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Ethnic variation in higher education participation amongst males in the UK: The mediating effects of attitudes and prior attainment

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Ethnic variation in higher education participation amongst males in the UK: The mediating effect of attitudes and prior attainment

This article reports on the findings from a longitudinal analysis of 2976 boys from the Next Steps (formerly LSYPE) dataset. It unites the existing literature on ethnic gaps in attainment and higher educational participation to offer deeper more holistic insight about the relationship between ethnicity and educational outcomes. The article offers a robust understanding of the extent to which ethnic variations in higher educational participation are mediated by attitudes and attainment. Structural equation mediation models were used to investigate the link between ethnicity and outcome across a seven year period. The analyses show specific mediated-effects of attitude to school and attainment on ethnic variations in higher educational participation for boys from certain BME groups relative to their White British counterparts. The findings have implications for policy and practice, both in compulsory schooling and in higher education.

Keywords: ethnicity; higher educational participation; attainment; social class; parental expectation; structural equation model

Introduction

This article fits within the literature on widening participation (WP), with a specific focus on learners from Black and Minority Ethnic (BME) groups relative to White British. It includes a secondary analysis of the Next Step dataset (formerly LSYPE) to explain ethnic variations in higher education participation (HEP) in the UK. According to Kettley (2007), modern views on WP relate to increasing access to HE for groups traditionally marginalised. This usually includes demographics like gender, social-class and ethnicity amongst others. The main narrative pinpoints the underrepresentation of disadvantaged groups – especially the working class, BME and females/males in certain disciplines - in HE as well as the overrepresentation of their more privileged counterparts (Boliver, 2013; Chowdry, Crawford, Dearden, Goodman, & Vignoles, 2013; Crawford & Greaves, 2015; Kettley, 2007; Moore, Sanders, & Higham, 2013;

Murray & Klinger, 2013). However, a recently recurrent theme in the media (Guardian, Independent, Telegraph etc.), supported by a review by the Equality and Human Rights Commission (EHRC), is that working class White-British boys have fallen behind all BME groups in attainment. According to the EHRC (2015), this will impact on their educational outcomes as it reduces their chance of success. Research has consistently shown that attitude/belief to/about school (Carter-Wall & Whitfield, 2012; Goodman, Gregg, & Washbrook, 2011; Gorard, H., & Davies, 2012); aspirations/expectations (DfE, 2008; Gorard et al., 2012; Khattab, 2014; Kintrea, St Clair, & Houston, 2011) and prior attainment (especially key stage 4 and 5) (Chowdry et al., 2013; Crawford & Greaves, 2015; Moore et al., 2013) partly explain ethnic discrepancies in educational outcome. Factors like attitude, expectation/aspirations are time-varying as youths mature and respond to different stimulus in their environment (Ajzen, 2011; Bandura, Barbaranelli, Caprara, & Pastorelli, 2001; Gottfredson, 2002). These impact on educational outcome by influencing a predisposition to behave selectively towards particular goals. Attainment at the secondary level of schooling is also significantly demarcated by gender, with the proportion achieving the benchmarks (five or more A*-C grades at GCSE¹) 10 percentage points higher for girls than for boys (Steve Strand, 2014). A recent review from the Department for Education showed 54.6% of boys achieving this benchmark - including English and Mathematics – in comparison to 61.9% of girls (DfE, 2011).

According to the literature, explaining the reason for ethnic differences in educational outcome is under-researched, due to limitations stemming from the dynamic

¹ General Certificate of Secondary Education – a standardised exam taken at the end of compulsory schooling in the United Kingdom.

nature of the factors involved (Boliver, 2011, 2013; Crawford & Greaves, 2015; Moore et al., 2013; Murray & Klinger, 2013). This paper aims to address this gap *and* respond to the literature by assessing the assumption of ethnic differences between BME groups and White-British in higher educational participation (HEP) amongst boys; *and* evaluate its relationship with certain factors like attitudes and prior attainment. Four key questions are addressed in this paper:

- (1) How do HEP at age 19 vary by ethnicity?
- (2) Is the effect of ethnicity on HEP at age 19, mediated by attitude to school (ATS) at age 13?
- (3) Is the effect of ethnicity on HEP at age 19 mediated by ATS at age 13 via attainment at age 16?
- (4) Can the effect of ethnicity on HEP at age 19 be explained additionally by social-class and parental expectation (PE) at age 16?

Ethnic variations in higher education in the UK

Higher education participation (HEP) is operationalised in relation to how it is defined in the Next Step dataset, i.e., as being enrolled on any course in a UK HE institution at age 18/19 in March 2010 and where this is the main activity (Ward & D'Souza, 2008). The expansion of the UK HE has been encouraged by the government based on its value to increase skill levels and add to national productivity (Blanden & Machin, 2004; DfE, 2015). Many HE institutions have invested in WP measures to increase not only numbers but the proportion of underrepresented groups (low-income, disabled and ethnic minorities) they have enrolled. The trend in the literature shows a general increase in HEP across all student groups (including WP) from the 1960's to present (Blanden & Machin, 2004; DfE, 2015; HEFCE, 2010). However, there remains a

disparity in the rate at which various WP groups' access HE. Attitude to school may be a factor in explaining this disparity for White-British working class, where according to Stamou et al (2014), this group is overrepresented in the category of those with general feelings of disinterest towards education and schooling. For BME groups, attainment - as measured by GCSE scores - may be the biggest factor as BME groups tend to underachieve in key stages four and five (Crawford & Greaves, 2015; Moore et al 2013). Moore et al (2013) identify arguments focussed on 'institutionalised racism' and/or 'student deficit model' in explaining ethnic gaps in attainment from a literature review they carried out. According to Moore et al (2013), arguments focussed on institutionalised racism involves implicit ethnic bias at different points of the educational process while a deficit model explains lower attainment with respect to lack of ability, individual factors or even selecting the 'wrong' subjects at year 10 (p.49). On the other hand, with the recent trend in White-British working class underachievement, explaining ethnic gaps in HEP seem to have become even more complex. Overall, the literature identifies five key points relevant to this article:

- Boys are generally less likely to go into HE at age 18/19 than girls; however, this is significantly explained by gender differences in attainment at the end of secondary schooling (Crawford & Greaves, 2015).
- Students from lower-socioeconomic groups are less likely to participate in HE: this is particularly the case for those who are first generation entrants (Sutton-Trust, 2008) and from low participation neighbourhoods (the most disadvantaged geographical locations) (HEFCE, 2010; Moore et al., 2013).
- BME students are significantly more likely to aspire towards and enter HE than White-British and their participation rates are increasing (Crawford & Greaves, 2015; Moore et al., 2013).

- BME groups vary significantly in their attainment (Steve Strand, 2014) and HEP rates (Crawford & Greaves, 2015); with Chinese and Indian students significantly more likely to achieve the benchmark in attainment than White-British.
- Of the BME groups, Caribbean boys are the least likely to move into HE and are overrepresented in the category of those with negative attitudes towards school but more positive ones towards education (Stamou, Edwards, Daniels, & Ferguson, 2014).

Understanding the reasons for ethnic variations in HE is critical for the success of the WP agenda to promote equality and inclusion. However, coming to grips with a holistic explanation is challenging because of the inherent complexities of the interrelated factors, i.e., they are mitigated by a variety of dynamic variables. These factors, like attitudinal beliefs, have been flagged as impacting on educational outcome by various social-psychological models – e.g. Bandura et al (2001), Ajzen (2011) amongst others – and research (Alderman, 2013; Carter-Wall & Whitfield, 2012; Côté & Levine, 2000; Gorard et al., 2012; Gutman & Schoon, 2013; López-Pérez, Pérez-López, & Rodríguez-Ariza, 2011; Richardson, Abraham, & Bond, 2012; S Stockfelt, 2015). However, the time-varying nature of these concepts makes it difficult to fully ascertain. Additionally, as Strand's (2014) analysis of the current dataset (Next Step) indicates, many of these factors do not just combine in an additive manner. Rather, there is substantial intersectionality of certain factors – like ethnicity, gender or social-class – which challenges researchers to take a more nuanced view. Therefore, this study utilises the structural equation modelling (SEM) framework to explore the direct and indirect effect of being BME relative to White-British in relation to a variety of time-varying factors.

Ethnic variation in higher education participation amongst males in the UK: The mediating effect of attitudes and prior attainment

This article reports on the findings from a longitudinal analysis of 2976 boys from the Next Steps (formerly LSYPE) dataset. It unites the existing literature on ethnic gaps in attainment and higher education participation to offer deeper, more holistic insight into the relationship between ethnicity and educational outcomes. The article offers a robust understanding of the extent to which ethnic variations in higher education participation are mediated by attitudes and attainment. Structural equation mediation models were used to investigate the link between ethnicity and outcome across a seven-year period. The analyses show specific mediated-effects of attitude to school and attainment on ethnic variations in higher education participation for boys from certain BME groups relative to their White British counterparts. The findings have implications for policy and practice, both in compulsory schooling and in higher education.

Keywords: ethnicity; higher education participation; attainment; social class; parental expectation; structural equation model

Introduction

This article fits within the literature on widening participation (WP), with a specific focus on learners from Black and Minority Ethnic (BME) groups relative to White British. It includes a secondary analysis of the Next Step dataset (formerly Longitudinal Study of Young People in England - LSYPE) to explain ethnic variations in higher education participation (HEP) in the UK. According to Kettleby (2007), modern views on WP relate to increasing access to higher education (HE) for groups traditionally marginalised. This usually includes demographics like gender, social-class and ethnicity amongst others. The main narrative pinpoints the underrepresentation of disadvantaged groups – especially the working class, BME and females/males in certain disciplines - in HE, as well as the overrepresentation of their more privileged counterparts (Crawford and Greaves 2015, Murray and Klinger 2013, Moore, Sanders, and Higham 2013,

Chowdry et al. 2013, Boliver 2013, Kettley 2007). However, a recently recurrent theme in the media (Guardian, Independent, Telegraph etc.), supported by a review by the Equality and Human Rights Commission (EHRC), is that working class White-British boys have fallen behind all BME groups in attainment. According to the EHRC (2015), this will impact on their educational outcomes as it reduces their chances of having successful and prosperous careers. This link between attainment and outcome is a longstanding one, validating the concerns of the EHRC (Chowdry et al. 2013, Crawford and Greaves 2015, Moore, Sanders, and Higham 2013). Understanding this link is not so clearcut, due to limitations stemming from the dynamic nature of the mitigating factors (Boliver 2011, 2013, Crawford and Greaves 2015, Moore, Sanders, and Higham 2013, Murray and Klinger 2013). These factors include attitude/belief to/about school (Carter-Wall and Whitfield 2012, Goodman, Gregg, and Washbrook 2011, Gorard, H., and Davies 2012); aspirations/expectations (DfE 2008, Gorard, H., and Davies 2012, Khattab 2014, Kintrea, St Clair, and Houston 2011) and prior attainment (especially key stage 4 and 5) (Chowdry et al. 2013, Crawford and Greaves 2015, Moore, Sanders, and Higham 2013) amongst others. Factors like attitude, expectations/aspirations are time-varying as youths mature and respond to different stimulus in their environments (Ajzen 2011, Bandura et al. 2001, Gottfredson 2002). These impact on educational outcome by influencing a predisposition to behave selectively towards particular goals. Attainment at the secondary level of schooling is also significantly demarcated by gender, with the proportion achieving the benchmark (five or more A*-C grades at GCSE²) 10 percentage points higher for girls than for boys (Strand 2014). A recent review from the

² General Certificate of Secondary Education – a standardised exam taken at the end of compulsory schooling in the United Kingdom.

Department for Education showed 54.6% of boys achieving this benchmark - including English and Mathematics – in comparison to 61.9% of girls (DfE 2011a). According to the literature, the underlying reasons for ethnic differences in educational outcome is under-researched. This is due to limitations stemming from the dynamic nature of the factors involved (Boliver 2011, 2013, Crawford and Greaves 2015, Moore, Sanders, and Higham 2013, Murray and Klinger 2013). This paper aims to address this gap *and* respond to the literature by assessing the assumption of ethnic differences between BME groups and White-British in HEP amongst boys. Four key questions are addressed in this paper:

- (5) How do HEP at age 19 vary by ethnicity?
- (6) Is the effect of ethnicity on HEP at age 19, mediated by attitude to school (ATS) at age 13?
- (7) Is the effect of ethnicity on HEP at age 19 mediated by ATS at age 13 via attainment at age 16?
- (8) Can the effect of ethnicity on HEP at age 19 be explained additionally by social-class and parental expectation (PE) at age 16?

These questions aim to assess the extent of the ethnic differences and evaluate its relations with various factors like attitudes (time-varying) and prior attainment. White-British was used as the baseline group for comparison in response to the underlying narratives in the literature (see next section).

Ethnic variations in higher education in the UK

Higher education participation (HEP) is operationalised in relation to how it is defined in the Next Step dataset, i.e., as being enrolled on any course in a UK HE institution at

age 18/19 in March 2010 and where this is the main activity (Ward and D'Souza 2008). The expansion of the UK HE has been encouraged by the Government based on its value to increase skill levels and add to national productivity (DfE 2015a, Blanden and Machin 2004). Many HE institutions have invested in WP measures to increase not only numbers but the proportion of underrepresented groups (low-income, disabled and ethnic minorities) they have enrolled. The trend in the literature shows a general increase in HEP across all student groups (including WP) from the 1960's to present (Blanden and Machin 2004, HEFCE 2010, DfE 2015a). However, there remains a disparity in the rate at which various WP groups access HE. Attitude to school may be a factor in explaining this disparity for White-British working class, where according to Stamou et al (2014), this group is overrepresented in the category of those with general feelings of disinterest towards education and schooling. For BME groups, attainment - as measured by GCSE scores - may be the biggest factor as BME groups tend to underachieve in key stages four and five (Crawford & Greaves, 2015; Moore et al 2013). Moore et al (2013) identify arguments focussed on institutionalised racism and/or student deficit model in explaining ethnic gaps in attainment from a literature review they carried out. According to Moore et al (2013), arguments focussed on institutionalised racism involves implicit ethnic bias at different points of the educational process while a deficit model explains lower attainment with respect to lack of ability, individual factors or even selecting the 'wrong' subjects at year 10 (p.49). The former is supported by the literature including the recent analysis of Russel Group Universities entrance data that flagged significant unexplained gaps between BME groups and White-British students offer of placement, even after accounting for a variety of relevant factors (Boliver,

2016). The latter is also supported by the strong links with socio-cultural and economic factors that encompasses beliefs, aspirations and the role of social-class itself (Modood 2004, Shah, Dwyer, and Modood 2010, Strand 2011). Neither arguments are in discord with the other as they overlap and interconnect. This interconnection is difficult to unpack as they include internal and external factors that are both dynamic within themselves and in relation to time. This article does not aim to challenge these views but to utilise them to contextualise a nuanced understanding of the complex interrelations between these factors in explaining ethnic differences in HEP.

Overall, the literature identifies five key points relevant to this article:

- Boys are generally less likely to go into HE at age 18/19 than girls; however, this is significantly explained by gender differences in attainment at the end of secondary schooling (Crawford and Greaves 2015).
- Students from lower-socioeconomic groups are less likely to participate in HE: this is particularly the case for those who are first generation entrants (Sutton-Trust 2008) and from low participation neighbourhoods (the most disadvantaged geographical locations) (HEFCE 2010, Moore, Sanders, and Higham 2013).
- BME students are significantly more likely to aspire towards and enter HE than White-British and their participation rates are increasing (Crawford and Greaves 2015, Moore, Sanders, and Higham 2013).
- BME groups vary significantly in their attainment (Strand 2014) and HEP rates (Crawford and Greaves 2015); with Chinese and Indian students significantly more likely to achieve the benchmark in attainment than White-British.
- Of the BME groups, Caribbean boys are the least likely to move into HE and are overrepresented in the category of those with negative attitudes towards school but more positive ones towards education (Stamou et al. 2014).

Understanding the reasons for ethnic variations in HE is critical for the success of the WP agenda to promote equality and inclusion. However, coming to grips with a holistic explanation is challenged by the complex interrelation and time-varying characteristics of the mitigated factors. These factors, like attitudinal beliefs, have been flagged as impacting on educational outcome by various social-psychological models – e.g. Bandura et al (2001), Ajzen (2011) amongst others – and research (Alderman 2013, Carter-Wall and Whitfield 2012, Côté and Levine 2000, Gorard, H., and Davies 2012, Gutman and Schoon 2013, López-Pérez, Pérez-López, and Rodríguez-Ariza 2011, Richardson, Abraham, and Bond 2012, Stockfelt 2016). The impact of ethnicity tends to be explained through the role of culture as it relates to social class (Noden et al 2014, Goldthorpe, 2010, Shah et al, 2010, Modood 2004) and structural factors as it relates to institutionalised racism (Boliver 2013, 2016). Overall, as Strand’s (2014) analysis of the current dataset (Next Step) indicated, many of these factors do not just combine in an additive manner. Rather, there is substantial intersectionality of certain factors – like ethnicity, gender or social-class – which challenges researchers to take a more nuanced view. This article builds on the conceptual foundation of the literature, to contextualise a more nuanced understanding of these complex interrelations impacting on ethnic differences in HEP. Structural equation modelling (SEM) was used to measure the differences (direct and indirect effects) between BME groups and White-British in relation to a variety of time-varying factors.

Methodology

The study used data from the Next Step (formerly LSYPE) survey (DfE 2011b). The Next Step is a panel study managed by the Centre for Longitudinal Studies (CLS) in the UK and was based on a survey of 15,700 adolescents in 2004 when they were age 13/14. The survey used a two-stage stratified random sampling design where schools were

sampled at stage one and pupils at stage two. The pupils were born in 1989-90 and in year nine of secondary school (CLS , Ward and D'Souza 2008). The attrition rate for this dataset was relatively low, with 85-95% response rates after the first wave (DfE 2011b). The sample used in this study included all male respondents (2976) present at waves one (age 13/14), three (age 15/16) and seven (age 18/19) from 596 schools. Only cases present at these waves were included in the analyses.

Path and structural equation mediation models (see Figure 1 below) were fitted using Mplus software (Muthén and Muthén 2012). These were appropriate for modelling categorical data with repeated measures. Based on the feature of the data and the study design, standard errors were adjusted to account for clustering of individuals by schools based on the stratified sampling method (school as the primary sampling unit) used in the data collection. Nonresponse weights³ were also used to adjust for attrition bias (the probability of selection into the initial sample, nonresponse at wave 1, drop-outs between the included waves and school non-response). The weights were standardised based on population totals for relevant demographic variables (example: ethnicity, sex, region and educational qualification) (DfE, 2011). In response to the categorical outcome variable, these analyses were done without assumptions of normality - that is, to circumvent normality, a standard error (SE) computation using a sandwich estimator for estimating covariance matrices of parameter estimates was used (Carroll et al. 1998). Additionally, robust weighted least squares (WLSMV) estimation was used which according to Brown (2015), is one of the best option for modelling categorical outcomes. The model was deemed appropriate for the data using the

³ On the advice of the data owners ((DfE 2011b), the weight used in the analysis was from the last wave (wave 7).

standard tests/criteria for SEM. These were the Root Mean Square Error of Approximation (RMSEA <0.06), Standardised Root Mean Square (SRMR <0.08) and Comparative Fit Index (CFI/NFI >0.90) of the measurement model (see appendix 1 for actual estimates⁴) (Schermelleh-Engel et al, 2003).

The aim of the analyses was to assess the contributions of a range of time-varying factors in explaining ethnic differences in HE participation. Probit regression models were used because the dependent variable – HEP - was measured on a binary scale based on the respondent’s primary (main) activity at age 18/19 (wave 7) (DfE 2011b). These main activities were separated into two categories: in HE or not (employed, apprenticeship/training, unemployed/inactive). The analyses included the following six covariates:

- Ethnicity: categorised into six groups (see Table 1)
- Attitude to school (ATS): a latent variable measured by seven indicators of ‘feeling about school’ at wave 1 when the respondents were aged 13 (approximately 30%) and 14. Each item was measured, on a five-point ordinal scale with values ranging from ‘strongly agree’ to ‘strongly disagree’. The structural equation model comprises a measurement model for ATS (see appendix 1) which is estimated simultaneously with the (structural) model for HEP. The items are:

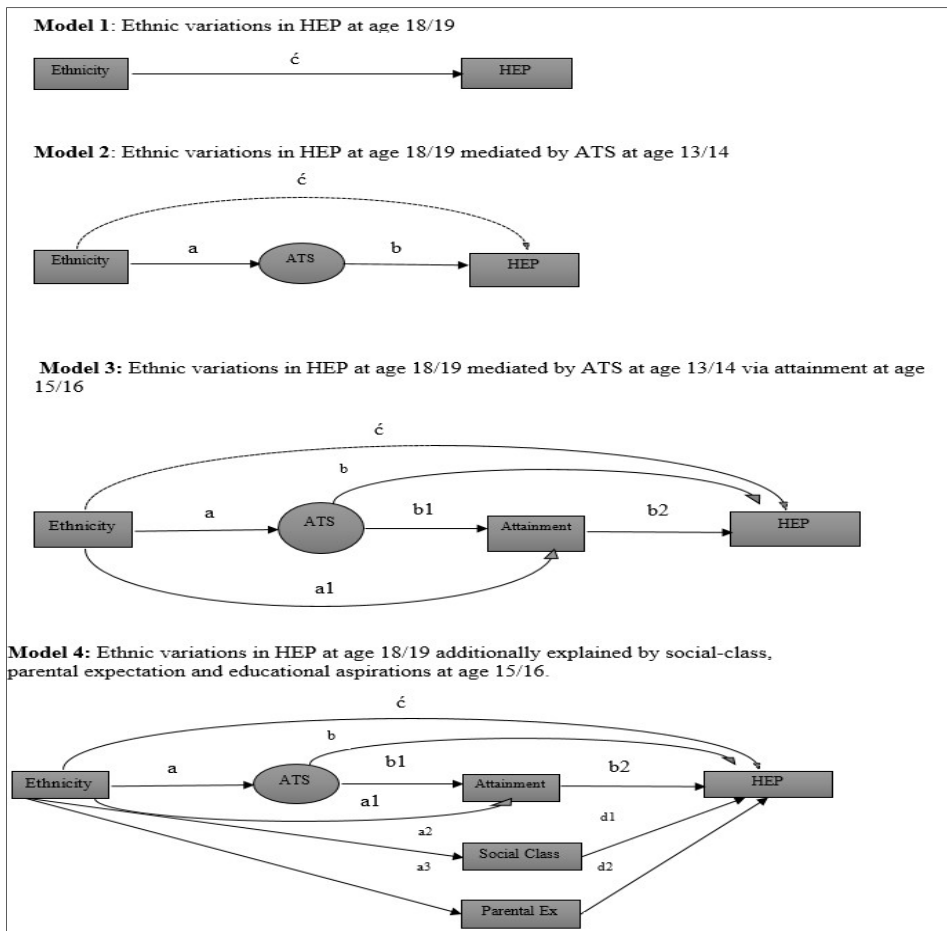
⁴ Significance testing using a Chi-Square test is often one of the core ways of testing the appropriateness of SEM for the data. However, although the chi-square result is reported for transparency, this sort of testing was not suitable for this dataset which is not multivariate-normal and has a large sample size with accompanied degree of freedom. Such a combination usually leads to a significant Chi-Square result and the possibility of a type 1 error (when taken in conjunction with good results from the other fit indices as in this case) (Schermelleh-Engel, 2003).

- I am happy when I am at school
- School is a waste of time for me
- School work is worth doing
- People think my school is a good school
- I am bored in lessons
- The work I do in lessons is interesting to me
- I get good marks for my work

The coding of negatively worded items was reversed for measurement consistency.

- Attainment: Measured at wave 3 by the total uncapped GCSE and equivalent points based on the new scoring system in 2004 (DfE 2015b).
- Parental expectation: binary indicator based on parent's report (at wave 3 when respondents were 15/16) of whether they expected their child to stay in full time education (FTE).
- Social-class: based on the National Statistics Socio-economic Classification (NS-SEC) from the main household reference person in the LSYPE dataset at wave 3.

Figure 1: Path (model 1) and structural equation models (model 2 – 4) showing direct and indirect effects of ethnicity on HEP



Statistical Models

The estimates of the paths from the predictors to HEP (the observed categorical dependent variable) in Figure 1 above are probit regression coefficients. The coefficients for these paths (Table 3 below) were standardised with respect to a continuous latent variable underlying the observed binary HEP (see Appendix 3 for more details) (Muthén and Muthén 2012). These coefficients should be interpreted as contrasts between each BME ethnic group and White-British in the propensity to participate in HE. For these probit models, a positive sign indicates that the propensity of HEP is higher for a particular ethnic group, relative to the baseline category (White-British boys). The amount of difference between each ethnic group and White-British (baseline) can be interpreted from the standardised coefficients as relative effects.

Each model is an extension of the previous, corresponding to the research questions (RQ) to assess the direct and indirect impacts of ethnicity on HEP as follows:

- Model 1 (RQ1) is a simple probit regression to test for ethnic differences in HEP between BME boys and White British at age 18/19;
- Model 2 (RQ2) extends model 1 into a structural equation model (SEM) allowing for an indirect effect of ethnicity through ATS at age 13/14. ATS is referred to as a mediator variable in the relationship between ethnicity and HEP.
- Model 3 (RQ3) extends model 2 to a serial mediation model with an indirect effect of ethnicity through ATS, which in turn has an indirect effect on HEP via attainment at age 15/16.
- Model 4 (RQ4) extends model 3 to additionally include the effects of social-class and parental expectation at age 15/16.

Findings

Descriptive statistics

Table 1 shows the frequencies (n) and percentages of respondents with HEP as their main activity at age 18/19 by covariates. Social-class and attainment are presented in this table as binary just to give a crude indication of the contrasts between the upper and lowermost sections; however, both are treated as continuous variables in all models. Attainment is a continuous variable (mean=382.3, SD=154.8 prior to standardisation) which was standardised to a z-score prior to analysis. Cut-off for this variable was calculated from the 50th percentile (median value) with a value of 396. Social-class is based on eight ordinal categories and was treated as continuous - with a mean of 4.5 and a SD of 2.5 - because of its approximate linear relationship with HEP. The descriptive analysis shows patterns in boys' HEP that were consistent with the literature. Overall,

the percentage of boys in HE varied by ethnicity, with White-British followed by Caribbean the least represented. Additionally, there were lower percentages of boys with HEP in the following categories: lower social-class groups, lower 50th percentile uncapped GCSE total score points, and little/no parental expectations.

Table 1: Descriptive statistics of covariates by HEP

Variables	HEP	HEP	Total
	n	%	n
Total	1520	51.1	2976
Ethnicity			
White-British	945	44.7	2112
Indian	189	79.7	237
Pakistani/Bangladeshi	175	65.5	267
Caribbean	58	48.3	120
African	54	80.6	67
Any Other	99	57.2	173
Social-Class			
Upper	933	59.3	1574
Lower	587	41.9	1402
Attainment			
Upper 50 th percentile	1204	68.9	1748
Lower 50 th percentile	316	25.7	1228
Parental expectation			
Yes	1441	60.4	2386
No	79	13.4	590

RQ1: Ethnic variations in higher education participation

This question responds to the literature’s main narrative of ethnic variations in HEP, but with a focus on males. As Crawford & Greaves (2015) have identified in their review of the literature, White-British males are less likely to move into HE. This informed the probit regression model (see figure 1 above) which allowed the propensity of HEP to

vary across BME groups relative to White-British. The result of this analysis (Table 2⁵ below) showed that HEP significantly ($p < 0.01$) varied by ethnicity at age 18/19. In support of the literature, all ethnic categories - except for Caribbean - showed a significantly higher propensity toward HEP than White-British (Wald test chi-squared statistic = 132.74, 5 d.f., $p < 0.01$).

Table 2: Effects of ethnicity on male HEP at age 18/19

Variables	Model 1		
	Unstandardized Coefficient	Standardised Coefficient	SE
Indian	1.05*	1.02*	0.12
Pakistani/Bangladeshi	0.56*	0.55*	0.10
Caribbean	0.04	0.04	0.14
African	1.18*	1.14*	0.21
Any Other	0.44*	0.43*	0.12

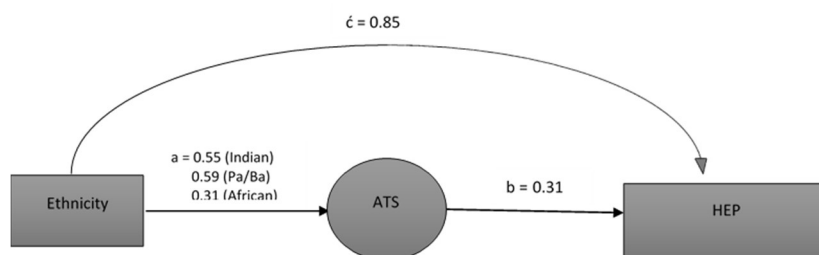
RQ2: Indirect effect of ethnicity through attitude to school (ATS) at age 13/14

Model 2 links with the literature to assess the role of attitudinal beliefs about school in early adolescence and its impact on HEP in early adulthood. The results showed significant ($p < 0.05$) indirect effects of ethnicity through ATS for Indian, Pakistani/Bangladeshi and African boys relative to White-British. Specifically, the positive coefficients (see Table 3 below) showed that the propensity of HEP increased with more positive attitude towards school ('higher' values of ATS). For example, the standardised indirect effect of being Indian vs. White-British via ATS is 0.17 (Table 3) which is calculated as the product of the coefficients for Indian \rightarrow ATS (0.55, path 'a')

⁵ Note that the presence of the asterisk denotes significance ($p < 0.05$) in this and all the tables included in this paper. Additionally, standardised coef are only included in this model for comparison with later mediation models.

in Figure 2) and ATS → HEP (0.31, path 'b'); i.e., $a \times b$ [0.31×0.55]. Therefore, being Indian had a significant direct effect on ATS (0.55) at age 13/14, however, only part of this effect - 0.31 of it - was transmitted to HEP at age 18/19. This means the latent propensity of HEP for Indian boys versus White-British, is expected to increase by 0.17 SD units for every 0.31 SD unit increase in ATS. A Wald test on the added parameters was highly significant ($p < 0.01$) with $\chi^2(6) = 175.36$, suggesting that ATS at age 13/14 partially mediates ethnic differences in HEP at age 18/19 for Indian, Pakistani/Bangladeshi and African boys relative to White-British.

Figure 2: SEM mediation model showing indirect effect of ethnicity via ATS at age 13/14



RQ3: Indirect effect of ethnicity through ATS via attainment at age 15/16

Model 3 further explored the role of prior attainment on HEP based on the literature, to test the mediating effect of ATS on ethnic variations via prior attainment. The result (Table 3) showed significant ($p < 0.05$) indirect paths via ATS and attainment for Indians, Pakistanis/Bangladeshis and Africans (same ethnic groups as Model 2) relative to White-British boys (see Figure 3 below). Additionally, the indirect path via attainment was significant for Caribbean boys. Each ethnic group had three possible indirect effects on HEP: one through ATS ($a \times b$), one through attainment ($a_1 \times b_2$), and the third through both ($a \times b_1 \times b_2$). However, not all indirect paths were significant (see Tables 3). BME groups differed in the mediating effects of ATS and attainment on HEP relative to White-British as follows:

- Indian vs White-British: Only the indirect effects through ATS and through ATS via attainment were significant for this group. This means that there was no significant difference in the propensity towards HEP between Indian and White-British boys based on attainment at age 15/16. Including attainment, resulted in a reduction in the direct effect of ethnicity from 0.85 to 0.81 and a decomposition⁶ of the indirect effect from the previous model. The indirect effect was now decomposed across the two significant routes: 0.05 via ATS; and 0.12 through ATS via attainment (see Table 3). Therefore, being Indian had a direct effect on ATS (path a = 0.56 in Figure 3), where part of this effect is transmitted to attainment (path b1 = 0.40) and another part (path b2 = 0.56) is transmitted to HEP. This means that the propensity of HEP for this group is expected to increase by 0.12 SD for every 0.40 SD increase in attainment by ATS.
- Pakistani/Bangladeshi vs White-British: All three standardised indirect effects of being Pakistani/Bangladeshi on HEP were significant. Including attainment resulted in an increase in the direct effect from 0.37 (Model 2) to 0.67, and further decomposition of the indirect effects (see Table 3). The indirect effects through ATS and ATS via attainment were almost the same as the Indian boys. However, the indirect effect via attainment was significant and negative (-0.30). This meant that their propensity of HEP is expected to decrease by 0.30 SD of every 0.56 SD increase in attainment relative to White-British.
- Caribbean vs White-British: The standardised indirect effect via attainment (-0.13) was the only significant path for this group. Like Pakistani/Bangladeshi

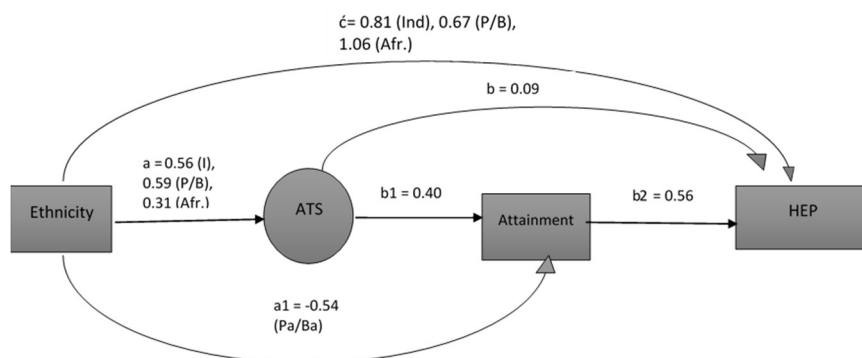
⁶ Broken-down between two pathways ATS → HEP and ATS → Attainment → HEP.

boys, the propensity of HEP is expected to decrease (by 0.13 SD unit) with 0.56 SD increase in attainment relative to White-British.

- African vs White-British: Only the standardised indirect effect through ATS via attainment was significant for this group with a coefficient of 0.07.

A Wald test on the added parameters was highly significant ($p < 0.01$) with $\chi^2(7) = 1146.20$, suggesting that the differences in HEP between these BME groups and White-British is partially explained by ATS at age 13/14 via attainment at age 15/16 when the other effects are held constant.

Figure 3: Serial mediation SEM showing indirect effect of ethnicity through ATS via attainment at age 15/16



RQ4: Additional effects of social-class and parental expectation at age 15/16

Model 4 assessed the influence of two of the most common factors impacting on HEP and other educational outcomes as identified in the literature (see introduction). This model included two additional indirect effects or paths (see Figure 4 below): via social class ($a_2 \times d_1$) and via parental expectations ($a_3 \times d_2$). The results (see Table 3) showed that – with the other variables held constant – social-class had a highly significant ($p < 0.05$) and negative relationship with being Pakistani/Bangladeshi, African and ‘Any

other' ethnicities relative to White-British. This means that boys from these ethnic groups from higher social-class groupings have lower propensities of HEP at age 18/19 than their White-British counterparts. Pakistani/Bangladeshi boys showed the highest negative propensity – on average - towards HEP with social-class. On the other hand, parental expectation had a highly significant and positive effect on HEP for all ethnic groups - except Caribbean where the effect was not significant ($p>0.05$) - relative to White British. Africans, followed by Indian boys showed the greatest propensities toward HEP with parental expectations.

Except for Caribbean, accounting for social-class and parental expectation did not change the mediated effects of the three original paths for the BME groups that were significantly different from White-British. Rather, they explained a proportion of the relative gap in HEP as shown by further significant reduction in the direct effects for certain BME groups (Table 3) as follows:

- The direct effect of Indian vs. White-British on HEP was reduced from 0.81 (from Model 3) to 0.26. The indirect effect of social-class was not significant ($p>0.05$) but parental expectation was, with a coefficient of 0.58 (see Figure 4 below). This means being Indian has a direct effect (0.88) on parental expectation at age 15/16, with part of this effect (0.66) transmitted to HEP at age 18/19. Overall, parental expectation accounted for approximately 57% ($0.58/1.02 \times 100$) of the total effect of being Indian relative to White-British.
- The direct effect of Pakistani/Bangladeshi vs White-British was reduced from 0.67 (from Model 3) to 0.47. The indirect effect of both social-class and parental expectation were significant for this group ($p<0.05$) with coefficients of -0.28 and 0.48. The negative coefficient for social-class shows the propensity of HEP

decreasing with increased units of social-class for this group relative to their White-British counterparts.

- The direct effect of being African vs. White-British on HEP became non-significant. This means that while holding the other variables constant, accounting for social-class and parental expectation explained away the significant difference between African and White-British boys in the effect of their ethnic groups. Like Pakistani/Bangladeshi boys, social-class had an indirect negative effect, while parental expectation was positive with the highest standardised coefficient of the BME groups.
- The ethnic category 'Any other' also showed a similar trend - in the indirect effect re social-class and parental expectation - as Pakistanis/Bangladeshis and Africans.
- Additionally, accounting for social-class and parental expectation 'explained' the indirect negative effect of being Caribbean vs. White-British via attainment on HEP.

A Wald test on the added parameters were highly significant ($p < 0.01$) with $\chi^2(12) = 999.18$. This suggests that the significant differences between Indian, Pakistani/Bangladeshi, African and Any-Other with White-British, is further explained by social-class and parental expectations.

Figure 4: Model 3 with additional effects of social-class and parental expectation

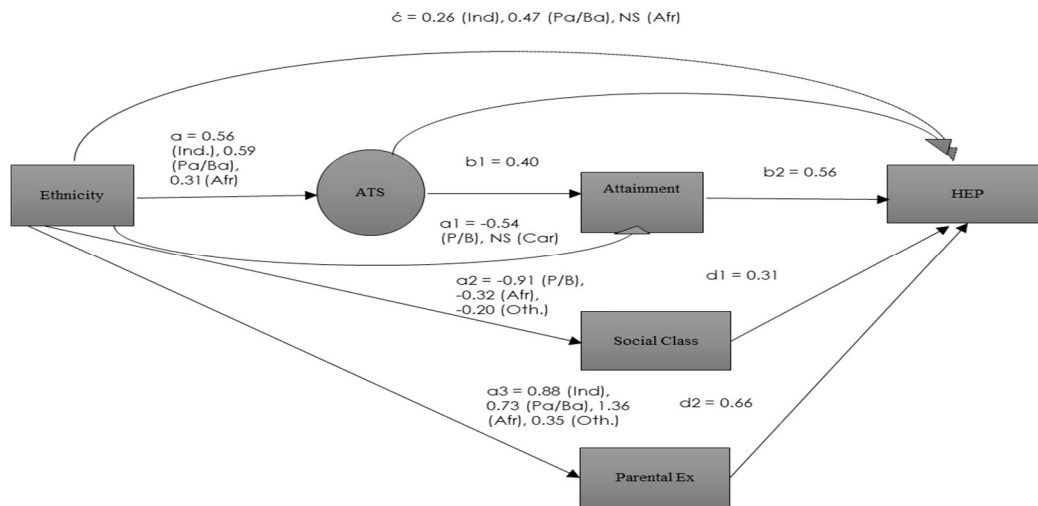


Table 3: Standardised coefficient for BME groups relative to White-British from probit models of male HEP at age 18/19 with mediating effects of ATS and GCSE attainment

	Indian vs. WB		Pak/Ban vs. WB		Caribbean vs. WB		African vs. WB		Any Other vs. WB	
	Coef	SE	Coef	SE	Coef	SE	Coef	SE	Coef	SE
Model 2										
Indirect via ATS	0.17*	0.03	0.18*	0.03	-0.03	0.14	0.10*	0.04	0.01	0.12
Direct	0.85*	0.12	0.37*	0.10	0.07	0.14	1.05*	0.21	0.42	0.12
Total	1.02*	0.12	0.55*	0.10	0.04	0.14	1.15*	0.21	0.43*	0.12
Model 3										
Indirect via ATS	0.05*	0.02	0.05*	0.01	-0.01	0.01	0.03	0.02	0.00	0.01
Indirect via attainment	0.04	0.06	-0.30*	0.05	-0.13*	0.08	-0.00	0.12	0.04	0.05
Indirect via ATS & attainment	0.12*	0.02	0.13*	0.02	-0.02	0.03	0.07*	0.03	0.00	0.02
Total Indirect	0.21*	0.06	-0.12*	0.06	-0.02*	0.02	0.09	0.10	0.05	0.12
Direct	0.81*	0.09	0.67*	0.09	0.20	0.11	1.06*	0.22	0.38*	0.10
Total	1.02*	0.12	0.55*	0.10	0.04	0.14	1.15*	0.21	0.43*	0.12
Model 4										
Indirect via ATS	0.05*	0.02	0.05*	0.02	-0.01	0.01	0.03	0.02	0.00	0.01
Indirect via attainment	0.04	0.06	-0.30*	0.05	-0.13	0.08	-0.00	0.12	0.04	0.05
Indirect via ATS & attainment	0.12*	0.02	0.13*	0.02	-0.02	0.03	0.07*	0.03	0.00	0.02
Indirect via social-class	-0.03	0.03	-0.28*	0.03	-0.02	0.03	-0.10*	0.04	-0.06*	0.03
Indirect via parental expectation	0.58*	0.09	0.48*	0.09	0.28	0.16	0.89*	0.17	0.23*	0.10
Total Indirect	0.76*	0.14	0.08	0.13	0.09	0.22	0.89*	0.20	0.22	0.15
Direct	0.26*	0.02	0.47*	0.13	-0.05	0.18	0.26	0.25	0.21	0.11
Total	1.02*	0.12	0.55*	0.10	0.04	0.14	1.15*	0.21	0.43*	0.12

Discussion

The findings were generally consistent with some aspect of the literature: BME groups differed in higher educational participation (HEP) rates to White-British; White-British and Caribbean boys have the lowest propensity of HEP; and prior attainment and social-class explained a large proportion of the gap in HEP. Specifically, the existence of an ethnic demarcation amongst boys' showed that the effect of ethnicity goes beyond gender. Quite critically, the variation in the effects of the different BME groups relative to White-British builds on the literature to highlight a more diverse understanding in relation to certain factors.

Attitude to school (ATS) is a time varying subjective concept; i.e., children tend to change their beliefs, attitudes, etc. as they mature and adjust to limitations and/or opportunities in their environments (Sullivan 2001, Reay 2006, Stockfelt 2015, Goldthorpe 2007, Hansen 2008). However, as the results showed, the mediated effect of ATS differed according to ethnic group, for example, Indian and Pakistani/Bangladeshi boys with positive ATS at age 13/14 had a greater propensity of HEP at age 18/19 than their White-British counterparts, even after accounting for the factors used in the analyses (Model 4). On the other hand, Caribbean, African and Other BME boys with positive ATS at age 13/14 did not significantly differ from White-British in their propensity to HEP at age 18/19. This coincides with the literature identifying diversity in attainment and HEP rates amongst BME groups (Crawford and Greaves 2015) as well as the role of parental influence in boosting attainment amongst certain Asian groups (see below for further discussion) (Modood 2004, Shah, Dwyer, and Modood 2010, Strand 2011). Beliefs about/towards schooling has often been used as measures of attitudes towards education (Côté and Levine 2000, Goodman, Gregg, and Washbrook 2011, Kintrea, St Clair, and Houston 2011, Richardson, Abraham, and Bond 2012, Stockfelt 2016, Strand 2007). As said previously, the limits of quantitative research in

understanding this link is tied with the time-varying characteristic of the concept itself. The longitudinal focus of the study should capture some aspect of this dynamics by assessing this link with the same cohort between ages 13/14 and 18/19. However, to properly represent this time-variation, ATS would need to be captured repeatedly over this seven-year period. This was not present within the dataset and might have shown the extent of the variation by ethnicity, but would still flag the question of why similar measures of ATS around the same age range vary across BME groups vs White-British. Additionally, why White-British and Caribbean boys have the lowest propensity towards HEP with ATS. A previous analysis of the current dataset by Stamou et al (2014) identified Caribbean pupils as being overrepresented in a category of youths disengaging from schools but not from education and White-working class as those uninterested in education generally. Such ideas could explain the non-significant role of ATS on HEP for these two ethnic groups irrespective of the factors controlled for (across models 2-4). However, a large proportion of the difference (statistically and substantively) remained unexplained.

Including prior attainment at the end of compulsory schooling was particularly illuminating, as although it confirmed the literature, in being highly significant in explaining ethnic differences in HEP. It points to a more diverse story about HEP trend amongst BME boys vs White-British. Like ATS, the relationship between attainment and ethnicity differed for some BME groups relative to White-British. For example, while there were no significant differences in the mediated effect of attainment for Indian and African boys relative to White-British, this was not the same for Pakistani/Bangladeshi and Caribbean boys showing a negative effect; i.e., higher attaining boys from these groups had a lower propensity of HEP. This contextualises the general narrative in the literature about the growth in the trend of BME youths in HE

relative to White-British. Explicitly, it highlights the possibility of a specific ‘ethnic effect’ amongst high achieving Pakistani/Bangladeshi and Caribbean boys. Findings of this sort has been flagged by a minority of studies in the literature as evidence of institutionalised racism (Alexander & Arday, 2015; Pilkington, 2011), and/or universities not being meritocratic (Boliver 2011, 2013, 2016). For example, recent analyses of the UCAS data identified suitably qualified BME students as been less likely to receive an offer of a place at UK’s prestigious universities (Boliver, 2016). This gap remained significantly unexplained despite controlling for a variety of relevant factors like prior-attainment, school-type (private or state) and the numerical-competitiveness of the chosen degrees.

Including the impact of social-class and parental expectation further highlighted a growing understanding of the complexities within the impacting factors and its relationship with ethnicity. In relation to the literature focus on lower HEP rates of ‘working class White-British’, the current results re-emphasised the effect of ethnicity for BME groups relative to White-British. That is, comparatively with White-British, boys with higher units of social-class (higher social-groupings) from most BME groups have significantly lower propensities of HEP. Simplistically speaking, in relation to the literature, while higher economic-capital may benefit White-British boys in HEP, it does not have the same ‘advantaged-effect’ for most BME groups already disadvantaged by ethnicity. The mediated-effect of social-class was non-significant for Caribbean and Indians, but the negative coefficients (Table 4) highlighted the same underlying propensity. In this manner, being minority ethnic has a stronger relative impact on HEP rates than being economically-privileged, while for White-British social-class was the dominant factor.

The mediated-effect of parental expectation, shows another extreme, where comparatively with all BME groups, White-British boys have a negative propensity towards HEP with parental expectations towards FTE at age 15/16. This seems to re-emphasise a pattern of difference between most BME groups and White-British (except for Caribbean) where class seems to play a stronger role in determining educational outcomes than beliefs, expectation or aspirations (Stamou et al, 2014; McDowell, 2011; Evans, 2006). A potential explanation may be inferred from Goldthorpe's (2010) Rational Action Theory (RAT). RAT attempts to explain the gap in attainment from social class, with the class differential effect on parental expectation. According to Goldthorpe's (2010), class differences come into play when pupils reach transitional phases in the education system and have to make choices. Choices are then determined by the influence of their parents' rational assessment of costs and benefits and chance of success/failure. His thesis rests on the hypothesis that more ambitious options are less favourable for those disadvantaged by class as it would take greater aspirational effort to perceive success as working class families have more to lose from a failed attempt at HE. Goldthorpe, amongst others – Bourdieu's notion of school reproducing social inequalities (Reay, 2006; Stockfelt, 2015) – may provide a rational understanding of the role of social class, but not the demarcation in its mediated-effects with BME groups relative to White-British. A feasible hypothesis stems from the work of Modood (2004) who argues that this demarcation stems from differences in how ethnic groups socialise academic motivation for their children. He – along with others (Modood 2004, Shah, Dwyer, and Modood 2010, Strand 2011) – posits that certain BME groups (for example, Indians, Bangladeshi/Pakistani) compensate socio-economic deficits with strong social and cultural capital stemming from family values and networks that promote particular educational goals. This may result in the stronger effect of parental

aspirations/expectations, offsetting the negative impact of social-class. Such arguments help to provide some growing understanding of these ethnic variations as culture undoubtedly impacts on attitudes and dispositions – especially in relation to Indian and Pakistani boys - towards education and schooling (Modood 2004, Shah, Dwyer, and Modood 2010, Strand 2011, Stockfelt 2015, 2016). Whilst these arguments help to contextualise the difference in the impact of high parental aspirations/expectations with lower social-class for certain ethnic groups; it does not explain the negative impact of ethnicity for high achieving Pakistani and Caribbean boys or for BME from higher-social groupings compared to their White-British counterparts. These findings, along with the recent finding of BME under-representation at prestigious UK universities (Boliver, 2016), calls for a deeper large-scale investigation of the issue that is beyond the scope of this article. Further research is necessary to establish a concrete explanation of the *hows* and *whys* as well as a way forward to ensure more equitable HEP rates.

Limitations

Overall, the results of the analyses, flagged ethnic variations in the mediated-effects of ATS, prior attainment, social-class and parental expectation on HEP. For consistency, it is important to contextualise the findings, substantively in relation to the literature, and methodologically based on the limitations of the data, characteristics of the variables and analyses.

Literature

Generally speaking, there are more White-British youths in higher education than BMEs in the UK. The findings point to a relative increase in HEP rate for BME students relative to White-British when looking *only* at the direct effect of ethnicity.

Additionally, it is necessary to note the general increase in students from WP

background in HE (Blanden & Machin, 2004; DfE, 2015a); and so the findings would likely be reflecting some aspects of this increase.

Methodology/Data analysis

Methodologically, it is difficult to measure certain variables like ‘attitude to school’ and ‘expectation’ – measures of these will always be open to subjective understandings.

However, such ‘error’ is minimised within a SEM framework which allows for consistent estimation of the relevant regression parameters (Bollen, 1989). Additionally, missing cases were assumed to be missing completely at random and so excluded. Such assumptions of missingness are based on an educated guess, but it allows the inclusion of weights to make the reduced sample more representative based on the recommendation of the data owners (DfE, 2011b) – quite relevant since they were calibrated in relation to variables included in the current analyses (attainment, ethnicity, social-class etc.). At the same time, the robustness of the analyses and the consistency between the findings and the literature – including analyses on the same dataset - adds a good measure of reliability.

Implications and conclusion

Overall, the findings offer an understanding of the direct and indirect impact of ethnicity on HE participation amongst boys. It both confirms and nuances the literature in the relative ethnic differences in the mediating effects of dynamic variables. Except for Caribbean, all BME groups have a greater propensity of HE at age 18/19 than White-British. This is especially the case when looking at the mediated effect of attitude to school at age 13/14 and parental expectation at age 15/16. However, BME groups with higher social-class scores, and some with higher attainment (Pakistani/Bangladeshi, Caribbean – Model 3) scores at age 15/16, actually have a

lower propensity of HEP at age 18/19 relative to White-British counterparts. There is indeed a need for some sort of intervention to improve HEP rates for White-British working-class boys, however, this should in no way reduce the emphasis placed on boosting HEP rates for BME groups. Overall, there is an urgent need for more to be done to reduce the impact of ethnicity for BME groups. This should be accompanied by additional support for certain groups made more vulnerable by the intersectionalities of certain factors (like being an ethnic minority from the working class). These findings have implications for policy, practice and further research re a more targeted and contextualised approach with respect to increasing the HEP rates of BME groups as a part of the widening participation (WP) agenda, as follows:

- There is the need for targeted interventions for high attaining Pakistani/Bangladeshi and Caribbean boys either at the end of compulsory schooling – to help direct their HE choices – or structurally at the universities to reduce non-meritocratic or covert racist practices. The findings from this research along with others (Boliver 2016) do call for a stricter approach. At the institutional level, this may include in-depth case studies at the least representative universities accompanied by strict minimal numerical targets for BME (across all disciplines).
- There is the need for understanding the role of parental expectation and its comparatively lower effect on HEP with respect to White-British and Caribbean boys. At the policy level, to help contextualise understandings further investments is needed to fund more large-scale longitudinal research that include data on ethnic-effect on labour market outcome. This may help to account for the relative lower representation of these groups in HE as well as provide a more detailed context of general ethnic-related outcomes and why.

- Caribbean boys are a particularly vulnerable group, i.e., they have the lowest relative propensity of HEP irrespective of the factors accounted for.

Additionally, the negative relationship between attainment and HEP begs the need for deeper explorative qualitative (or mixed-methods) longitudinal research at the individual (boys themselves) and institutional (schools and universities) level to unpick some of the complexities. The result of this study supported by other studies in the literature (for example, Gorard et al 2012, Goodman et al 2011) re-emphasise the vulnerability of this group and the need for the WP agenda to undertake a more focussed approach.

Overall, the findings imply the drawback of a ‘one-size-fits-all’ approach in any WP agenda and incite the need for further in-depth qualitative research to offer deeper insights. This may provide a more holistic understanding of the issue and support specific informed interventions.

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Appendix

Appendix 1: Estimates from the SEM measurement model for ATS and goodness of fit statistics

Variables	Estimates		SE
	Standardised	Unstandardised	
ATS1: I am happy when I am at school	0.54	1.00	---
ATS2: School is a waste of time for me	0.43	0.84	0.82
ATS3: School work is worth doing	0.46	0.85	0.06
ATS5: People think my school is a good school	0.34	0.76	0.07
ATS9: I am bored in lessons	0.57	1.20	0.10
ATS11: The work I do in lessons is interesting to me	0.66	1.11	0.08
ATS12: I get good marks for my work	0.43	0.68	0.06
ATS (variance)	1.00	0.34	0.02
Test of model fit			
Chi-Square		Estimate	Sig
		1281.10	<0.01
RMSEA		0.04	<0.01
CFI/TLI		0.93	<0.01
SRMR		0.03	<0.01

Appendix 2: Unstandardised and Standardised effects of ethnic differences between BME groups and White-British from probit models of male HEP at age 18/19

Variables	Model 2			Model 3			Model 4		
	Unstan. Coef	Stan. Coef	SE	Unstan. Coef	Coef	SE	Unstan. Coef	Stan. Coef	SE
Dependent: HEP									
Attainment				0.56*	0.56*	0.02	0.56*	0.56*	0.02
ATS	0.86*	0.31*	0.03	0.26*	0.09*	0.03	0.26*	0.09*	0.09
Social Class							0.13*	0.31*	0.01
Parental expectation							0.66*	0.66*	0.02
Indian	0.88*	0.85*	0.12	0.83*	0.81*	0.09	0.27*	0.26*	0.12
Pakistani/Bangladeshi	0.38*	0.37*	0.10	0.69*	0.67*	0.09	0.48*	0.47*	0.14
Caribbean	0.07	0.07	0.14	0.21	0.20	0.11	-0.06	-0.05	0.19
African	1.09*	1.06*	0.21	1.09*	1.06*	0.21	0.27	0.26	0.26
Other	0.43*	0.42*	0.12	0.39*	0.38*	0.10	0.22	0.21	0.11
Dependent: Attainment									
ATS				1.13*	0.40*	0.02		0.40*	0.08
Indian				0.07	0.07	0.10		0.07	0.11
Pak/Ban				-0.56*	-0.54*	0.10		-0.54*	0.10
Caribbean				-0.25	-0.24	0.15		-0.24	0.15
African				-0.01	-0.01	0.21		-0.01	0.22
Any other				0.08	0.07	0.09		0.07	0.09
Dependent: ATS									
Indian	0.20*	0.55*	0.10	0.20*	0.56*	0.10		0.56*	0.04
Pakistani/Bangladeshi	0.22*	0.59*	0.08	0.21*	0.59*	0.09		0.59*	0.03
Caribbean	-0.04	-0.10	0.13	-0.04	-0.10	0.13		-0.10	0.05
African	0.11*	0.31*	0.14	0.11*	0.31*	0.14		0.31*	0.05
Other	0.01	0.02	0.10	0.01	0.02	0.10		0.02	0.03
Dependent: Social Class									
Indian								-0.11	0.13
Pak/Ban								-0.91*	0.23
Caribbean								-0.08	0.28
African								-0.32*	0.34
Other								-0.20*	0.22
Dependent: Parental Expectation									
Indian								0.89*	0.13
Pakistani/Bangladeshi								0.73*	0.13
Caribbean								0.43	0.25
African								1.36*	0.27
Other								0.35*	0.16

Appendix 3: Calculating standardised effects

Models	Standardisation (<i>see Appendix 2 above for unstandardised coefficient</i>)
Model 1	The path coefficients in this model are standardised on y (HEP) based on the following formula: $[b_{stdY} = b/SD(y)]$ where $b = b_{ethnicity}$, $y = HEP$, $SD(y) = 1.03$
Model 2	<p>The effects in the model are standardised according to the dependent variable of each equation based on the following:</p> <ul style="list-style-type: none"> ▪ Ethnicity* \rightarrow ATS: $[b_{stdY} = b/SD(y)]$ where $b = b_{ethnicity}$, $y = ATS$, $SD(y) = 0.37$ ▪ ATS \rightarrow HEP: $[b_{stdX} = b*SD(x)]$ where $b = b_{hep}$, $x = ATS$, $SD(x) = 0.37$ ▪ Ethnicity* \rightarrow ATS \rightarrow HEP: $[b_{stdY} = b/SD(y)]$ where $b = b_{ethnicity}$, $y = ATS$, $SD(y) = 1.03$. Note that the effect of ethnicity is mediated by ATS – a continuous latent variable – in this path so the standardisation is done according to this observed binary HEP.
Model 3	<p>In addition to model 2, the effects in this model are standardised as follows:</p> <ul style="list-style-type: none"> ▪ Ethnicity* \rightarrow Attainment: $[b_{stdY} = b/SD(y)]$ where $b = b_{ethnicity}$, $y = attainment$, $SD(y) = 1.03$ ▪ ATS \rightarrow attainment: $[b_{stdX} = b*SD(x)]$ where $b = b_{attainment}$, $x = ATS$, $SD(x) = 0.35$ ▪ Attainment \rightarrow HEP: $[b_{stdX} = b*SD(x)]$ where $b = b_{hep}$, $x = attainment$, $SD(x) = 1.03$ ▪ Ethnicity* \rightarrow ATS \rightarrow Attainment \rightarrow HEP: $[b_{stdY} = b/SD(y)]$ where $b = b_{hep}$, $y = HEP$, $SD(y) = 1.03$
Model 4	<p>In addition to Model 3, the effects in this model are standardised as follows:</p> <ul style="list-style-type: none"> ▪ Ethnicity* \rightarrow social-class: $[b_{stdY} = b/SD(y)]$ where $b = b_{ethnicity}$, $y = social-class$, $SD(y) = 2.47$ ▪ Social-class \rightarrow HEP: $[b_{stdX} = b*SD(x)]$ where $b = b_{hep}$, $x = social-class$, $SD(x) = 2.47$ ▪ Ethnicity* \rightarrow Parental expectation: $[b_{stdY} = b/SD(y)]$ where $b = b_{ethnicity}$, $y = parental\ expectation$, $SD(y) = 1.03$ ▪ Parental expectation \rightarrow HEP: $[b_{stdX} = b*SD(x)]$ where $b = b_{hep}$, $x = parental\ expectation$, $SD(x) = 1.03$