in 1000 current USD in a given year	CEPII Gravity Database (2021)

Abbreviations: ARWU, Academic Ranking of World Universities; CES, constant elasticity of substitution; EU, European Union; HDI, Human Development Index.

[a]It is important to note that the data used in this study relates to the period before the end of free movement and UK's withdrawal of the EU. As such, during this time period, EU students were able to study freely in the United Kingdom without visa requirements and at the same cost as home students.

However, as far as the authors are aware, this is the first paper of its kind to use NBRM in a comprehensive application to model ISM flows into the United Kingdom.

The first model was run to understand the relationship between influences of key contextual factors and flows includes a varying intercept for the origin country. Random intercepts allowed us to capture how the average size of flows varied across countries and additionally account for unobserved heterogeneity in each origin country that may affect the flow of international students. Such heterogeneity may include cultural, economic, political, or educational factors that are not measured in the model—for example, variegated visa policies. The second suite of models include random slopes for each of the explanatory variables, which allow us to measure the extent of the variation in the relationship between the size of ISM flows and those contextual factors being measured. A random slope provides a more nuanced understanding of the relationships

between explanatory variables and international student flows. By identifying the extent to which the effects of explanatory variables vary across countries, we can gain insight into the factors that influence ISM.

We also control for temporal dependence across the model through a temporal autoregressive (AR) term. Controlling for temporal dependence is important to account for the fact that observations made at different points in time are more likely similar to one another than those made further apart in time. The AR term is calculated as a weighted sum of the variable's previous values, with the weights determined by the AR coefficient. The AR terms allows us to account for the correlation that exists between observations made at the same point in time.

The first global model is expressed mathematically in Eq. (1). In Eq. (1), Y_{ij} captures the volume of flows between the origin country and the United Kingdom (i) in a given year (t). α_i is a random intercept that varies by origin country i; d_i relates to the distance between the origin and

destination; p_{it} refers to origin-destination factors in a given year such as size of origin country population in the United Kingdom, origin country population size, origin country GDP per capita, rank of origin country institutions, the size of trade flows between the origin country and the United Kingdom, size of the origin country population at student age and origin country unemployment. p_i relates to factors at the origin that do not change over time, such as colonial relationships and common language. p_{jt} relates to destination factors at a given year, including UK population, UK GDP per capita and UK unemployment. ε_{ij} is the origin-destination-level residual term that is assumed to be first-order AR (Ω_ε) where the residuals are assumed to be correlated.

$$Y_{it} = f(a_i + d_i + p_{it} + p_{jt}) + \varepsilon_{it} \qquad (1)$$

$$\varepsilon_{ij} \sim N(0, \Omega_\varepsilon)$$

The random effects models are expressed mathematically in Eq. (2). In Eq. (2), the same applies with the exception that $z_{ij} \sim N(z, \sigma_z)$ indicates where the slope of each variable is allowed to vary by origin country.

$$Y_{ij} = f(a_i + d_i + p_{it} + p_i + p_{jt})\varepsilon_{it}, \qquad (2)$$

$$\varepsilon_{ij} \sim N(0, \Omega_\varepsilon),$$

$$z_{ij} \sim N(z, \sigma_z).$$

5 | RESULTS

5.1 | The relationship between development and international student flows into the United Kingdom

The results demonstrate the existence of a nonlinear relationship between international student flows into the United Kingdom and the level of human development index for the sending countries. Figure 1a shows that the size of international student acceptances increases with development but not linearly. It follows international student acceptances seem to increase disproportionately more at mid (around 0.7) and high ranges (0.8–0.9) of development. This pattern indicates that the United Kingdom tends to attract more students from other highly developed countries. However, it is interesting that we see a dip at the higher end of medium development, signalling a slowing down of applications at this development level. These results could point to under-recruitment or lack of interest or capability to move from students in these emerging markets.

Figure 1b reveal the geographic distribution of this relationship. The largest number of flows originate from highly developed countries in North America and Europe, such as the USA, France, Germany and Poland. High flows from China are also evident on the map, where the development level is high. We also see high flows from India who are at a medium level of development. There is also evidence or relatively high flows from Nigeria, which has a low development level. These spatial patterns indicate that there are unique relationships between development and successful applications of internationally mobile students from certain countries. Although we know that the United Kingdom tends to attract students from higher development levels and less from lower development levels, there are some countries that display unique relationships to the United Kingdom, which lead to greater numbers of successful applications from them.

The results highlight the heterogeneity of the influence of development on mobility in different country contexts. This heterogeneity leads to a need to understand in more detail how contextual factors and determinants may vary across countries. These results are interesting in that they further the understanding of the curvilinear relationship between international student flows and development, but also the UK's relationship with different countries of different development levels.
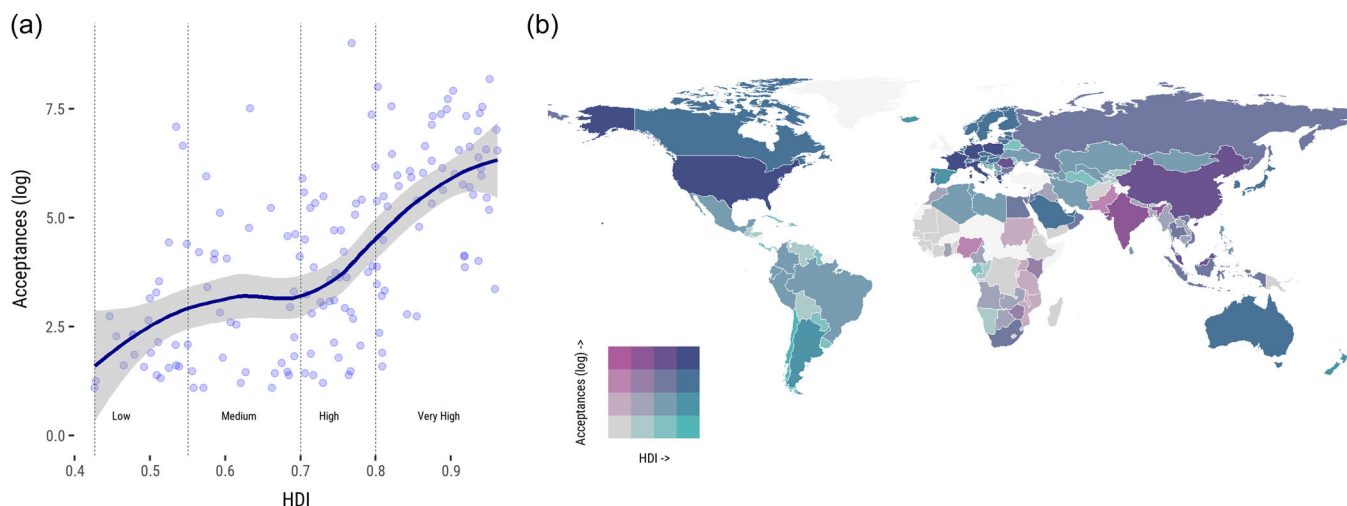

FIGURE 1 Relationship between the number of accepted applications (log) from an origin country and human development level (2009–2019) (a). Map of number of accepted applications (log) versus human development level (2009–2019) (b).

5.2 | Global governing relationships

We examine the influence of country-level contextual factors associated with ISM flows into the United Kingdom. We estimated a Global Gravity Model (M1) including country-of-origin intercepts. Figure 2 displays the coefficients for all the variables included in the model. They are ranked according to their relationship with ISM flows from the largest and positive to the largest and negative. The coefficients refer to the log of expected counts compared to the reference category in the case of a categorical variable; or the change in expected counts in relation to one-unit change in the continuous predictor. A positive coefficient indicates that there are increased flows from a country, whereas a negative relationship shows where the presence of such a factor tends to decrease flows.

Coefficients for EU membership, colonial relationship, population size from origin countries living in the United Kingdom, population size, and GDP per capita at origin countries all show positive and statistically significant relationships with international students flows into the United Kingdom. Coefficients for shared common language, the rank of origin country institutions, higher unemployment at the origin, and size of trade flows positively related to international flows into the United Kingdom, but were not statistically significant. As expected, these results indicate that wealthier countries and those with strong institutional, economic and cultural links to the United Kingdom are more likely to send students to the United Kingdom.

Conversely, the coefficient for unemployment in the United Kingdom is statistically significant and negative, suggesting that students may be deterred by more unreliable labour market opportunities. In addition, the size of the origin country population aged 15–24 years is negatively associated with flows, highlight how countries with larger populations of young people do not necessarily send more students to the United Kingdom, and that applications are more likely to come from countries with smaller younger-aged populations. Further, greater distance is negatively related to successful applications but this result is not statistically significant. These results suggest that where there is increased uncertainty and higher risks of movement, flows to the United Kingdom tend to be weaker but that this is not mitigated by larger student-aged populations.

By examining these results, we are able to see that there are particular factors that incentivize movement to the United Kingdom. In the context of development, these results corroborate what we know in that wealthier countries tend to send students to the United Kingdom and examining the factors that are significant in influencing flows helps build a picture of what incentivizes movement. However, these results only give a homogeneous picture of the influences of international student flows. Given that we see evidence that some countries send more students to the United Kingdom than others, despite otherwise similar economic and cultural and institutional links, it is
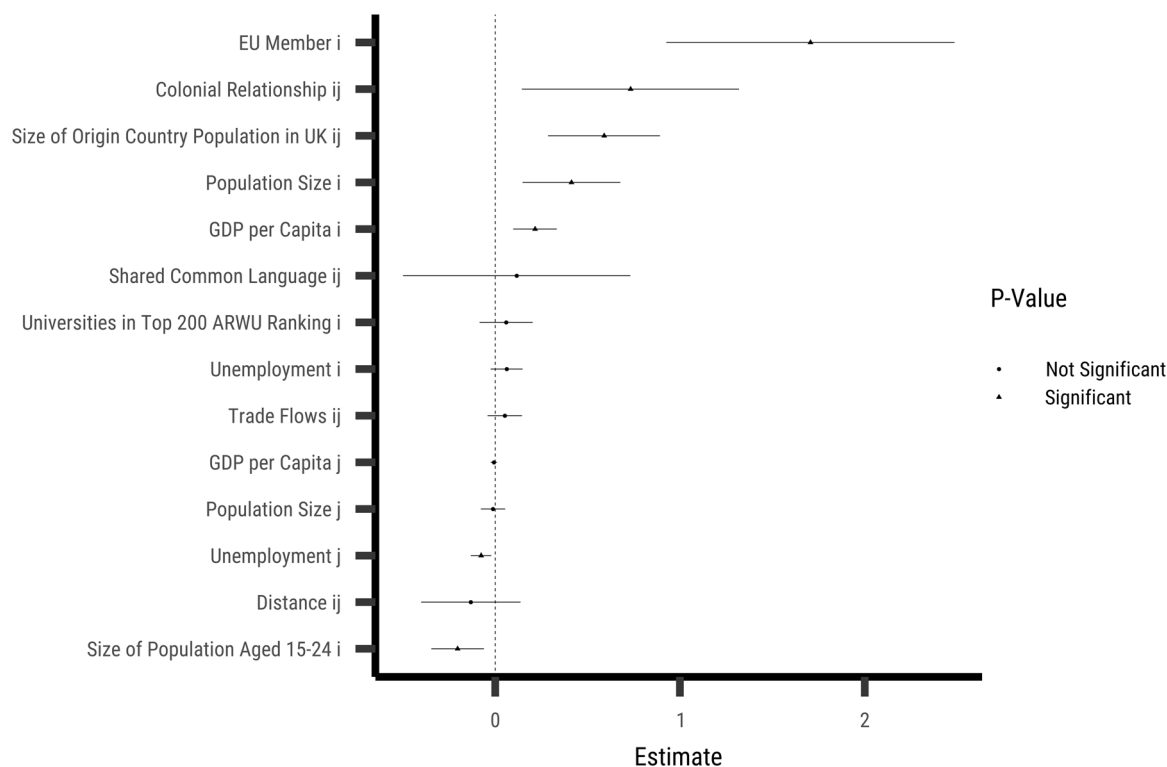

FIGURE 2 Coefficients for multilevel negative binomial model (M1) showing influence of factors at the origin (i), destination (j), and bilaterally between both (ij) on the number of successful UCAS applications. Factors denoted with an 'i' relate to characteristics of the origin country, factors denoted with a 'j' refer to characteristics of the destination country (United Kingdom), factors denoted with an 'ij' relate to factors that operate bilaterally between the origin and destination.

important to understand the nuanced way in which these factors operate and drive flows in different country contexts.

5.3 | Varying associations by origin country and development level

To analyse the country-of-origin-specific relationships, we estimated a multilevel model including random slopes for our covariates. Figure 3 reports the estimates for the full set of random slopes. We report them by origin country and their level of development. In the figure, the x axis refers to the country of origin, ordered from the greatest number of flows for the top 15 countries for each development level (less for lower development levels where there are fewer sending countries). The y axis relays the variable of interest ranked according to their relationship with ISM flows from the largest and positive to the largest and negative. Where a variable is a

categorical variable equal to one, there is a black dot to denote this. If a coefficient is blue this represents where a positive relationship is weaker; or a negative relationship is stronger. If a coefficient is orange this represents where positive relationships are stronger or a negative relationship is weaker.

The first point to note from the results are that some factors are consistently positive or negative, although their influence does differ across countries. The effect of colonial relationships and shared common language are consistently positive wherever they are present, except in the instances of Pakistan and India. This highlights the important role of these cultural and linguistic ties driving ISM flows into the United Kingdom.

Conversely, some factors are consistently negative. For example, not being a member of the EU consistently has a negative impact on flows into the United Kingdom, with the exception of India. This suggests heightened sensitivity to costs associated with non-EU membership, such as elevated fees and movement restrictions.
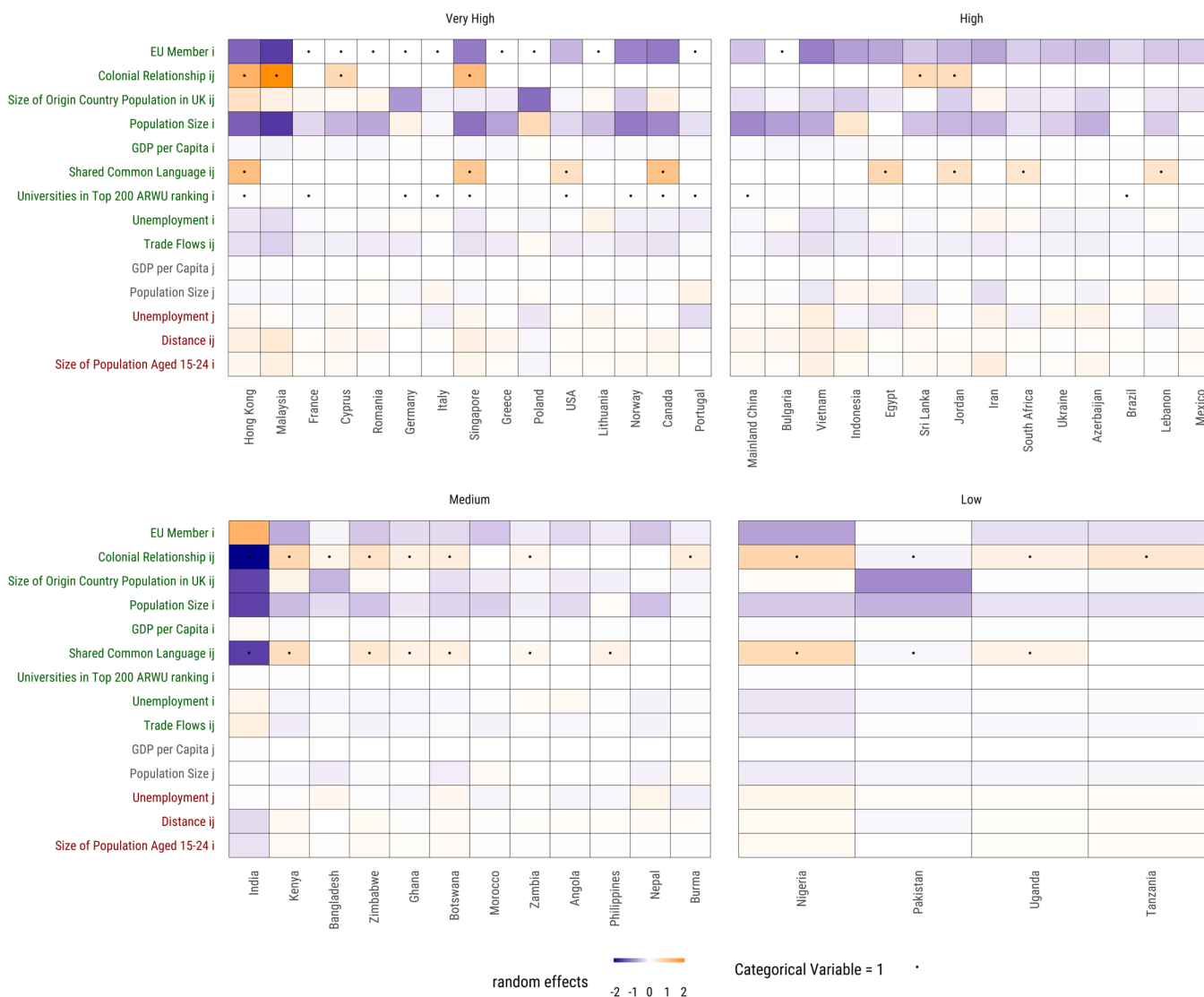

FIGURE 3 Random effects coefficients from a multilevel negative binomial model for individual origin countries.

Moreover, GDP per capita for both origin and destination, along with the rank of origin country institutions, consistently align with the model average, signifying their persistent influence across diverse origin countries. These results provide us with a set of consistent factors that serve as reliable influences in shaping ISM flows to the United Kingdom.

On the contrary, some factors have a different influence in shaping flows. The impact of the size of the origin country population in the United Kingdom differs across countries. Countries such as Germany, Poland, India, and Pakistan are less influenced by these effects than the model average. On the other hand, this is an important factor for Hong Kong, Malaysia, France. Cyprus, Romania, Canada, Iran, Kenya, and ZimbabweThese results sign-post stronger relationships between student flows and diaspora in the United Kingdom, and which countries are particularly driven by this. As previous literature has described, networks often are seen as a means to reduce costs of migration in some contexts. As a result, we can assume that for the countries where this relationship is greater, they may see the cost of mobility being negated by a network in the United Kingdom.

Moreover, unemployment levels in the origin country and in the United Kingdom also vary by influence. Lithuania, Bulgaria, Egypt, Iran, South Africa, India and Angola are particularly affected by the rates of origin country unemployment, whereas Italy, Poland, Portugal, Indonesia, Egypt, South Africa, Lebanon, Ghana, Morocco, Angola, the Philippines and Burma are particularly influenced by rates of UK unemployment. If relative employment opportunities are seen to be weak, the costs associated with mobility may be perceived to be higher. However, if employment opportunities are weak in the origin country, this may further incentivize movement in these contexts.

Additionally, each origin country exhibits a unique combination of factors that influence ISM flows. India, for example, show markedly different relationships with the common influences than the other countries considered, showing weaker relationships with colonial ties and common language with the United Kingdom. India is less influenced by its diaspora community in the United Kingdom, less deterred by non-EU membership and associated increased costs, and more affected by distance to the United Kingdom. India also sees a stronger relationship between outward flows and higher unemployment levels in India, and the size of trade flows seems to have a stronger positive relationship with student mobility than other countries.

In contrast, Hong Kong, another significant sender, is notably influenced by the size of its population in the United Kingdom, colonial relationships, and shared common language. But are less deterred by distance and less influenced by higher rates of unemployment in their country and the size of trade flows with the United Kingdom. These results show clearly how countries respond differently to different determinants of flows. Although Hong Kong appears to be more influenced by cultural and linguistic ties with the United Kingdom, India appears more motivated by financial and economic incentives related to unemployment while perhaps being less deterred by the high fees. We can therefore start to see the unique patterns of determinants which shape mobility in different country contexts.

Finally, we do not see factors that vary systematically depending on the level of development of the origin country. Instead, factors appear to vary more on a country to country basis. Although we do see stronger relationships with colonial relationships and shared common language in the 'very high' development level; these relationships tend to be strong wherever they are present. This suggests that the development level of a country does not dictate the factors influencing ISM flows into the United Kingdom; rather, the context of the specific country serves an important role.

These results demonstrate the spatial variability of the influence of these factors within and across development levels. We are able to uncover the heterogeneity of the contextual factors' impact on flows across the countries considered, evidencing the necessity to understand their distinct relationships. Additionally, these findings highlight unique patterns of influence for specific countries, such as Hong Kong and India, offering insight into the complexity of the determinants shaping ISM. Further, examining prominent origin countries unveils a complex interplay of influential factors that shape flows into the United Kingdom. Although some countries are motivated by their cultural and linguistic ties to the United Kingdom, others are influenced by potential economic opportunities. These results go further to uncover how unique combinations of determinants shape flows of international students into the United Kingdom.

6 | DISCUSSION AND CONCLUSION

In this study, we have examined the heterogeneous relationship between common determinants of ISM and specific countries-of-origin at different development levels. We were able to uncover the unique combinations of factors that operate in the formation of student flows into the United Kingdom, as well as those determinants that operate in a similar way across countries. Our findings are based on a quantitative analysis of UCAS successful applications data, covering over 150 countries of origin, with a specific focus on 49 countries at different levels of development.

Our analysis is three-fold. We first explore the role played by the level of development of the origin country in flows into UK HEIs. We see that there is a curvi-linear relationship between the rate of development of the origin country and flows into UK institutions, in line with what is seen for wider theories of migration in migration transition theories (de Haas, 2010) and global ISM (Weber & Van Mol, 2023). From this analysis we were able to see that although the United Kingdom does undoubtedly attract large numbers of students from countries at high levels of development, in line with previous studies (Shields, 2013; Weber & Van Mol, 2023) and official statistics (OECD, 2021), it tends to attract more students from lower development levels, with a dip in the mid-levels of development. This curvi-linear relationship between development and successful applications is important for the context of UK ISM, as it signifies where

recruitment is tending to occur, and where it is perhaps more successful. Further, by examining the geographical distribution of the relationship between development and successful applications we can see that there are some countries that are outliers of these relationships, with some countries particularly sending a lot of students within development levels. From this, we can infer that there are some countries that are more likely to send students to the United Kingdom, and that it is important to understand the factors that influence these countries.

Second, we presented results from a global model which outlined the key determinants of ISM into the United Kingdom. Our results indicated that EU membership, colonial relationships, size of the origin country population in the United Kingdom, GDP per capita of the origin country, shared common language, higher unemployment of the origin, greater bilateral trade flows, and universities appearing in the top 200 of the ARWU ranking in the origin country all led to increased applications from international students. On the other hand, higher levels of unemployment in the United Kingdom, greater distance and greater size of the origin country population who were student-aged were seen to reduce applications. Our results contribute to the literature by showing the importance of factors when considering the United Kingdom as the sole destination. In particular, we counter existing literature that lower levels of GDP per capita tends to lead to greater numbers of students abroad (Bertoli & Moraga, 2013; McMahon, 1992; Zheng, 2014). Further, we extend the understanding of the importance of cultural and linguistic ties to the United Kingdom, as well as the importance of levels of unemployment in ISM.

Third, our key contribution is the exploration of heterogeneity of the influence of these difference factors across different countries of origin at different development levels. We saw how some factors are consistent in their affect across countries, with factors such as colonial relationships and common language being nearly consistently important across all countries where it exists, just at varying levels. Equally, factors related to GDP, and institution ranking are consistent with the model average across all countries considered. Conversely, we showed how some determinants tend to vary a lot influence across countries. For example, the size of the origin country population in the United Kingdom and the rates of unemployment at the origin and the United Kingdom vary depending on the country of origin. We also showed how each country considered has its own unique relationship with the determinants of ISM to the United Kingdom. In particular, we highlighted the unique relationship shared by India with the common determinants of ISM, being less attracted by its colonial ties to the United Kingdom, but less deterred by financial costs associated with fees and more influenced by higher rates of unemployment in India. We compared this to Hong Kong, where colonial relationships, common language, and the size of the origin country population in the United Kingdom play an important role. Finally, we asserted that there are not consistent patterns across development levels, but rather that they vary more by country of origin.

This study is the first of its kind to explore the heterogeneity of these relationships in such depth using UCAS applications data and provides an insight into how the different key factors associated with ISM interact in unique ways in different countries of origin across different development levels. However, this study was constrained by a series of factors which provide scope for further research. First, although UCAS data are very rich and provide in-depth information on applications, we were limited in that our data only covers ~60% of international students, perhaps biasing our results towards those who use UCAS as a service. We do not have a clear idea on the different characteristics of UCAS users versus non-UCAS users. However, it could be presumed that there are some differences among those who do not use UCAS, and that results may be different if these were included. Future research could consider different data sources. Second, our analysis only focused on the United Kingdom, which allowed a depth of analysis on this particular market. However, future work should begin to apply this methodology to other key countries of destination as a means of comparing how these relationships vary depending on country of destination, although accessing data for these countries may be more challenging. Thirdly, we have analysed the United Kingdom as a whole but there are likely differences depending on where geographically students are applying to. For example, results between major hubs like London or Manchester may differ from smaller towns and cities. Future research could consider these differences in more detail. Finally, the United Kingdom is an example of highly developed and traditional destination for ISM. Future work should also focus on understanding the contextual factors influencing ISM flows into nontraditional and emerging destinations. Such analysis would be highly relevant given recent changes in the global higher education market as China and Saudi Arabia are heavily investing into attracting more international students, actively recruiting established academics and increasing their reputation in global rankings (Al-Thagafi et al., 2020; UNESCO, 2013, 2020).

This study covered the 10-year period of 2009–2019 as to avoid complicating the analysis with the inclusion of disruption of coronavirus 2019 (COVID-19) and Brexit. Since 2019, there have been a number of changes and disruptions to global mobility and mobility into the United Kingdom specifically. The COVID-19 pandemic may have led to temporary changes to the global movement of international students due to the widespread effects on both travel and study. The UK's withdrawal from the EU and Schengen area (Brexit), and subsequent limitations on EU students to travel and study beginning in the 2021/22 academic year, have negatively impacted the numbers of EU studying in the United Kingdom (HESA, 2023). These declines signal a significant and long-term change that will have ramifications for the UK higher education sector. The role of the United Kingdom on the global stage is changing, and its attitudes towards immigration and international students—particularly from developing nations—are becoming more hostile. Understanding how the relationships between ISM flows and key contextual factors have operated in the past will become ever more important to assess how these relationships may unfold into the future.

ACKNOWLEDGEMENTS

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from UCAS. Restrictions apply to the availability of these data, which were used under license for this study. Data are available from the author (s) with the permission of UCAS.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Neville, R., Rowe, F., & Singleton, A. (2024). Nonlinear relationships between human development and international student mobility: The prominent role of employment prospects and cultural and linguistic ties. *Population, Space and Place*, 30, e2764. https://doi.org/10.1002/psp.2764