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**Ethnicity, Parenting Styles, and Adolescent Health  
Behaviours**

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**Submitted in fulfilment of the requirements of the Degree  
of Doctor of Philosophy**

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## **Abstract:**

*Background:* There are ethnic variations in health behaviours in adolescence that track into adulthood and determine health outcomes. It is important to understand how these ethnic variations are influenced by factors such as the family environment so this thesis aimed to investigate whether ethnic variations in adolescent substance use, diet, and physical activity are mediated or moderated by parenting styles. Ethnic variations in adolescent health behaviours may also be moderated in strength by acculturation, and any investigation of parenting styles as a mediator needs to account for intermediate confounding by structural inequalities.

*Methods:* Data were taken from the second wave of the, London-based, UK DASH study. These data were collected from 4,779 adolescents, aged 14-16 years old, between 2005 and 2006. The ethnic diversity of the DASH study allows for investigation of differences between major UK ethnic groups. Outcome measures include substance use (smoking, alcohol, and illicit drug use), fruit and vegetable consumption, physical activity, body size, and clusters of health behaviours (identified by latent class analysis). Logistic regression analysis and marginal structural modelling were used to investigate whether ethnic variations in adolescent health behaviours were mediated or moderated by cultural values, or parenting styles. This approach allows for intermediate confounding by structural inequalities.

*Results:* Adolescent health behaviours varied by ethnicity and some variations were moderated by cultural factors, tending to be weaker where adolescents were more acculturated. Ethnic minority adolescents were less likely than White UK adolescents to engage in substance use behaviours but tended to have more unhealthy diets. Structural inequalities did not fully explain these ethnic variations. Compared to White UK adolescents, ethnic minority adolescents were more likely to perceive *Authoritative* or *Authoritarian* styles of parenting, characterised by higher parental control. Adolescents who perceived more *Authoritative* or *Permissive* styles of parenting, characterised by higher parental care, tended to have healthier behaviours. In general, the results of marginal structural models indicate that intervening on parenting styles would not remove ethnic variations in adolescent health behaviours, though this may be because the effects of *Authoritarian* and *Authoritative* parenting would to some extent cancel each other out.

*Conclusion:* Although intervening to modify parenting styles may improve adolescent health behaviours in general, further research is needed to better understand the role of cultural factors in influencing ethnic variations.



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# 1. Introduction

## *Aims and objectives:*

The overall aim of my Thesis is to investigate whether perceived parenting styles explain ethnic variations in adolescent health behaviours. To achieve that aim the following five objectives were identified (Figure 1-1):

- A. Investigate ethnic variations in adolescent health behaviours
- B. Investigate ethnic variations in perceived parenting styles
- C. Investigate relationships between perceived parenting styles and adolescent health behaviours
- D. Investigate whether perceived parenting styles mediated any ethnic variations in adolescent health behaviours
- E. Investigate whether perceived parenting styles moderated any ethnic variations in adolescent health behaviour

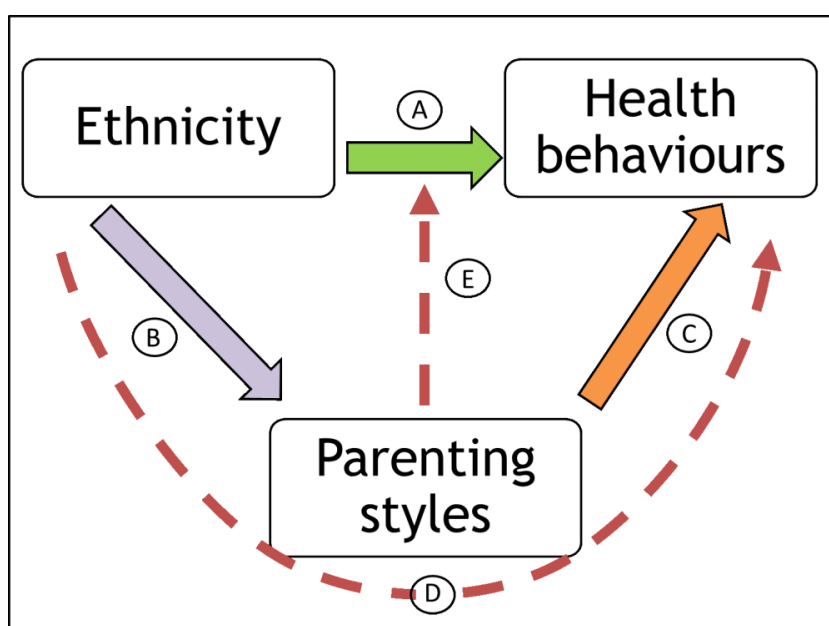


Figure 1-1: Thesis aims and objectives.

## 2. Thesis structure

In Chapter 0, I introduce the key concepts of ethnicity and parenting. In Chapter 4, I reviewed existing literature related to my objectives and based on my findings formulated a series of research questions. I describe my data and methods in Chapter 5, and, in Chapters 6-9, I present findings of analyses I carried out to address my objectives. In Chapter 10, I discuss those finding with reference to existing knowledge in the area, consider implications with regard to the aims of my Thesis and possible

interventions, as well strengths and limitations of my study, and ideas for future directions, before presenting my conclusions in Chapter 11.



### **3. Background**

The main aim of my Thesis is to investigate whether ethnic variations in adolescent health behaviours are moderated or mediated by parenting styles. Here, I introduce the study data and major concepts, which are central to my Thesis.

#### **3.1. The DASH study:**

The Determinants of Adolescent Social wellbeing and Health (DASH) study aimed to investigate how conditions influence ethnic health inequalities in adolescence and later life. A published cohort profile provides further information about the study including its settings, aims, scope and data collection (Harding et al., 2007). The study dataset provides the opportunity to investigate whether ethnic variations in adolescent health behaviours are moderated or mediated by parenting styles.

Fifty-one secondary schools across eight London boroughs were invited to take part. The boroughs of Brent, Croydon, Hackney, Hammersmith and Fulham, Haringey, Lambeth, Newham, Southwark, Waltham Forest, and Wandsworth boroughs were selected for their high proportions and numbers of people from ethnic minority groups. Within each borough, schools were selected above and below the national averages for academic performance based on reports from the Office for Standards in Education. Schools and pupils actively consented to take part in the study; parents were given the opportunity to opt their child out of the study. Eighty-three per cent of eligible students took part at baseline.

At baseline and follow-up, participants completed questionnaires covering socio-demographic, area, family life, social support, health (illness and health behaviours) and psychosocial factors. Questionnaires were completed in school, under exam conditions to minimise external influences. Physical measurements were taken by a trained survey assistant and included anthropometry, blood pressure, pubertal stage, lung function and salivary cotinine (the latter two at baseline only). More information about the measures utilised in this Thesis can be found in Section 5.1.

Between 2003 and 2004, 6,643 adolescents took part in baseline measures, aged 11 to 13 years old. At follow-up 49 of the original 51 schools were still involved, and 4,779 adolescents took part again, now aged 14 to 16 years old. The main reason for attrition was children leaving the school that they were in at baseline. Little information was available about where these pupils had moved on to. Information about the study sample, including breakdowns by ethnicity and gender at baseline and follow-up, can be found in my descriptive statistics section (5.1.6).

### **3.2. Ethnicity and health:**

The concept of ethnicity is related to that of race. Whereas race places more emphasis on physical characteristics, ethnicity emphasises cultural ones (Bhopal, 2016). Senior and Bhopal (1994) suggest that ethnicity be defined by one or more of the following: shared origins or social background; shared culture and traditions that are distinctive, maintained between generations, and lead to a sense of identity and group; and a common language or religious tradition. In my thesis, I draw on this definition of ethnicity. Migration and acculturation, cultural changes that occur when two groups are in contact, are relevant to ethnicity. As well as self-identifying their ethnicity, DASH study participants were asked about their country of birth, language use, and religious attendance. In my Thesis, I consider these cultural variables as moderators of ethnic differences in adolescent health behaviours and perceived parenting styles.

After the Second World War, there was substantial migration to the UK from commonwealth countries in the Caribbean and the Asian subcontinent. This increased in the 50s and 60s, to fill gaps in the UK workforce, for example in the newly formed National Health Service.

At the time of the 2011 census, 80.5 percent of the population in England and Wales identified as White British. The largest minority group was Asian or Asian British (7.5%), followed by Black, Black African, Black Caribbean or Black British (3.3%). This diversity varied between regions with the greatest proportions of ethnic minorities in London where 18.5% identified as Asian or British Asian, and 13.3% identified as Black, Black African, Black Caribbean or Black British (Office for National Statistics, 2012).

UK mortality data for working age people by country of birth suggest ethnic variations in health with higher all-cause standardised mortality rates for African and South Asian males, and African females, compared to UK-born counterparts (Smith et al., 2000). Higher rates of ischaemic heart disease mortality were recorded among East African and South Asian males and females, and higher rates of stroke were recorded among Caribbean males, West African males and females, and South Asian males and females. It is important to understand how ethnic inequalities in health such as these arise, and understanding ethnic variations in the development of health behaviours during adolescence may contribute to such an understanding.

### **3.3. Adolescent health behaviours:**

Unhealthy behaviours are often established in adolescence and track into adulthood (Viner et al., 2015). Tobacco and alcohol use, two of the five biggest risk factors in terms of global disability adjusted life years (DALYs) lost, are predominantly initiated

during adolescence in high-income countries (Lozano et al., 2012). Low fruit and vegetable consumption, physical inactivity, elevated blood plasma glucose, and high body mass index are amongst the top ten global risk factors and are also strongly determined in adolescence (Lozano et al., 2012). It is of great importance therefore to find out more about risk factors for establishment of those behaviours during adolescence and to plan policies or interventions to modify them.

Adolescence is one of the most important phases of human physical and psychological development. It is said by the World Health Organisation to cover ages 10 to 19 years old, however many biological or social changes associated with adolescence may begin earlier and continue later. While beliefs about adolescence are culturally grounded, broadly speaking, it is seen as the transition from childhood to adulthood.

As well as rapid physical growth, adolescents undergo seismic hormonal and neurological changes. Research shows that many executive functions, that enable the control and coordination of thoughts and behaviour, emerge during adolescence (Choudhury et al., 2006). With developing cognitive skills, adolescents gain self-awareness, independent personalities and social identities. Their lives become less centred on their parents (and families), and relationships with peers become more important (West, 2009). Increasing adolescent autonomy is a common source of parent-child conflict.

Risk taking also increases among adolescents, perhaps because of neurological changes occurring in puberty (Steinberg, 2008). During adolescence there is a dramatic remodelling of the brain's dopaminergic system, which is associated with reward-seeking behaviour, particularly in the presence of peers. Meanwhile, behavioural self-regulation is often not fully developed until the early twenties. This developmental schedule may mean that, compared to children and adults, adolescents tend to be more susceptible to unhealthy behaviours, including substance use, unhealthy diets, and physical inactivity. However, habits and behaviours established in adolescence can track a long way into adulthood, potentially having large, long-term impacts on health (Due et al., 2011, Viner et al., 2012).

Large-scale surveys have looked at ethnic variations in adolescent health behaviours. In general ethnic minority adolescents in the UK are less likely to engage in substance use behaviours, and tend to eat fewer fruit and vegetables and are less physically active. These ethnic variations in adolescent health behaviours are covered in more detail in Section 4.2.1 of my literature review chapter.

### **3.4. Clustering of health behaviours:**

Research shows that certain health behaviours are correlated with each other (Hale and Viner, 2012). There is some debate about the mechanisms underlying the co-occurrence, or clustering, of health behaviours (Hale and Viner, 2012). Two suggested mechanisms include: the gateway model, where engagement in particular health behaviours leads to others; and the 'single syndrome' model where unhealthy lifestyles are posited to arise through common developmental processes.

Noble et al. (2015) carried out a systematic review including 56 studies that looked at the clustering of health behaviours in various countries, including 16 US-based and four UK-based studies. More than half of the studies found clustering of tobacco and alcohol use, and half found clustering of tobacco use, alcohol use, unhealthy diets and physical inactivity. Another systematic review (Meader et al., 2016) explored clustering of health behaviours among UK adults and young adults (defined as 16 to 21 year olds). Thirty-seven such studies were identified, although only four studies included young adults. Among adults, studies found clusters of tobacco use with alcohol use, and tobacco use with unhealthy diet. Among young adults, studies found clusters of tobacco use with alcohol use, and alcohol use with sexual risk behaviours.

There is also a limited amount of research showing that there are ethnic variations in the clustering of adolescent health behaviours. Viner et al. (2006) analysed data from the Research with East London Adolescents Community Health Survey (RELACHS), which recorded regular tobacco and alcohol use and lifetime illicit drug use, among an ethnically diverse sample of 11 to 14 year olds. Compared to White adolescents, Indian, Pakistani, Bangladeshi and Black African adolescents were less likely to engage in at least two of the substance use behaviours. The study did not look at the co-occurrence of substance use behaviours with either unhealthy diet or physical inactivity.

Evidence from recent systematic reviews indicates that adolescent health behaviours cluster, especially substance use behaviours. Evidence on clustering of unhealthy diet and physical activity behaviours is more mixed and more research is needed to investigate how substance use behaviours, unhealthy diet, and physical inactivity cluster among UK adolescents, and how this varies by ethnicity.

### **3.5. Parenting and adolescent development:**

In the field of adolescent development, parenting has received the most attention as a likely determinant of health and wellbeing (Steinberg, 2001). Early work by Diana

Baumrind (Baumrind, 1967, Baumrind, 1971, Baumrind, 1972), and subsequent work by Maccoby et al. (1983), established a typology of four parenting styles, defined by dimensions of care and control, with 'care' referring to responsiveness, and 'control' referring to demandingness:

- Authoritative: high in both care and control
- Authoritarian: low in care, high in control
- Permissive: high in care and low in control
- Neglectful: low in care and low in control

Since the 1990s, in particular, a large body of research has looked at the effects of parenting styles on adolescent development (Steinberg, 2001). Authoritative parenting, which combines warmth and responsiveness (care) with consistent guidelines, limits and expectations (control), (Lamborn et al., 1991, Steinberg et al., 1994, Steinberg et al., 1992) is associated with better psychosocial development and mental health. Parenting styles also appear to influence adolescent health behaviours (Leather, 2009, Steinberg, 2004). This is covered in detail in my literature review (Section 4.2.3). There is also a predominantly US-based body of literature suggesting that there are ethnic variations in parenting styles. This is covered in detail in my literature review (Section 4.2.2). Given that parenting styles appear to vary by ethnicity, and influence adolescent health behaviours, they may be mediators of ethnic variations in adolescent health behaviours. In my literature review (Section 4.2.4), I have reviewed primary studies that have investigated that question. Moreover, there is also evidence that interventions are able to modify parenting styles, including a systematic review of randomised trials (Medlow et al., 2016). This means that parenting is a potentially modifiable risk factor, which could be targeted by interventions aiming to reduce inequalities in the development of adolescent health behaviours.

## 4. Literature review

In this literature review, I describe previous research related to my Thesis objectives. In section 4.1, I describe the methods used to identify relevant literature and in section 4.2 I present my findings. In sections 4.2.1 and 4.2.2, I review literature that describes and attempts to explain, ethnic variations in adolescent health behaviours, and parenting, respectively. In section 4.2.3, I review literature that examines relationships between parenting and adolescent health behaviours, and in section 4.2.4, I review literature that examines whether parenting styles play any part in ethnic variations in adolescent health behaviours. Based upon the literature, I formulate research questions for the analyses presented in Chapters 6-9.

### 4.1. Methods

The purpose of this literature review is to investigate what is already known about ethnic variations in adolescent health behaviours and parenting styles.

The structure of the literature review follows the five objectives of my Thesis:

- A. Investigate ethnic variations in adolescent health behaviours
- B. Investigate ethnic variations in perceived parenting styles
- C. Investigate relationships between perceived parenting styles and adolescent health behaviours
- D. Investigate whether perceived parenting styles mediate ethnic variations in adolescent health behaviours
- E. Investigate whether perceived parenting styles moderate ethnic variations in adolescent health behaviour

Objectives A to C constitute three broad pillars of my Thesis and literature review, each of which represent large areas of existing research. A range of adolescent health behaviours (substance use behaviours, diet, physical activity, and body size), as well as clustering of adolescent health behaviours, are covered by objectives A and C, and parenting styles, measured in many different ways, are covered by objectives B, and C. Given the resources available and the quantity of research, it is not feasible to systematically review all studies in these areas, so a review of reviews was carried out for each area (i.e. A, B and C). This was intended to give a general overview of existing literature in these very broad areas.

The focal point of my Thesis, is where the above three themes coincide, i.e. objectives D and E, which consider whether ethnic variations in adolescent health behaviours are mediated or moderated by parenting styles. Given the specific focus on this area, I

carried out a systematic review of primary empirical studies that address mediation and/or moderation of ethnic variations in health behaviours by parenting styles. This was intended to identify existing literature that has specifically addressed the focal questions of this thesis.

For each part of my literature review, searches were carried out in MEDLINE, Embase, and SocIndex combining search terms as listed in Appendix A. Results were limited to articles published since January 2000 to ensure relevant material was identified.

Within the main themes of ethnicity, health behaviours, and parenting styles search terms were combined using the OR operator, and themes were combined using the AND operator. These combinations are shown in Figure 4-1.

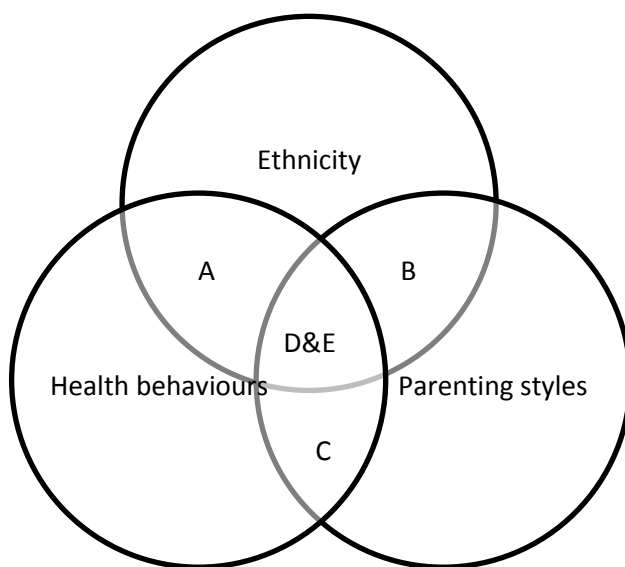


Figure 4-1: Combinations of search terms by Thesis objective

My reviews of reviews each combined two of the three main themes. For objective A, for example, I combined search terms for ethnicity and health behaviours with the AND operator. For the central part of my review (objectives D and E) search terms for all three of the main themes were combined with the AND operator.

For objectives A to C, built-in search filters were applied in MEDLINE and Embase to select review articles. That facility was not available in SocIndex so additional search terms were included for that purpose.

Built-in search filters were applied in MEDLINE and Embase to select articles about adolescence (13 to 18 years old). That facility was not available in SocIndex so additional search terms were included for that purpose. I focus on research on adolescents but in reviews of reviews have included other research (e.g. on younger

children's dietary patterns) where information on adolescents is sparse and data could still be informative. Additional articles were also included in my review of review to complete discussions about mediation, for example.

For each of the four search areas the results were combined in Endnote where duplicate records were removed. Records that were not relevant to the Thesis objectives were excluded in two steps: titles and abstracts were screened first, and then full articles were screened for the remaining records.

For objectives A and B, I included review articles that attempted to explain ethnic variations in adolescent health behaviours, and parenting styles, respectively. In these areas much of the existing literature was in the form of narrative reviews. These reviews proposed explanations for ethnic variations in adolescent health behaviours and parenting styles but often did not cite sufficient evidence to support these ideas. I therefore carried out some additional searches for primary studies where insufficient evidence had been cited in reviews. These supplementary searches contribute to a broad (but not comprehensive) overview of existing research in these areas. For objective C, I included articles that reviewed evidence for relationships between parenting styles and adolescent health behaviours.

For objectives D and E, to narrow my search to empirical studies that have looked at how parenting styles might explain ethnic variations in adolescent health behaviours, I included 'mediation' and 'moderation' as additional key words in my searches. Studies' reference lists were checked for additional studies which were then included in my review.

I did not apply quality criteria for inclusion of literature but logged the quality of articles in my review to help me to interpret the quality of evidence. I scored each study according to eight quality criteria that were chosen to assess the relevance of the study to my research, and the strength of the evidence that they provide. These quality criteria include study design, response rate, measures of ethnicity, parenting, and health behaviours, participant age, and statistical methods used to look at mediation and moderation.

*Study design:* cohort, longitudinal and interventional study findings are more able to identify causal relationships, and are scored one point, cross-sectional studies are scored half a point.

*Response rate:* studies with lower response rates may provide less reliable evidence as they are more susceptible to response bias. Studies with response rates over 70% scored 1 point, Studies with response rates between 50 and 70%, and those that did not report



response rate, scored half a point, and studies with response rates below 50% scored zero points.

*Ethnicity:* studies that use defined ethnic categories (e.g. African American, Hispanic American, White American) can identify patterns among specific groups and scored one point. Studies that categorise ethnicity more broadly (e.g. White and non-White, or immigrants and non-immigrants) scored zero points.

*Age group:* as the focus of my research is on adolescent health behaviours studies that looked specifically at adolescents were scored one point. Studies that grouped adolescents with other age groups scored zero points.

*Parenting:* studies that used measures of parenting that correspond to the dimensions of care and control or the four parenting styles (permissive, authoritative, authoritarian, and neglectful) scored one point, other studies scored zero points.

*Health behaviours:* studies that looked specifically at tobacco use, alcohol use, illicit drug use, fruit and vegetable consumption, physical activity, body size, or clusters of these behaviours were scored one point, studies that used broader measures (e.g. problem behaviours) scored half a point.

*Mediation analysis:* As structural inequalities (or socioeconomic status) are determined by ethnicity and are likely to influence both parenting and adolescent health behaviours they should be considered intermediate-confounders. Analyses that do not control for them appropriately (e.g. by using marginal structural models with inverse probability of treatment weights) will produce biased estimates of the effects of ethnicity, and the effects mediated by parenting. Studies that treated structural inequalities appropriately were scored one point, other studies scored zero points.

*Moderation analysis:* The most suitable statistical methods to investigate moderation are regression analysis including interactions and stratified regression analysis. Studies that used one of these methodologies were scored one point, other studies scored zero points.

For objectives A to C, I considered whether reviews were systematic or narrative, and whether they had assessed the quality of their primary studies. For objectives D and E, I assessed the quality of the primary studies included in this part of my literature review.

## **4.2. Findings**

The findings of my literature review are organised according to the objectives of my thesis. In sections 4.2.1 and 4.2.2, I present findings of my ethnic variations in adolescent health behaviours (objective A), and parenting (objective B) reviews of reviews, respectively. These sections begin by describing ethnic variations before considering possible explanations for these variations. In section 4.2.3, I present findings of my parenting and adolescent health behaviours (objective C) review of reviews, and in section 4.2.4, I present findings of my systematic review of parenting styles as mediators or moderators of ethnic variations in adolescent health behaviours (objectives D and E, respectively). In each section, I suggest hypotheses for the DASH study population, an ethnically diverse urban sample of adolescents from London.

### **4.2.1. Ethnic variations in adolescent health behaviours**

I carried out systematic searches to identify review articles that had attempted to explain ethnic variations in adolescent health behaviours. Electronic database searches (described in Section 4.1) identified 1,557 records, of which 170 duplicates were removed. The remaining titles and abstracts were screened, retaining 55 articles that might provide explanations for some ethnic variations in adolescent health behaviours. After reviewing in full 20 articles that attempted to explain ethnic variations in adolescent health behaviours were retained. Eleven of those articles address ethnic variations in substance use behaviours and nine address ethnic variations in body size and related behaviours. Key findings of these articles are summarized in Table 4-1. and discussed in subsequent sections.

More than half of the reviews (eleven of the twenty reviews) take a narrative approach providing no information about how they identified relevant research or assessed the quality of evidence. The remaining nine were systematic reviews, which describe systematic searches carried out. Eleven of the reviews look at adolescent substance use, whereas nine look at body size and related behaviours.

In my review of reviews of ethnic variations in adolescent health behaviours I included additional papers that describe (rather than attempt to explain) ethnic variations in adolescent substance use behaviours in the US and the UK.

The reviews often suggest explanations for ethnic variations in adolescent health behaviours without providing sufficient supporting evidence. For example, certain reviews suggest that cultural values might explain some ethnic variations in adolescent health behaviours but do not provide evidence for ethnic differences in cultural values.

Therefore, to properly consider possible explanations for ethnic variations in adolescent health behaviours, I carried out searches to address these gaps.

Table 4-1. Articles included in ethnic variations in adolescent health behaviours review of reviews:

<b>Authors</b>	<b>Health behaviours</b>	<b>Review style/ methodology</b>	<b>Key findings (explanatory factors)</b>
Yasui and Dishion (2007)	Substance use	Narrative review of literature related to the cultural context of problem behaviours among ethnic minority American adolescents.	Ethnic identity related to psychological adjustment and resilience. Ethnic minority families are more likely to encounter socio-cultural challenges (such as racial discrimination, poverty, and acculturation), and may use adaptive, culturally grounded, parenting styles that differ from those practiced by mainstream-culture families.
Kim et al. (2007)	Tobacco use	Systematic review of studies on tobacco use among Asian American adolescents, including findings on factors associated with tobacco use. Methodology described.	Acculturation, peer, sibling and parental tobacco use positively associated with adolescent use. Ethnic differences in adolescent and parental attitudes towards tobacco use. Religiosity and positive family relationships negatively associated with adolescent tobacco use.
Tosh and Simmons (2007)	Substance use	Narrative review of risk taking behaviours among Asian American adolescents.	Adolescent acculturation positively associated with substance use.
El-Sayed and Galea (2009)	Tobacco use	Systematic review of studies of Arab American health. Search strategy and inclusion criteria described. Limited material on Arab American adolescents.	Peer and family smoking, and American-born mothers positively associated with adolescent use. Religiosity negatively associated with tobacco use.
Tyas and Pederson (1998)	Tobacco use	Systematic review of studies looking at determinants of	Lower levels of tobacco use among Black Americans, despite structural inequalities, poorly understood. Possible ethnic

		adolescent tobacco use. The methodology is well described.	differences in social influences. Hispanic Americans relative levels of tobacco use depend on both country of origin and level of acculturation.
Conrad et al. (1992)	Tobacco use	Systematic review including 27 longitudinal studies looking at predictors of smoking among children or adolescents.	Lower SES, family and peer tobacco use predicted tobacco use initiation.
Hoffman et al. (2006)	Tobacco use	Narrative review of peer influences on adolescent tobacco use. Includes a small number of studies that look at ethnic differences in this relationship.	Peer tobacco use may have less influence on Black adolescent smoking compared to White adolescents. However, some study findings are inconsistent.
Szapocznik et al. (2007)	Illicit drug use	Narrative review of risk and protective factors for drug use among African American and Hispanic American adolescents.	African American adolescents, ethnic identity may be protective against illicit drug use, moderating negative effects of racism. Among Hispanic American adolescents, acculturation appears to be positively associated with illicit drug use. That relationship may be explained by acculturative stress and family conflict.
Choi et al. (2008)	Tobacco use	Meta-analysis of the effects of acculturation on tobacco use among Asian Americans (including adolescents).	Acculturation appears to increase risk of tobacco use among Asian American adolescents.
Zamboanga et al. (2014)	Alcohol use	Narrative review of the relationship between acculturation and alcohol use	Acculturation appears to increase risk of alcohol use, particularly among females. This may be explained by a larger difference in US and traditional Hispanic attitudes towards alcohol use among females.

		among Hispanic American college students.	
Pachter and Coll (2009)	Substance use	Systematic review of studies looking at effects of racism on child health.	Both adolescent and parental experiences of racism related to adolescent substance use mediated by psychological distress, mental health and more negative parenting.
Kumanyika (2008)	Body size and related behaviours	Narrative review of influences of ethnic variations in childhood obesity	Cultural influences may contribute to higher than average risk of obesity among children and youth in US ethnic minority populations. Demographic, socio-structural, and environmental variables must also be considered.
Di Noia and Byrd-Bredbenner (2014)	Fruit and vegetable consumption	Systematic review of the determinants of fruit and vegetable consumption among low income children and adolescents	Ethnicity found to be a determinant of fruit and vegetable consumption. Most studies found that White children and adolescents ate more fruit and vegetables than ethnic minority children.
Caprio et al. (2008)	Body size and related behaviours	Narrative review of factors related to ethnic variations in childhood obesity, including ethnic variations	Lower SES among ethnic minority groups may encourage consumption energy-dense-nutrient-poor, foods (e.g. fast foods instead of fruit and vegetables), which often cost less and involve less preparation. Food is an expression of cultural identity. Acculturation may include the loss of traditional dietary beliefs and behaviours (i.e. greater fruit and vegetable consumption) that minimise the risk of overweight. Similarly, traditional physically active lifestyles may be replaced by lifestyles that are more sedentary.  Parents influence childhood obesity via feeding practices and modelling diet and physical activity behaviours.

Kumanyika et al. (2012)	Body size and related behaviours	Narrative review of literature on excess obesity among ethnic minorities, and framework for community energy balance. Focussed on African descent populations in English-speaking nations with generalizability for other minority groups.	Describes a framework of energy balance within a framework that includes cultural and contextual factors.
Towns and D'Auria (2009)	Body size and related behaviours	Systematic review of literature on parental perceptions of child overweight including six studies that included analysis by ethnicity.	Only one of six cross-cultural studies reported ethnic differences in parental perception of child overweight. Four studies focussed on a single ethnic group reported preferences for larger body size in children or perception that child overweight was not a problem. There is limited evidence in this area.
Ward (2008)	Body size and related behaviours	Systematic review of parental perceptions of childhood overweight among Mexican Americans. Describes systematic search, inclusion criteria, and quality assessment.	Review found limited research involving overweight Mexican American children. Most studies found that large percentages of parents did not perceive their children to be overweight and were not concerned about health risks. One qualitative study reported that parents viewed child overweight as a sign of health and wellbeing, especially among immigrants from countries with higher incidences of malnutrition, intestinal parasites, or infections. Household food insecurity negatively associated with child body size. Mixed findings related to acculturation, body size and related behaviours.

Zhou and Cheah (2015)	Body size and related behaviours	Narrative review of risk factors for overweight among Chinese American children.	SES and perceptions of body size related to variations in body size.
Alio et al. (2006)	Body size and related behaviours	Narrative review of literature on African American childhood obesity. Systematic search criteria explained.	Risk factors include family, school and community environments. Family ethnic identity, beliefs, and behaviours may increase risk of obesity among African American children. Influences of child obesity include parental diet and physical activity, cultural beliefs about the relationship between body size and health, family socioeconomic status, and community availability of healthy food and leisure activities.
Sosa (2012)	Body size and related behaviours	Systematic review of literature on Mexican American mothers' perceptions of childhood obesity.	Parents' perceptions of child body size related to child body size.
Yancey and Kumanyika (2007)	Body size and related behaviours	Narrative review of social inequalities in childhood obesity.	Socioeconomic status suggested as explanation ofr variations in body size
Biddle et al. (2005)	Body size and related behaviours	Systematic review of adolescent physical activity	Studies cited found higher levels of physical activity among White compared to Black and Hispanic girls. Ethnic variations were smaller among boys.



#### 4.2.1.1. Substance use behaviours:

Eleven review articles that attempt to explain ethnic variations in adolescent substance use behaviours were identified. These reviews predominantly focus on ethnic variations in US adolescents.

In addition, to relate these explanations to my own research, I present research that describes ethnic variations in UK adolescent substance use, as well as previous DASH study findings. UK research was identified through a preparatory scoping review and some additional searches. Information about ethnic variations in health behaviours in the UK, and the DASH study, allowed me to consider the implications for my own analysis.

##### **Previous DASH study findings:**

Prevalence for most substances tended to be highest among White UK adolescents. Tobacco use was lower among Black Caribbean and Pakistani/ Bangladeshi adolescents, and lowest among Black African, and Indian adolescents. Alcohol use was lower among Black Caribbean, lower still among Black African, and Indian adolescents, and very low among Pakistani/ Bangladeshi adolescents (Harding et al., 2015b).

In the UK, The Smoking Drinking and Drug use among young people in England (SDD) survey has found similar ethnic variations in tobacco and alcohol use to those found in the DASH study, but no significant ethnic differences in illicit drug use (Fuller and Hawkins, 2012). Black, Mixed ethnicity, and South Asian adolescents, were less likely to use tobacco, or alcohol, than were White UK adolescents. While this survey provides nationally representative information about ethnic variations in UK adolescent substance use, an additional search was carried out for UK-based empirical studies. Several London-based studies found greater tobacco and alcohol use among White, compared to ethnic minority children, with varying patterns of use amongst ethnic minority groups (Best et al., 2001, Karlsen et al., 1998, Rogers et al., 1997). Karlsen et al. (1998) and Rogers et al. (1997) found that Bangladeshi children were more likely to use tobacco than Black children in their sample, whereas Best et al. (2001) found that South Asian children were less likely to use tobacco than Black children. While these studies are less representative than larger surveys, they highlight the fact that adolescent substance use will also vary between communities based on local contextual factors.

In the US, Johnston et al. (2007) reported ethnic variations between White, Black, and Hispanic adolescents from the 2005-2006 wave of the US Monitoring the Future study. Among 15-16 year olds, tobacco use was highest among White adolescents (16.6%), lower among Hispanic adolescents (12.1%), and lowest among Black adolescents (8.0%). Alcohol use was equivalent among White (36.3%) and Hispanic (36.1%) adolescents, and lower among Black adolescents (21.5%). There were similar ethnic variations in illicit drug use. Prevalence was equivalent across White (17.6%) and Hispanic (17.0%) adolescents, and lower among Black adolescents (15.0%). However, in younger adolescence (13-14 years old), Hispanic American adolescent had higher prevalence of tobacco and alcohol use than White American adolescents (Johnston et al., 2007). Another US study using more specific ethnic categories carried out by Delva et al. (2005) found substantial heterogeneity in the prevalence of substance use behaviours across Hispanic American subgroups (Mexican, Puerto Rican, and Cuban Americans). An earlier study of the 1996-2000 Monitoring the Future survey reported that Asian American adolescents were less likely than White, Black, and Hispanic American adolescents to use cannabis or alcohol, and were less likely to use tobacco than White, and Hispanic American adolescents (Wallace Jr et al., 2003). These large nationally representative studies provide reliable evidence of ethnic variations in substance use behaviours in the US.

In summary, survey data provide reliable evidence of ethnic variations in adolescent substance use behaviours in the UK and the US. White UK and US adolescents are generally more likely than ethnic minority adolescents to engage in substance use behaviours, however, evidence from smaller UK community-based samples suggest that in specific contexts, certain ethnic minority adolescent can be more likely to use substances than White adolescents.

#### 4.2.1.2. *Body-size and related behaviours:*

Nine, predominantly US-focussed, reviews that attempt to explain ethnic variations in body-size and related behaviours were identified. In this section, I summarise information provided on the underlying US ethnic variations. In addition, I provide information on ethnic variations from the UK and the DASH study, to consider implications for my own analysis.

##### **Previous DASH study findings:**

Previous analysis of the DASH study found ethnic variations in adolescent fruit and vegetable consumption in the UK (Harding et al., 2008). Indian adolescents were more likely to eat at least 5 portions of fruit and vegetables per day, whereas, Black Caribbean, Black African, and Pakistani/ Bangladeshi adolescents were less likely to eat at least 5 portions of fruit and vegetables per day, compared to White UK adolescents. UK DASH study analysis also found ethnic variations in adolescent physical activity (Harding et al., 2008). Black Caribbean, Black African, and Pakistani/ Bangladeshi males were more likely to be among the most active adolescents, and Black Caribbean, Black African, Indian, and Pakistani/ Bangladeshi males were less likely to be among the least active adolescents, compared to White UK males. Compared to White UK females, Black Caribbean, Black African, Indian, and Pakistani/ Bangladeshi females were more likely to be among the most active, whereas, Black Caribbean and Black African females were less likely, and Indian females were more likely to be among the least active.

Ethnic variations in body size were found in DASH study data (Harding et al., 2010). Overweight and obesity were more prevalent among Black Caribbean, Black African, Indian, and Pakistani/ Bangladeshi adolescents, compared to White UK adolescents, although statistically significant variations were limited to Black Caribbean, and Black African adolescents.

In their narrative review of the influences of childhood obesity, Kumanyika (2008) cites several studies reporting ethnic variations in body size related behaviours from large cohort studies. Schmidt et al. (2005), examined ethnic variations in dietary behaviours among 9 to 19 year olds in The National Heart, Lung, and Blood Institute Growth and Health Study, finding that Black girls consumed more fast-food, and calories overall, than White girls. Hastert et al. (2005) examined ethnic variations in the dietary behaviours of 12 to 17 year olds in the California Health Interview Survey. Black and Hispanic American adolescents consumed more fizzy drinks than did White American and Asian American adolescents; Black American, Hispanic, and Asian American

adolescents, consumed more fast food than White Americans, and those who consumed more fast food consumed fewer fruit and vegetables. Clarke et al. (2009) examined ethnic variations in body-size related behaviours among 19-26 year olds from the Monitoring the Future study (1984-2006) reporting that Black and Hispanic young adults consumed fewer fruit and vegetables than White adolescents. Despite the narrative review style taken by Kumanyika (2008), these large studies may present a reliable picture of US ethnic variations in adolescent dietary behaviours.

A systematic review of the determinants of fruit and vegetable consumption among low-income American children and adolescents reported somewhat similar ethnic variations (Di Noia and Byrd-Bredbenner, 2014). Several studies cited found that White children ate more fruit and vegetables than Black American children (Acharya et al., 2011, Horodyski et al., 2010, Papaioannou et al., 2013, Wroten et al., 2012), although one reported opposite findings (Faith et al., 2006). Six studies found that Hispanic American children ate more fruit and vegetables than both Black or White American children (Acharya et al., 2011, Faith et al., 2006, Kong et al., 2013, Papaioannou et al., 2013, Salvo et al., 2012, Wroten et al., 2012). Acharya et al. (2011), Papaioannou et al. (2013), and Wroten et al. (2012) examined ethnic variations in fruit and vegetable consumption among 3-5 years old children who attended Head Start centres, and found that fruit and vegetable consumption was highest among Hispanic children, lower among White children, and lowest among Black American children. Salvo et al. (2012), and Kong et al. (2013) found, in separate samples of Black American and Hispanic American preschool children from low-income families, that fruit consumption was higher among Hispanic American, compared to Black American children, but there was no significant ethnic difference in vegetable consumption. Another study, examining ethnic variations in fruit and vegetable consumption among low-income preschool children (Horodyski et al., 2010), found that Black American children ate fewer fruit and vegetables than White American children. Faith et al. (2006) found, in their sample of 1-5 year olds, that Hispanic American, and Black American children ate more fruit than White American children, Hispanic American children ate more carrots than White American, and Black American children, but there were no ethnic differences in overall vegetable consumption.

Given the systematic approach taken, the review by Di Noia and Byrd-Bredbenner (2014) is likely to provide an accurate representation of research in their area of interest; however, the relevance of their findings to this Thesis might be affected by their inclusion of studies of younger children who have less autonomy in their dietary behaviours than adolescents. This might explain why their findings appear to contradict Kumanyika (2008).

Secondly, they include only studies that sampled low-income families. Di Noia and Byrd-Bredbenner (2014) suggest that, as a result, ethnic variations in fruit and vegetable consumption are less attributable to SES, and rather, may reflect cultural dietary preferences among Hispanic families. In particular, they suggest that as higher SES tends to be associated with greater dietary acculturation, therefore, traditional dietary preferences may buffer lower SES Hispanic families against otherwise lower fruit and vegetable consumption.

Biddle et al. (2005) systematically reviewed correlates of adolescent physical activity in the US citing four studies that look at ethnic variations in adolescent physical activity (Felton et al., 2002, Gordon-Larsen et al., 1999, Gordon-Larsen et al., 2000, Mcguire et al., 2002).

Gordon-Larsen et al. carried out two separate analyses of the large US National Longitudinal Study of Adolescent Health (Add Health) study (Gordon-Larsen et al., 1999, Gordon-Larsen et al., 2000). Their first study sample numbered 14,438 including 3,135 Blacks, 2,446 Hispanics and 976 Asian adolescents, their second numbered 17,766 including 3,933 Blacks, 3,148 Hispanic, and 1,337 Asian adolescents. Moderate to vigorous physical activity was measured by self-report questionnaire and categorised as low, medium or high. Both studies reported substantial ethnic differences in physical activity levels among girls (but not boys). Specifically, White girls were more likely to be in the high category, and less likely to be in the low category, of physical activity, than both Black and Hispanic girls. Consistent findings were reported by Felton et al. (2002) and Mcguire et al. (2002) who both had samples of around 900 adolescents. Felton et al. (2002) found that White girls scored higher, than Black girls, for both moderate-to-vigorous and vigorous physical activity and Mcguire et al. (2002) found that White girls were more hours of physical activity than Black, Hispanic and Asian girls.

In their analysis of data from the US National Health and Nutrition Examination Survey (NHANES) 2003-2006, Ogden et al. (2008) reported ethnic variations in the prevalence of overweight and obesity among 12-19 year old adolescents. Compared to White American males, Hispanic American males were more likely to be overweight or obese, and Black American males were more likely to be obese, although only the former ethnic variation was statistically significant. Hispanic American females and Black American females were significantly more likely to be overweight or obese, than were White American females.

Survey data from the National Child Measurement Programme (NCMP) demonstrates ethnic variations in childhood overweight and obesity in UK (Dinsdale and Rutter, 2008). Among year 6 boys and girls, the prevalence of obesity was greater among Black

Caribbean, Black African, Pakistani, and Bangladeshi children compared to White children. Larger ethnic variations were seen amongst girls than boys and amongst girls, the highest prevalence of obesity was seen amongst Black Caribbean and Black African girls who, compared to White girls, were around twice as likely to be obese. This survey data provides reliable evidence of ethnic variations in obesity amongst young adolescents, which is consistent with previous findings from the DASH study.

In summary, there is reliable evidence from large surveys as well as other studies that show ethnic variations in adolescent body size and related behaviours in the US. In general, ethnic minority adolescents tend to eat fewer fruit and vegetables, engage in less physical activity (particularly females), and are more likely to be overweight or obese than White American adolescents. Some contradictory findings (e.g. in relation to fruit and vegetable consumption and low-income families) may indicate heterogeneity in this ethnic variation. Similar patterns have been found in the DASH study. Black Caribbean, Black African and Pakistani/ Bangladeshi adolescents tended to eat fewer fruit and vegetables than did White UK adolescents. However, Indian adolescents tended to eat more portions of fruit and vegetables than did White UK adolescents. Ethnic variations in physical activity in the DASH study are markedly different to those among US adolescents; ethnic minority adolescents tended to be more active than White UK adolescents.

In these sections, I have presented evidence of ethnic variations in adolescent health behaviours. Next, I examine evidence for possible explanations, as suggested in the research literature. Explanations are grouped into cultural values (sections 4.2.1.3-4), and structural inequalities (sections 4.2.1.5-7).

#### 4.2.1.3. Cultural values and adolescent substance use behaviours:

In their narrative review, Yasui and Dishion (2007) propose that collectivist values, as opposed to individualist values, can explain some ethnic variations in substance use behaviours.

Collectivist cultural values may include parental respect, familism, communalism, religiosity, and traditionally differentiated gender roles (Schwartz et al., 2010b, Unger et al., 2002). Parental respect is a sense of obligation to parents. Familism is a sense of connectedness and obligation to one's immediate and extended family. Communalism is an emphasis on ties to family members, as well as to friends, fictive kin (people who are regarded as part of the family though not related by blood or marriage), and the wider community, over self. Under differentiated gender roles, attitudes towards behaviours differ depending on gender. The terms machismo/marianismo describe this phenomenon among Latino and Hispanic cultures (Unger et al., 2002). Differentiated gender roles represent the prioritization of traditional family/ community values over individual interests, and as such can be considered an aspect of collectivism (Unger et al., 2002). Positive correlations have been found between parental respect, familism, and communalism (Unger et al., 2002), as well as between collectivism and parental respect, familism, communalism, and traditional gender roles in multi-ethnic samples (Schwartz et al., 2010b) suggesting that collectivist values are related to each other.

For collectivist cultural values to explain ethnic variations in adolescent substance use we would expect ethnic minorities to hold more collectivist values that are in turn associated with less adolescent substance use. In their review, Yasui and Dishion (2007) do not provide this evidence and, therefore, additional searches were carried out in order to consider this explanation for ethnic variations in adolescent substance use behaviours.

Several US studies that looked at ethnic differences in cultural values were identified. Greater communalism and religiosity have been reported among Black Americans (Brook and Pahl, 2005), familism, and machismo/marianismo among Latino/Hispanic Americans (Cuellar et al., 1995, Sabogal et al., 1987), and high levels of parental respect are reported among Asian cultures in India and China (Rao et al., 2003, Ho, 1994). However, other studies did not find ethnic differences in cultural values. found similar levels of familism among White, Hispanic, and Black Americans, and Shih et al. (2010) found no significant differences in familism or parental respect between White, African, Hispanic, and Asian Americans.

Evidence of ethnic differences in cultural values in the UK is very limited, in their qualitative study Bradby (2007) describes prioritisation of family over individual, and differentiated gender roles among British Asian families. Female adolescents were more strongly discouraged from substance use behaviours by the threat of permanent reputational damage. Stopes-Roe and Cochrane (1989) also found that compared to White families, British Asians tended to hold more collectivist attitudes regarding family values (including parental obedience, parental respect, individual/family decision making, help for siblings, and living with extended family).

There is also good evidence that collectivist values are protective against adolescent substance use behaviours. For example, in an ethnically diverse sample of US adolescents, parental respect and familism were associated with lower prevalence of substance use (Unger et al., 2002). Shih et al. (2010) found a similar inverse relationship between parental respect and substance use among Asian American adolescents.

Collectivist values could protect against adolescent substance use behaviours in two ways. First, collectivism may increase social support, relieving stress that can result in substance use (Ghazarian et al., 2008, Zhang et al., 2007). Second, collectivism may increase adherence to parental influence against substance use, and reduce peer influence towards substance use (Brook and Pahl, 2005, Le and Kato, 2006, Tosh and Simmons, 2007).

Collectivist cultural values may be reflected in ethnic differences in adolescents' attitudes towards substance use behaviours. In their systematic review of ethnic variations in tobacco use among Asian Americans, Kim et al. (2007) cite empirical evidence of ethnic differences in attitudes towards tobacco use as well as ethnic differences in associations between attitudes and tobacco use. For example, Spruijt-Metz et al. (2004) found that the prevalence of smoking was twice as high among White (12%), compared to Asian Americans (6%). Among White adolescents, tobacco use was associated with individualistic attitudes that smoking increases energy, and helps with studies, sociability, and independence, whereas, among Asian Americans, tobacco use was associated with not wanting to make another smoke alone (conceivably a sign of collectivist values). Therefore, individualist, compared to collectivist values, could explain greater tobacco use among White American adolescents, compared to Asian American adolescents. On the other hand, there is evidence that certain collectivist attitudes may increase tobacco use among Asian American adolescents. The review by Kim et al. (2007) was conducted with well described systematic methodology we can consider this evidence relatively reliable, although their findings focused on Asian Americans and may not necessarily generalize to other ethnic minority groups.



The systematic review by Kim et al. (2007), and narrative reviews by Tosh and Simmons (2007), and El-Sayed and Galea (2009) suggest that differences in parents' attitudes explain ethnic variations in adolescents' substance use. Indeed, family substance use has been found to be associated with adolescent substance use in the general population (Hawkins et al., 1992), as well as among ethnic minority groups in the US (Catalano et al., 1992). Compared to White American parents, Asian Americans were more disapproving of substance use, and parental disapproval was protective against substance use (Catalano et al., 1992). Therefore, this pathway may have contributed to lower prevalence of substance use among Asian Americans, compared to White Americans. Ethnic variations in adolescent substance use were similar to ethnic variations in parental substance use in the DASH study (Harding et al., 2008, Harding et al., 2015b) which, while not directly measuring parental attitudes, is perhaps indicative of a similar relationship.

In their reviews, El-Sayed and Galea (2009) and Kim et al. (2007) identify peer influence as another determinant adolescent substance use among ethnic minority groups. This is the case among general population adolescents in the US (Tias and Pederson, 1998), and in other countries including the UK (Conrad et al., 1992). Furthermore, the strength of peer influence appears to vary between ethnic groups (Hoffman et al., 2006), and may therefore explain some variations in substance use. Empirical studies have found that Black American (Headen et al., 1991, Urberg et al., 1997) and Hispanic American adolescents (Hu et al., 1995) were influenced less by peer tobacco use than White American adolescents. Similarly, Black American adolescents were influenced less by peer alcohol use, than were White American adolescents (Hong et al., 2013). Ethnic differences in the strength of peer influences on adolescent substance use behaviours could reflect differences in cultural values. Adolescents who hold more collectivist values being more likely to adhere to parental rather than peer influence. This might explain lower prevalence of substance use behaviours among ethnic minority adolescents in the US and the UK, including the DASH study.

The narrative reviews by Tosh and Simmons (2007) and El-Sayed and Galea (2009) do not describe how studies were identified. This may introduce bias to their findings if important studies were not included. Since research on Asian American adolescent health behaviours reviewed by Tosh and Simmons (2007) is quite extensive their findings may be relatively reliable. In contrast, since research on Arab American health reviewed by El-Sayed and Galea (2009) is limited their findings are less reliable.

Religiosity may be protective against adolescent substance use behaviours, according to the reviews by El-Sayed and Galea (2009), Kim et al. (2007), and Wallace et al. (2016).

Wallace et al. (2016) found empirical evidence that religiosity (perceived religious importance, and religious attendance) was protective against adolescent substance use in an ethnically diverse sample of American adolescents. Substance use was more prevalent among White Americans, and Hispanic Americans, lower among Black Americans, and lowest among Asian Americans, logistic regression showed greater odds of substance use among less religious adolescents, and there was ethnic patterning of religiosity reflecting ethnic variations in substance use. Sixty percent of Black Americans reported at least monthly religious attendance, compared to around half of White, Hispanic and Asian Americans. Furthermore, around three quarters of Black Americans rated religion as important, compared to around two thirds of Hispanic, and Asian Americans, and around half of White Americans. These results suggest that differences in religiosity could explain some ethnic variations in adolescent substance use among Black American adolescents who were more religious and less likely to engage in substance use, compared to White American adolescents.

Acculturation refers to how cultural values may converge over time when cultural groups interact with each other, and may be relevant to ethnic variations in adolescent health behaviours. Acculturation is a process of bi-directional cultural change that occurs when two groups come into contact with each other, with greater change among the non-dominant immigrant culture (Sam, 2006). Acculturation is multidimensional, with changes to cultural practices, values, and identifications occurring. These dimensions can be independent: some practices, values, or identifications may be acquired from the mainstream culture while others are retained from the heritage culture (Schwartz et al., 2010a). Acculturation has been measured in various ways including generational status, length of residence, grandparents' countries of birth, residential ethnic density, preferred language; however, the validity of these indicators is debatable, most being at best rough proxies for acculturation (Oetting and Donnermeyer, 1998).

Since acculturation tends to involve diminishing cultural practices, values, and identifications among ethnic minority groups, acculturation should be associated with reduced ethnic variations in adolescent substance use behaviours. Indeed, reviews provide evidence that adolescent substance use is negatively associated with ethnic identity among Black Americans (Szapocznik et al., 2007), and positively associated with acculturation among Asian Americans (Choi et al., 2008, Kim et al., 2007, Tosh and Simmons, 2007), Arab Americans (El-Sayed and Galea, 2009), and Hispanic Americans (Szapocznik et al., 2007, Zamboanga et al., 2014).

Studies carried out in the UK have also found acculturation to be a risk factor for adolescent substance use behaviours, i.e. bringing rates closer to those of White UK adolescents. Bécares et al. (2009) examined variations in adolescent alcohol use among Black Caribbean, Black African, Pakistani, and Indian adolescents with residential area ethnic densities used as a proxy for acculturation. Among ethnic minority adolescents, living in areas inhabited predominantly by White people was a risk factor for adolescent alcohol use, whereas, greater own ethnic density was protective against alcohol use. Similarly, (Jayakody et al., 2006) carried out a study examining associations between length of residence in the UK, as a marker of acculturation, and cannabis use. They found that greater length of residence in the UK was associated with higher risk of cannabis use.

In summary, there is evidence that differences in cultural values can explain some ethnic variations in adolescent substance use behaviours. More collectivist values and religiosity are likely to be protective, whereas acculturation that diminishes collectivist cultural values is likely to be a risk factor for adolescent substance use behaviours. Based on these findings, I would expect ethnic minority adolescents in the DASH study would be less likely to engage in substance use behaviours, compared to White UK adolescents, especially where they are less acculturated and therefore more likely to identify with collectivist cultural values (with less acculturation indicated by being born abroad, speaking less English with their family, or attended a place of worship more frequently).

#### 4.2.1.4. Cultural values and adolescent body-size and related behaviours:

Brown and Konner (1987) present an anthropological argument that cultural memories of food insecurity can explain larger body sizes, unhealthy diets and physical inactivity among ethnic minorities. In the context of food insecurity, larger body sizes, more energy dense foods, and sedentary lifestyles tend to be preferred, however when energy dense foods and sedentary lifestyles are more readily available, those preferences are likely to lead to overweight and obesity.

Several reviews suggest that cultural differences in attitudes towards body size and related behaviours explain some ethnic variations in body size, diet, and physical activity (Caprio et al., 2008, Kumanyika et al., 2012, Towns and D'Auria, 2009, Ward, 2008, Zhou and Cheah, 2015).

Towns and D'Auria (2009), and Ward (2008) argue that parents' perceptions of adolescent body size explains some ethnic variation in children being overweight. Towns and D'Auria (2009) cite Boutelle et al. (2004) who reported ethnic differences in

mothers' accuracy in correctly identifying whether their children were overweight. Hispanic mothers were less accurate (54%), and Asian mothers (66.3%) were more accurate, than White or Black American mothers (62.7%, and 61%, respectively). These differences might explain the higher prevalence of overweight among Hispanic adolescents, and the lower prevalence of overweight among Asian adolescents.

Similarly, Caprio et al. (2008), Kumanyika et al. (2012), Ward et al. (2014), and Zhou and Cheah (2015) argue in their narrative reviews that differences in ideal body size explain some ethnic variation in children's overweight. There is evidence of ethnic differences in ideal body size termed body image discrepancy that represents the body size at which individuals are unsatisfied with their body size. Fitzgibbon et al. (2000) found that Black and Hispanic American women's body image discrepancies were higher, becoming on average unsatisfied with their body size at 29.2 kg/m<sup>2</sup>, and 28.5 kg/m<sup>2</sup>, respectively, compared to White women who became unsatisfied with their body size at 24.6 kg/m<sup>2</sup>. Caprio et al. (2008) present evidence that ideal body size is greater among Black Americans compared to White Americans arguing that perceptions of their child's body size are likely to reflect their perceptions of their own body size. This finding was replicated in adolescents by Banitt et al. (2008): among female adolescents, Black Americans became unsatisfied with their body size at a higher level than did White Americans; the same ethnic pattern was apparent among male adolescents but was not statistically significant. A meta-analysis of factors relating to eating pathologies Stice (2002) found that body image dissatisfaction was significantly associated with nutritional behaviours. Higher body image discrepancies could explain higher prevalence of overweight amongst Black American and Hispanic American, compared to White American, females. Swami et al. (2009) investigated differences in body image among undergraduate females in the UK. Body image discrepancies were smaller among South Asian, and higher amongst Black Caribbean, compared to White females.

In summary, there is evidence that cultural values can explain some ethnic variations in adolescent body size and related behaviours. Among certain ethnic minority groups, and particularly amongst females, cultural values appear to be positively associated with body size. Based on these findings, I would expect lower fruit and vegetable consumption and physical activity and greater body-size among ethnic minority adolescents in the DASH study compared to White UK adolescents, especially among females and those who are less acculturated (as indicated by being born abroad, speaking less English with their family, or frequently attending a place of worship).

#### 4.2.1.5. Structural inequalities and adolescent health behaviours:

Nazroo (2003) suggests that structural inequalities, underpinned by racism, are fundamental causes of ethnic health inequalities in the US and UK. Structural inequalities are conditions where one group of people are attributed an unequal status in relation to other categories of people; inequalities are perpetuated and reinforced by the maintenance of unequal relations in roles, functions, decisions, rights, and opportunities. There is substantial research to show that ethnic minorities tend to be exposed to disadvantageous structural inequalities, such as lower socioeconomic status (SES), family structure, and experiences of racism, and that as a result they experience more stress and suffer more mental health problems. Below I describe these structural inequalities, before reviewing literature relevant to whether these structural inequalities could explain some ethnic variations in adolescent health behaviours.

There are significant differences in SES between ethnic groups in the US (US Department of Health, 2010), in the UK (Nazroo, 1998), and in the DASH study sample (Astell-Burt et al., 2012). In the US, Black and Hispanic American children are more likely to be under the poverty line (39%, and 35%, respectively) than White American, and Asian American children (12%, and 14%, respectively). At the other end of the spectrum, White American and Asian American children are more likely to be in the highest relative income bracket (37%, and 40%, respectively), compared to Black and Hispanic American children (both 11%). Analysis of DASH study data by Astell-Burt et al. (2012) showed that Pakistani/ Bangladeshi, Black Caribbean, and Black African participants' households were more likely to be amongst the most deprived, and less likely to be amongst the least deprived. Indian participants' households were less likely to be amongst the most deprived, compared to White UK participants' households. Lower socioeconomic status has also been found to be positively associated with depression. For example, in their systematic review and meta-analysis, Lorant et al. (2003) found that lower SES individuals had higher odds of depression, the odds of chronic depression were notably higher than the odds of new episodes of depression.

Among ethnic minorities in both the US and the UK, a common source of stress and mental health problems is racism (Nazroo and Williams, 2005, Karlsen and Nazroo, 2004, Nazroo, 2003, Clark et al., 1999). In their review of relationships between experiences of racism and negative mental health outcomes, Williams et al. (2003) found 38 positive associations of a total of 47 analyses. Mental health outcomes included well-being, self-esteem, control/mastery, psychological distress, major depression, anxiety disorder, and anger. Similarly, in her systematic review, Paradies (2006) found that 148 of 206 analyses reported positive associations between discrimination and negative mental health outcomes such as stress, psychological distress, anxiety, and depression.

US census data shows that, compared to White families with children under 18 years old, corresponding Black American and Hispanic American families were more likely, and Asian American families were less likely, to be single-parent families (Vespa et al., 2013).

Thus, structural inequalities such as socioeconomic status, single-parent families, and experiences of racism would be expected to result in higher rates of mental health problems among ethnic minority groups. While there is evidence that ethnic minorities are exposed to more stressful life events (Brady and Matthews, 2002), there have been inconsistent findings regarding ethnic differences in prevalence of mental health problems. In their analysis of the large National Comorbidity Survey (NCS), Kessler et al. (1994) found that affective disorders (which include depression, bipolar, anxiety disorders) were more prevalent among Hispanic, but less prevalent among Blacks, compared to White Americans. In contrast, Riolo et al. (2005) found that among participants of the US National Health and Nutrition Examination Survey (NHANES) III, acute depression was less common among Blacks and Hispanics, but chronic depression (lasting over 2 years) was substantially more common among Blacks, compared to White Americans. Thus, ethnic differences appear to depend on the type of depression, with at least one study suggesting that chronic depression is more common among ethnic minorities.

In the following two sections, I review literature related to whether structural inequalities (including SES, experiences of racism, and resulting poor mental health) can explain any ethnic variations in adolescent health behaviours: first, I consider substance use behaviours, then body size and body size related behaviours.

#### 4.2.1.6. Structural inequalities and adolescent substance use behaviours:

Hanson and Chen (2007) reviewed literature on associations between SES and adolescent health behaviours: low SES was generally associated with more tobacco use. Similarly, Lemstra et al. (2008), from their meta-analysis of the effects of SES on adolescent cannabis and alcohol use, reported that low SES was associated with more substance use. However, Melotti et al. (2011), reported some inconsistent results from their analysis of data from the Avon Longitudinal study of Parents and Children (ALSPAC). Greater maternal education was associated with less adolescent tobacco, and alcohol use. However, greater household income was associated with more alcohol use. Therefore, based on the fact that ethnic minorities in the US and UK generally have lower SES than White majorities, we would expect ethnic minority adolescent to have higher prevalence of tobacco and cannabis use, and lower prevalence of alcohol use, compared to White majority adolescents (though the difference in alcohol use is more

ambiguous). In fact, as previously discussed, prevalence of substance use behaviours is generally lower among ethnic minority, compared to White adolescents. Therefore, while lower adolescent alcohol use might be explained by lower SES, lower adolescent tobacco and illicit drug use is difficult to explain in this way. It may be the case that, among ethnic minority adolescents, negative effects of low SES on tobacco and illicit drug use are masked by other protective factors. Alternatively, it may be that some effects of low SES on adolescent substance use are moderated by ethnicity (i.e., low SES may be protective among ethnic minority adolescents).

In their review of the effects of racism on child health, Pachter and Coll (2009) cite studies that report positive associations between perceived discrimination and substance use behaviours (Gibbons et al., 2007, Gibbons et al., 2004). In their longitudinal study, Gibbons et al. (2004) found a concurrent, and prospective, positive association between perceived discrimination and Black American adolescent substance use (tobacco, alcohol, and cannabis use), and evidence that this relationship was mediated by adolescent distress (anxiety and depression). Gibbons et al. (2007) subsequently reported that Black American illicit drug use was predicted by earlier experiences of discrimination, this relationship was mediated by affiliation with substance using peers. In a subsequent publication, Gibbons et al. (2010) reported that the relationship between discrimination and later adolescent drug use was mediated by anger and could be weakened by effective parenting. However, these findings are not consistent with generally lower substance use behaviours among ethnic minority adolescents. I would therefore speculate that other counter-vailing protective factors mask the effects of racism on adolescent substance use.

Reviews have presented evidence for relationships between stressful life events and adolescent substance use (Keyes et al., 2011, Enoch, 2011). Keyes et al. (2011) cite studies that show positive associations between childhood physical or sexual abuse and adolescent alcohol and illicit drug use (e.g. Bensley et al. (1999)), whereas, Enoch (2011) cite studies that show positive association between cumulative stressful life events and adolescent alcohol use (e.g. Lloyd and Turner (2008)). US studies have shown that anxiety and depression are positively associated with adolescent substance use (Koval et al., 2000, Weiss et al., 2005), with similar relationships reported in the UK (Green et al., 2013), Norway (Tjora et al., 2014), and Australia (McKenzie et al., 2010). Lower substance use behaviours among ethnic minority adolescents are therefore inconsistent with higher prevalence of stressful life experiences and chronic depression. Therefore, any negative effects of stressful life experiences and chronic depression on adolescent substance use behaviours must be masked or buffered by other, protective factors.

Previous analyses of the DASH study have reported that racism is positively associated with psychological difficulties (Astell-Burt et al., 2012), and tobacco use (Reed et al., 2016).

In summary, evidence suggests that ethnic minorities are exposed to more structural inequalities in the form of lower SES, experiences of racism, and other stressful life events that can result in mental health problems. Structural inequalities may then in turn be associated with greater substance use. This evidence is inconsistent with generally lower prevalence of substance use behaviours among ethnic minority adolescents. However, it is possible that negative effects are being masked or buffered by other protective factors.

I would hypothesise that DASH study participants who were exposed to more structural inequalities would engage in more substance use behaviours than those who were exposed to fewer structural inequalities. However, this pathway will not explain lower substance use among ethnic minority adolescent compared to White UK adolescents.

#### 4.2.1.7. Structural inequalities and adolescent body-size and related behaviours:

Several reviews identify SES as an explanation for ethnic variations in adolescent body size, and related behaviours (Alio et al., 2006, Caprio et al., 2008, Sosa, 2012, Towns and D'Auria, 2009, Ward, 2008, Yancey and Kumanyika, 2007, Zhou and Cheah, 2015). Hanson and Chen (2007) reviewed literature on associations between SES and adolescent health behaviours. Low SES was associated with poorer diets and less physical activity. Analysis of a large, longitudinal UK dataset from the National Study of Health and Growth, and the Health Survey for England, by Stamatakis et al. (2005) found that children from manual social class, or lower income households, were more likely to be obese, than those from non-manual class, and higher income households.

SES might explain ethnic variations in body size, and related behaviours by several mechanisms. The disadvantaged SES of ethnic minority parents could mean they have less time available to prepare healthy meals (Caprio et al., 2008), or to support their children to engage in physical activity (Zhou and Cheah, 2015). They may be discouraged from buying fruit and vegetables in favour of cheaper, energy dense convenience foods (Alio et al., 2006, Caprio et al., 2008, Ward, 2008). Financial costs may also be a barrier to physical activity among ethnic minority adolescents (Zhou and Cheah, 2015). In less affluent neighbourhoods, where ethnic minority families are more likely to live, energy dense convenience foods are often more readily available than fruit and vegetables (Alio et al., 2006, Yancey and Kumanyika, 2007, Zhou and Cheah,



2015). Ethnic minority adolescents may also be less likely to engage in physical activity due to a lack of facilities or concerns for safety in their neighbourhoods (Sosa, 2012, Zhou and Cheah, 2015).

Lower fruit and vegetable consumption and physical activity, and greater prevalence of overweight among Black American, and Hispanic American adolescents, compared to White American adolescents are consistent with differences in SES. Ethnic variations in fruit and vegetable consumption in the DASH study were also consistent with differences in SES. Indian adolescents tended to be of higher SES, and to eat more fruit and vegetables, compared to White UK adolescents. In contrast, Black Caribbean, Black African, and Pakistani/ Bangladeshi adolescents tended to be of lower SES, and to eat fewer fruit and vegetables, compared to White UK adolescents. Therefore, I hypothesise that some ethnic variations in fruit and vegetable consumption can be explained by differences in SES. Lower engagement in physical activity among ethnic minority adolescents, compared to White American adolescents are consistent with differences in SES. In the DASH study, lower physical activity among Black Caribbean, Black African, and Pakistani/ Bangladeshi females, are consistent with lower SES in these groups compared to White UK adolescents. However, Indian females who also engaged in less physical activity, but tended to be of a higher SES, compared to White UK females. Therefore, differences in SES might explain some of the lower engagement in physical activity by females, belonging to some but not all, ethnic minority groups, compared to White UK adolescents.

#### 4.2.1.8. Research questions:

This part of my literature review related to objective A of my thesis, investigating ethnic variations in health behaviours. I have looked at research that has attempted to explain ethnic variations in adolescent health behaviours, though the vast majority of this research has investigated health behaviours in isolation, without attention to how they may (or may not) cluster together. The literature indicated that ethnic variations in health behaviours may be moderated by factors indicative of acculturation (i.e. generational status, English language use with family, and religious attendance), and that some ethnic differences in behaviours, specifically those for body-size related behaviours, may be explained by structural inequalities, whereas ethnic variations in substance use seem unlikely to be explained by such structural inequalities. I have therefore posed four research questions for the DASH study (Box 4-1). I present analyses carried out to address these research questions in Chapter 6.

Box 4-1. Objective A - Research questions:

1. Was there clustering of adolescent health behaviours?
2. Were there ethnic variations in adolescent health behaviours or the clustering of health behaviours?
3. Were ethnic variations in health behaviours, or the clustering of health behaviours moderated by cultural values?
4. Were ethnic variations in health behaviours, or the clustering of health behaviours mediated by structural inequalities?

#### 4.2.2. Ethnic variations in parenting

Electronic database searches (described in Section 4.1) identified 629 records, of which 84 duplicates were removed. Of the remaining 545 articles, seven met the criteria for this review of reviews. The most common reasons for exclusion were not being a review article and not attempting to explain any ethnic variations in parenting. Only one of the seven review articles carried out systematic searches. Six of the reviews are focussed on US ethnic minority families, the other review covers Chinese immigrants in the US and Canada. Key findings of these articles are summarized in Table 4-2 and discussed in subsequent sections.

More than half of the reviews (six of the seven reviews) take a narrative approach providing no information about how they identified relevant research or assessed the quality of evidence. The remaining was a systematic reviews, which describe systematic searches carried out.

The reviews often suggest explanations for ethnic variations in parenting without providing sufficient supporting evidence. For example, certain reviews suggest that socioeconomic status might explain some ethnic variations in parenting but do not provide evidence for ethnic differences. To properly consider possible explanations for ethnic variations in adolescent health behaviours, I carried out searches to address such gaps.

Table 4-2. Articles included in ethnic variations in parenting review of reviews:

Authors	Review style/ methodology	Ethnicities	Key findings (explanatory factors)
Yasui and Dishion (2007)	Narrative review of the ethnic context of child and adolescent development. The review covers parenting among African American, Asian American and Hispanic American families.	African American, Hispanic American, Asian American	Ethnic minority parenting styles have been characterised as authoritarian in the past however more recent literature suggests culturally grounded styles of parenting that are high in parental control and parental care which are therefore analogous to authoritative parenting. Religiosity is suggested to influence parenting, particularly among African Americans. Cultural determinants, including collectivist values and religiosity, are suggested.
Forehand and Kotchick (2016)	Narrative review of the cultural context of parenting among African American, Asian American and Hispanic American families.	African American, Hispanic American, Asian American	Collectivist cultural values such as parental respect are identified as determinants across ethnic groups. Religion is identified as a determinant amongst African American families.
Ho (2014)	Systematic review of acculturation and its impacts on parenting among Chinese Immigrants.	Chinese Immigrants in US and Canada	Studies suggest that acculturation influences parenting. Studies included in review found that more acculturated parents' parenting attitudes were more similar to mainstream attitudes. Acculturation discrepancies cause parent-child conflict.
Parke (2004)	Narrative review of child development in the family	USA focused	Collectivist cultural values and religiosity suggested as a determinant of stricter parenting across ethnic groups. Stricter parenting might be adaptive in more dangerous environments.
Mahoney (2010)	Narrative review of religion and family functioning. Does not	USA focused	Religiosity among adolescents related to greater parent-child relationship quality; Religious

	cover ethnic differences in parenting in detail.		dissimilarity between parent and adolescent related to lower quality parent-child relationships and more parent-child conflict.
Halgunseth et al. (2006)	Narrative review of parental control among Hispanic American families.	Hispanic Americans	Determinants of parental control suggested to include cultural values (familism and parental respect) and context (including structural inequalities)
McLoyd (1990)	Narrative review of the impact of economic hardship on Black families and children.	Black Americans	Economic hardship diminishes the capacity for positive parenting, mediated by psychological distress.

The narrative review by Yasui and Dishion (2007) describes and attempts to explain ethnic variations in parenting. It does not state how relevant literature was identified, so there is potential for bias in their findings. Yasui and Dishion (2007) present literature that framed ethnic minority parenting as authoritarian, and “culturally deviant”, compared to mainstream parenting, followed by literature challenging that paradigm.

Dornbusch et al. (1987) reported ethnic variations in parenting styles among 14-18 year old American adolescents. Using a 25 item questionnaire, Dornbusch et al. (1987) derived authoritarian, permissive, and authoritative parenting style scales, based on Baumrind’s typology (Baumrind, 1971). Compared to parents of White American adolescents, parents of Black, Hispanic, and Asian American males and females scored higher on the authoritarian parenting scale, parents of Black, Hispanic, and Asian American females scored lower on the authoritative parenting scales. Ethnic variations in the permissive parenting scale were more complicated: compared to White American adolescents, Black Americans scored lower, Hispanic and Asian American adolescents scored higher. However, the scales for authoritarian vs authoritative parenting used here were based on different items reflecting different control practices (with those in the authoritarian scale being harsher and more controlling), so the distinction between how these practices were measured here is more complex than simply low vs high care.

In an observational study, Baumrind (1972) reported that parents of African American preschool girls used more authoritarian parenting practices than parents of White American girls. However, they also reported that, compared to White Authoritarian parents, Black Authoritarian parents scored higher on *Discouraging infant dependency*,

lower on *Parental rejection* scales, and were more inclined to spontaneous expression of emotions. Baumrind (1972) suggested that her findings indicated that a Black American parenting was not rejecting, but encouraged independence; furthermore in her discussions, Baumrind (1972) differentiates authoritarian parenting practices from an authoritarian parenting style (dogmatic and intolerant attitudes, motivated by repressed anger, emotional coldness, and a sense of importance). These findings were replicated by others who described an African American 'no nonsense' parenting style in observational studies of preschool children and their parents (Young, 1974, Brody and Flor, 1998).

In their quantitative study of parenting of African American 11 year olds, Steele et al. (2005) found that parental over reactivity (control) was positively correlated with parental acceptance (care), suggesting that this reflects the "no nonsense" parenting style conceptualised by others. These findings suggest that African American parents use a combination of high parental control and care, reflecting what I would define here as an authoritative parenting style.

Chao (1994) challenged characterisations of Asian American parenting as authoritarian, describing a culturally grounded "child training" style of parenting, which combines high parental control with care. Chao (1994) investigated parenting styles of parents of Asian American 2-4 year olds. Compared to White American parents, Asian American parents had higher authoritarian parenting scores, but similar authoritative parenting scores; they also scored higher for "child training" attitudes than White American parents. The authoritarian parenting scale included items related to strict control, such as "I have strict, well-established rules for my child" and "I believe that scolding and criticism help my child". The "child training" parenting scale included items related to organisational control, such as "parents must begin training a child as soon as ready", "mothers express love by helping child succeed, esp. in school". The authoritative parenting scale included items related to communication and affection (care), such as "I express affection by hugging, kissing, and holding my child", and "I talk it over and reason with my child when he misbehaves". Therefore, these findings suggest that Asian American parents were higher in control and care, a combination reflecting what I would define here as an authoritative parenting style. Further evidence of authoritative parenting among Asian families is provided by Rohner and Pettengill (1985) who examined perceived parental care and control among 15-18 year old Korean adolescents, reporting that parental control was correlated positively with parental care. These findings suggest that Asian American parents use a combination of high parental control and care, reflecting an authoritative parenting style.

In their study of parents of 2-4 year olds, MacPhee et al. (1996) found that compared to White parents, Hispanic American parents placed less emphasis on child autonomy and were more likely to use harsh punishments than White American parents. Similarly, among older children and adolescents (8-13 years old), Hill et al. (2003) found that Spanish speaking Hispanic American parents were more likely to use harsh control and inconsistent discipline than White American parents. Hill et al. (2003) also found that among Spanish speaking Hispanic American mothers, parental acceptance (care) was positively correlated with parental control, unrelated among English speaking Hispanic Americans, and negatively correlated among White Americans. These findings also suggest that Hispanic American parents (especially those who were Spanish speaking) use a combination of high parental control and care, reflecting an authoritative parenting style.

Recently, we reported ethnic variations in parental care and control among DASH study participants (Harding et al., 2015b). Among 11-13, and 14-16 year olds, compared to White UK adolescents, perceived parental control was higher among Black Caribbean, Black African, Indian, Pakistani/ Bangladeshi, and Other ethnicity adolescents. Compared to 14-16 year old White UK adolescents, perceived parental care was lower among Black Caribbean and Black African adolescents, while Indian and Pakistani/ Bangladeshi adolescents perceived moderately higher parental care (these differences were not statistically significant). These findings are somewhat consistent with the ethnic variations in parenting reported by US studies above. Based on the foregoing, I hypothesise that compared to White UK adolescents, ethnic minority adolescents will be more likely to perceive *Authoritative* and *Authoritarian* compared to *Permissive* parenting.

Garcia Coll et al. (1996) suggest that ethnic variations in parenting styles are influenced by variations in cultural values, and are adapted to cope with structural inequalities such as poverty, and racism. In the remaining two sections of this literature review, I discuss evidence that ethnic differences in cultural values and structural inequalities are related to ethnic variations in parenting.

#### 4.2.2.1. Cultural values and parenting:

This section describes evidence that ethnic variations in parenting are influenced by cultural values, acculturation, and religiosity. In their review, Forehand and Kotchick (2016) suggest that collectivist cultural values underlie high parental control, occurring alongside parental care, among African American, Asian American, and Hispanic American families. As covered in this literature review (section 4.2.1), there is evidence

that compared to White Americans, ethnic minorities are more likely to endorse collectivist, rather than individualist values.

Rudy and Grusec (2006) compared the cultural values and parenting styles of White Canadian parents with those of immigrant parents of 7-12 year olds (from the Middle East and South Asia). Items related to collectivist cultural values included: “a person should always consider the needs of his or her family more important than his or her own”, and “a person should always share his or her home with his or her uncles, aunts, or first cousins if they are in need”. Items related to authoritarian parenting attitudes included “I have strict, well-established rules for my child”, and “I control my child by warning him/ her about the bad things that can happen to him/her”. Compared to White Canadian parents, Immigrant parents were more likely to endorse collectivist values. Among Immigrant parents, but not among White Canadian parents, greater endorsement of collectivist values was positively correlated with authoritarian parenting attitudes (control). In contrast, among White Canadian parents, but not Immigrant parents, authoritarian parenting attitudes (control) were negatively correlated with parental warmth, negative views of their child, and positively correlated with negative emotions and cognitions specific to discipline situations; these correlations suggest that among White Canadian parents controlling parenting attitudes were more likely to be found alongside lower parental care. Similarly, in their study of parenting among Asian American college students, Park et al. (2010) found that among those who endorsed more collectivist cultural values, greater parental control was negatively correlated with family conflict (conceptually opposite to perceived parental care), whereas the reverse was found among those who endorsed fewer collectivist values. Hence, there is evidence to suggest that collectivist cultural values underlie ethnic differences in correlations between high parental control and parental care.

As discussed previously (section 4.2.1), acculturation is a complex process that tends to result in diminished cultural values among ethnic minorities (Sam, 2006). When considered within the family context the acculturation process is more complex because adolescents are often more acculturated to the mainstream culture than their parents leading to intergenerational discrepancies in cultural values. Such discrepancies in acculturation are known as acculturation gaps or acculturative conflict (Telzer, 2010).

Ho (2014) systematically reviewed literature examining relationships between acculturation and parenting among Asian American families, citing two studies of adolescents (Costigan and Koryzma, 2011, Lau, 2010). Costigan and Koryzma (2011) found that those parents of Asian Canadian 10-14 year olds who were more oriented towards Canadian culture reported more monitoring, and reasoning (authoritative



parenting practices). These findings suggest that acculturation among these Asian American parents was associated with more authoritative parenting. Lau (2010) reported univariate correlations between supposed Asian cultural values (strict parental control, and emotional restraint) and acculturation conflicts. Those parents of Asian American 10-16 year olds who endorsed stricter parental control also tended to endorse more emotional restraint, and tended to report greater acculturation conflicts; however, endorsement of emotional and acculturation conflicts were unrelated. Furthermore, among parents who endorsed stricter parental control, acculturative conflict was associated with the use of physical discipline. Lau used a measure of strict parental control which included items such as “Parents need to show children who is boss”, and a measure of acculturative conflict that included items such as “Your child wants to state her/his opinion, but you consider it to be disrespectful to talk back”. These findings demonstrate an acculturation gap: parents who were less acculturated (i.e. they valued stricter parental control) were more likely to report acculturation conflict, and in turn were more likely to use physical discipline.

Similar relationships between acculturation, parenting styles, and parent-child conflict have been reported among Asian Indian 13-19 year old adolescents and their parents (Farver et al., 2002, Farver et al., 2007). Compared to White American parents, less acculturated Indian Asian American parents were less likely to endorse more authoritative parenting practices, and more likely to endorse strict parental control, whereas the parenting styles of more acculturated Asian Indian American parents approximated those of the White American parents (Farver et al., 2007). Furthermore, both parents and adolescents reported greater frequency and intensity of parent-child conflicts when parents were less acculturated to the mainstream culture, and when parents and adolescents reported different levels of acculturation (i.e. there was an acculturation gap) (Farver et al., 2002).

Acculturation appears to lead to greater family conflicts among Hispanic American parents and adolescents. (Gonzales et al., 2006) examined links between family acculturation (language preferences) and family conflict among Hispanic American parents and 11-15 year old adolescents. Family acculturation (a latent construct combining adolescent and maternal acculturation) predicted both greater parent-child conflict, and inter-parental conflict. Gonzales et al. (2006) suggest that through acculturation Hispanic cultural values (familism, parental respect), which inhibit family conflicts, are diminished. Similarly, Fuligni et al. (1999) reported more positive family relationships between Asian, Hispanic and White American parents and 15-18 year old adolescents who emphasised family obligations.

Reviews of ethnic variations in parenting suggest that religiosity is an important factor, in particular among African Americans (Forehand and Kotchick, 2016, Parke et al., 2004, Yasui and Dishion, 2007), and two narrative reviews focus on religiosity and parenting (Mahoney, 2005, Mahoney, 2010). Available empirical evidence predominantly relates to American Christian families so might not be generalizable to other religions in other countries. Some studies indicate that religiosity is associated with greater use of physical punishment (Ellison and Sherkat, 1993), whereas others have reported authoritative parenting styles and less parent-child conflict (higher care) among more religious families (Gunnoe et al., 1999, Regnerus and Burdette, 2006, Simons et al., 2004). A recent, large-scale survey of ethnic differences in religiosity in the US (Pew Research Center, 2014) found that religiosity was lower among Asian Americans, similar amongst White Americans, and Hispanic Americans, and greater among African Americans. This is consistent with previous research reporting that African Americans were more religious than White Americans (Aldous and Ganey, 1999). Among Asian Americans, endorsement of Confucian philosophy is common, although since this does not dictate belief in a God, it would not have been captured by that survey. Ethnic variations in religiosity among African Americans, and relationships between religiosity and parenting styles fit reports of high parental control, and possibly physical punishment, combined with high parental care among African Americans. Furthermore, Stokes and Regnerus (2009), examined relationships between religiosity and parenting of adolescents (12-19 years old) using the Add Health study, found that parent-child relationship quality (care) was positively associated with parental religiosity but was negatively associated with religious discord (i.e. when adolescent religiosity is less than parental religiosity). There has been little relevant research in the UK, but there appear to be similar trends with more authoritative parenting and greater parental care among more religious families (Horwath et al., 2008).

Recently, we reported ethnic variations in adolescent religiosity among DASH study participants (Harding et al., 2015a). Among 11-13, and 14-16 year olds, compared to White UK adolescents, Black Caribbean, Black African, Indian, Pakistani/ Bangladeshi, and Other ethnicity adolescents attended a place of worship more frequently. Based on the foregoing research, I hypothesise that greater parental control, and Authoritative and Authoritarian rather than Permissive parenting styles among ethnic minority groups will be concentrated among ethnic minority adolescents who are less acculturated.

#### 4.2.2.2. Structural inequalities and parenting:

Several reviews have suggest that structural inequalities (deficiencies in household material resource, single parenthood, and experiences of racism) might explain some ethnic variations in parenting styles (Halgunseth et al., 2006, McLoyd, 1990, Yasui and Dishion, 2007). Additional literature searches were carried out to identify research that has examined those structural inequalities by ethnicity, and research that has examined their associations with parenting styles.

US research has shown structural inequalities to vary by ethnicity. Compared to White Americans, ethnic minorities tend to have lower SES (US Department of Health, 2010), are more likely to live in single-parent households (Vespa et al., 2013), and are more likely to have experienced racism (Clark et al., 1999). Similar structural inequalities were found among participants of the UK DASH study (Harding et al., 2015a). Compared to White UK adolescents, Black Caribbean, Black African, Pakistani/ Bangladeshi, and Other ethnicity adolescents tended to live in households with fewer material resources; Black Caribbean, Black African, and Other ethnicity adolescents were more likely to live in single-parent families, and all ethnic minority groups were more likely to have experienced racism. Conversely, Indian households tended to have more material resources, and Indian and Pakistani/ Bangladeshi adolescents were less likely to live in single-parent households, than White UK adolescents.

McLoyd (1990) built on Elder's seminal research into parenting among White American fathers during the Great Depression of the 1930s, formulating a family stress model in which structural inequalities lead to parental distress, that in turn undermines consistent and supportive parenting. McLoyd (1990) cites Elder Jr et al. (1985) who found that, among depression era fathers, those with lower income or social class tended to be indifferent, unsupportive, rejecting, and over-demanding towards their children. Indifference, unsupportive, and rejecting fathers can be seen as low in parental care, while over-demanding fathers can be seen as high in parental control, so fathers with these characteristics can be seen as having an authoritarian style of parenting. Subsequent studies examined the mediational pathway from family stress, via parental distress, to disrupted parenting styles among Black (McLoyd et al., 1994, Conger et al., 2002), and White Americans (Conger et al., 1995).

McLoyd et al. (1994) developed the mediational hypothesis among Black American single-mother families. Economic stressors were associated with impaired maternal psychological functioning: depressive symptoms were more commonly reported by mothers who were experiencing financial strain or were unemployed; those who were experiencing financial strain were also more likely to report negative perceptions of

their maternal role. Mothers with impaired psychological functioning were more likely to report using harsh parental discipline (e.g. yelling, hitting, and threatening). These parenting characteristics may be seen as reflecting an authoritarian style of parenting, high in parental control and low in parental care. In an interesting additional finding, McLoyd et al. (1994) reported evidence that perceived instrumental support buffers the negative effects of economic stress on maternal parental control. Conger et al. (2002) also found evidence that family stress, via parental distress, disrupts parenting styles among Black American families. Family economic stress, related to poverty or financial loss, was positively associated with parental depressive symptoms, which were in turn associated with poor management, high hostility, and low warmth. Poor management included several control related dimensions including monitoring, consistent discipline, inductive reasoning, and positive reinforcement. Poor parental management, high hostility, and low warmth can be seen as reflecting high parental control and low parental care that reflect an authoritarian parenting style. Conger et al. (1995) reported the results from two separate studies that investigated the effects of stress on parents of white adolescent boys. Both studies reported that parental reports of acute financial or health related stress were positively associated with parental depressive symptoms, which were in turn positively associated with harsh and inconsistent discipline, reflective of an authoritarian parenting style.

Halgunseth et al. (2006) suggest that differences in SES underlie findings that Hispanic American parents exhibit higher control and authoritarian parenting styles, compared to White American parents citing Parke et al. (2004). In that study, economic stressors (low income, insecure employment, and financial strain) were associated with maternal depression, which was in turn associated with hostile parenting. Hostile parenting, defined by rejection, hostile control, and inconsistent discipline, can be seen as reflecting high control, low care, and authoritarian rather than authoritative or permissive styles of parenting.

Two US studies with ethnically diverse samples of adolescents (Dornbusch et al., 1987, Glasgow et al., 1997) have reported associations between parental education (indicating higher SES) and perceived parenting styles. Dornbusch et al. (1987) found that adolescents whose parents had more years of education tended to score lower on authoritarian and permissive parenting scales, and higher on an authoritative parenting scale. Glasgow et al. (1997) reported somewhat consistent findings. Parents with more years of education were more likely to be perceived as authoritative, and less likely to be perceived as authoritarian or neglectful. Contrary to Dornbusch et al. (1987), Glasgow et al. (1997) found that parents with more education were more likely to be perceived as permissive. This inconsistency might have been caused by the use of

different measurements in these studies. Dornbusch et al. (1987) used separate scales to quantify authoritarian, authoritative, and permissive parenting behaviours simultaneously, whereas Glasgow et al. (1997) derived a categorical parenting styles typology from perceived parental acceptance/ involvement (care), and strictness/ supervision (control) scales.

Living in single parent, rather than two-parent families are associated with more authoritarian, rather than authoritative or permissive parenting styles. Barrett and Turner (2005) reported that adolescents living in households with two parents were more likely to perceive positive family support and less likely to perceive family negativity, compared to adolescents living in single-parent families. Positive family support measure, an index of perceived love and care, reflects higher perceived parental care. Family negativity an index of perceived criticism and demandingness reflects higher parental control. They are consistent with Forehand et al. (1990) who reported that, compared to unmarried parents, married parents of 11-15 year old adolescents exhibited more problem solving and positive communication, and less conflict initiation (reflecting higher perceived parental care). These findings suggest that single parents are more likely to exhibit authoritarian, rather than authoritative or permissive styles of parenting.

Murry et al. (2001) found that African American mothers of 10-11 year old children who had experienced racism were less likely to report nurturant parenting, defined by warmth and communication (parental care), as well as more inductive reasoning and monitoring (parental control), indicative of authoritative rather than authoritarian styles of parenting. Furthermore, in their study of Black American families, (Gibbons et al., 2004) found that experiences of racism were prospectively associated with distress (anxiety and depression). Those findings, combined with reported associations between parental distress and authoritarian rather than an authoritative style of parenting (Conger et al., 1995, Conger et al., 2002, McLoyd et al., 1994) suggest that relationships between experiences of racism and parenting styles may be mediated by parental distress.

In summary, US research provides evidence that structural inequalities are associated with parenting styles. Parents in household with fewer material resources, single parents, and those who have experienced racism are more likely to exhibit an authoritarian style of parenting (high parental control, low parental care), rather than authoritative (high parental control, and high parental care) or permissive (low parental control, and high parental care) styles of parenting. Based on this evidence it is

reasonable to expect that the structural inequalities to which ethnic minorities are more likely to be exposed can explain some variations in their parenting styles.

In the DASH study, three patterns of structural inequalities exist among ethnic minority adolescents, compared to White UK adolescents. Black Caribbean, Black African, and Other ethnicity adolescents were more likely to live in households with fewer material resources or with single parents, and to have experienced racism. Pakistani/ Bangladeshi adolescents were more likely to live in households with fewer material resources, and to have experienced racism, but less likely to live in households with single parents. Indian adolescents were more likely to have experienced racism but less likely to live in households with fewer material resources or with single parents. I would therefore hypothesise that among ethnic minority adolescents in the DASH study, structural inequalities will explain some ethnic differences in perceptions of authoritarian or authoritative rather than permissive styles of parenting. Among Pakistani / Bangladeshi adolescents, negative effects of living in households with fewer material resources and of racism are likely to be counteracted by positive effects of living in households with two parents. Among Indian adolescents, negative effects of racism are likely to be counteracted by living in households with more resources and with two parents. Therefore, I would hypothesise that mediation by structural inequalities will explain less ethnic variations in parenting styles among Indian and Pakistani/ Bangladeshi adolescents.

#### 4.2.2.3. Research questions:

In this part of my literature review related to objective B of my thesis, I have looked at research that has attempted to explain ethnic variations in parenting styles. Based on my findings I have posed 3 research questions for the DASH study (Box 4-2). Analyses presented in Chapter 7 were carried out to address these research questions.

#### Box 4-2. Objective B - Research questions:

1. Were there ethnic variations in perceived parenting styles?
2. Were ethnic variations in perceived parenting styles moderated by cultural values?
3. Were ethnic variations in perceived parenting styles mediated by structural inequalities?

### 4.2.3. Parenting styles and adolescent health behaviours

Electronic database searches (described in Section 4.1) identified 1,515 records, of which 233 duplicates were removed. Of the remaining 1,282 articles, four met the criteria and were included in this review of reviews. These four articles each carried out systematic searches. Key findings of these articles are summarized in Table 4-3 and discussed in subsequent sections.

This review is focused on the effects of parenting styles, rather than parenting practices, on adolescent health behaviours. The literature contains many different measures of parenting styles that can have quite similar meanings (Mahabee-Gittens et al., 2011), so in this review I attempt to frame the findings in terms of the dimensions of perceived parental care and control that have been used in the DASH study.

As the studies included in this review of reviews were systematic review with detailed search strategies including the numbers of studies included, a good quality of evidence provided.

Table 4-3. Review articles included in parenting styles and adolescent health behaviours review:

<b>Authors</b>	<b>Parenting styles</b>	<b>Health behaviours</b>	<b>Review style/ methodology</b>	<b>Key findings</b>
McPherson et al. (2013)	Review looks at family and community social capital. Family social capital includes the parent-child relationship.	Tobacco, alcohol, and illicit drug use among children and adolescents (review also covers sexual health and general risk behaviours).	Systematic review with detailed description of methodology.	In general positive parent-child relationships high in closeness, trust and nurturance are associated with less substance use.
Ryan et al. (2010)	Review looks at a range of general factors including parent-child relationship quality, parental involvement and communication (as well as parental alcohol use, alcohol-related parenting practices).	Adolescent alcohol use.	Systematic review of longitudinal studies. Detailed description of methodology.	Review found that delayed alcohol initiation was predicted by parental modelling, limiting availability of alcohol to the child, parental monitoring, parent – child relationship quality, parental involvement and general communication.
Čablová et al. (2014)	General parenting styles (permissive, neglectful, authoritative and authoritarian).	Alcohol use among children and adolescents.	Systematic review with detailed description of methodology.	Overall, this review suggests that authoritative parenting styles are protective against adolescent alcohol use although one study found

				that a permissive parenting style was superior.
Sleddens et al. (2011)	General parenting.	Child overweight and obesity inducing behaviours	Systematic review with detailed description of methodology.	Overall, this review suggests that children raised in authoritative homes ate more healthily, were more physically active and had lower BMI levels, compared to children who were raised with other styles (authoritarian, permissive/indulgent, uninvolved/ neglectful).

#### 4.2.3.1. Tobacco use:

McPherson et al.'s (2013) systematic review cites three studies examining the influence of parenting factors on adolescent tobacco use (Borawski et al., 2003, Wen et al., 2009, Yugo and Davidson, 2007). These studies provide evidence suggesting that adolescent tobacco use is less likely with high care styles of parenting (authoritative and permissive), and more likely with low care styles of parenting (authoritarian and neglectful).

These studies found that factors related to parental care, including parental trust (Borawski et al., 2003), nurturance (Yugo and Davidson, 2007), parent-child closeness, as well as parental control (Wen et al., 2009), were protective against adolescent tobacco use. Yugo and Davidson (2007) found no effect of parental control on adolescent tobacco use. In their study using data from the US National Longitudinal Study of Adolescent Health (Add Health), Wen et al. (2009) also found that the effect of parent-child communication on adolescent tobacco use was contingent on parent-child relationship closeness. Parent-child communication measured whether adolescents' personal issues, such as dating, social life, or school issues, were discussed. In the absence of a close relationship, communication was associated with greater risk, whereas in the context of a close relationship, it was protective. This interaction suggests that in the absence of a closeness relationship, communication may be superficial, or forced, therefore having no protective effect, or even acting as a risk factor.

Based on these findings I hypothesise that among participants in the DASH study, greater parental care will be associated with lower adolescent tobacco use, and greater control will be associated with more tobacco use. Furthermore, I hypothesise that authoritative or permissive parenting styles that combine high care with either high or low control respectively, will be protective against adolescent tobacco use. Conversely,



I hypothesise that greater risks of tobacco use will be associated with low parental care, and Neglectful or Authoritarian parenting styles that combine low parental care, with low or high parental control.

#### 4.2.3.2. Alcohol use:

Recent reviews have considered the influence of parenting on adolescent alcohol use. Two reviewed longitudinal studies (Ryan et al., 2010, McPherson et al., 2013), and a third reviewed studies specifically looking at the effects of parenting styles (Čablová et al., 2014).

Ryan et al. (2010) reviewed evidence from longitudinal studies, concluding that parent-child relationship quality was protective against adolescent alcohol use. In their study of 10-11 year olds Jackson et al. (1999) found that parental demandingness and monitoring, reflected higher parental control, were protective against adolescent alcohol use. Chuang et al. (2005) also found that parental monitoring was protective against alcohol use among 12-14 year olds. In that study, parental monitoring captured parents' monitoring efforts, and their actual knowledge of adolescent activities, and this was strongly correlated with parent-child closeness; thus, in this case parental monitoring resembled an authoritative parenting style that combined parental control with parental care. Thus, authoritative parenting might be expected to be protective for alcohol use.

Jordan and Lewis (2005) investigated the influence of paternal parenting on adolescent alcohol use among African Americans. Father-child relationship quality and father-child communication were moderately correlated; however, while father-child relationship quality was protective, parent-child communication was a risk factor, for adolescent alcohol use. The measure of father-child communication used in this study recorded whether they argued about behaviour, talked about grades, school, and personal problems. Therefore, adolescents may have perceived the communications measured as negative or intrusive. Furthermore, if fathers were concerned about their child's behaviour they may have communicated more frequently. Father-child communication, as measured in this study, could be seen as reflecting higher parental control, and in the absence of a close father-child relationship (parental care), may reflect an authoritarian parenting style. Another longitudinal study found that parental support, was protective against alcohol use among 10-12 year olds (Hung et al., 2009). In this study, perceived parental support was measured by several items, reflecting an authoritative parenting style that combines parental care and control.

Čablová et al. (2014) reviewed studies that investigated the effects of parenting styles on adolescent alcohol use. Most studies included in this review found that an authoritative parenting style, compared to other parenting styles, was protective against adolescent alcohol use (Adalbjarnardottir and Hafsteinsson, 2001, Bahr and Hoffmann, 2010, Barnes et al., 2000, Cohen and Rice, 1997, Patock-Peckham and Morgan-Lopez, 2007, Piko and Balázs, 2012). However, one study found that a permissive parenting style was associated with better alcohol outcomes than an authoritative parenting style (Garcia and Gracia, 2009).

Adalbjarnardottir and Hafsteinsson (2001) found that, compared to perceived authoritarian or neglectful parenting styles, a perceived authoritative parenting style was associated with lower odds of alcohol use, among Icelandic 14-17 year olds. Similarly, Bahr and Hoffmann (2010) found that alcohol use was less likely among US 12-18 year olds who perceived an authoritative parenting style, compared to those who perceived neglectful, authoritarian, and permissive parenting styles, although there was only a statistically significant difference between perceived authoritative, and neglectful parenting styles. Similarly, in another US study, Barnes et al. (2000) found that greater parental support and monitoring (reflecting an authoritative parenting style) was protective against alcohol use among 13-22 year old adolescents.

Based on these findings, I hypothesise that, among DASH study participants, higher parental care, and perceived authoritative parenting will be protective against adolescent alcohol use, whereas low parental care, and perceived authoritarian or neglectful parenting style will be associated with greater risks of adolescent alcohol use (in comparison to permissive parenting as a reference group).

#### 4.2.3.3. Illicit drug use:

McPherson et al. (2013) reviewed studies examining family influences on adolescent substance use behaviours, citing four empirical studies that found that factors reflecting permissive or authoritative parenting styles, were related to adolescent illicit drug use (Borawski et al., 2003, Oman et al., 2004, Springer et al., 2006, Yugo and Davidson, 2007).

Borawski et al. (2003) investigated the influence of negotiated unsupervised time with peers, parental monitoring, and perceived parental trust on cannabis use among 14-16 year old American adolescents. Parental monitoring was not associated with adolescent cannabis use, negotiated unsupervised time was positively associated with adolescent cannabis use, and perceived parental trust was negatively associated with cannabis use among girls but not boys.

Oman et al. (2004) found that positive parent-child communication was protective against adolescent illicit drug use among 13-17 year old American adolescents. In this study, parent-child communication was measured using items such as “How often does your mother or father try to understand your point of view?”, and “How often do you talk to your mother or father about your problems?” reflecting high perceived parental care. Springer et al. (2006) found that perceived parental support, measured by items such as “My parents/guardians are an important source of support for me” and “My parents/guardians try to help me all that they can.”, again reflecting high parental care, was protective against illicit drug use among 12-19 year old Salvadoran adolescents. Other studies found that illicit drug use was negatively associated with parental nurturance amongst 12-15 year old Canadians, and with family connectedness among 12-18 year old Americans; measures that reflect greater parental care. In their study investigating the influence of parenting styles on substance use among Icelandic 14-17 year olds, Adalbjarnardottir and Hafsteinsson (2001) found that an authoritative parenting style characterised by high parental care and high parental control was protective against adolescent illicit drug use, compared to neglectful, authoritarian, and permissive parenting styles.

Based on these findings, I hypothesise that, among DASH study participants, higher parental care, and perceived authoritative (compared to permissive) parenting will be protective against adolescent illicit drug use, whereas low parental care, and perceived authoritarian or neglectful (compared to permissive) parenting styles will be associated with greater risks of adolescent illicit drug use.

#### 4.2.3.4. Fruit and vegetable consumption:

Sleddens et al. (2011) reviewed studies investigating relationships between parenting styles and dietary behaviours. In one longitudinal study, Berge et al. (2010b) investigated relationships between perceived parenting styles and fruit and vegetable consumption among American adolescents. There were no effects of parenting styles on fruit and vegetable consumption among male adolescents. Among female adolescents, fruit and vegetable consumption was positively associated with perceived maternal authoritative parenting (high strictness, high responsiveness), and positively associated with perceived paternal permissive parenting (low strictness, high responsiveness) by fathers. In their cross-sectional study of 12-14 year old American adolescents, Lytle et al. (2003) also found that adolescent fruit and vegetable consumption was positively associated with perceived maternal authoritative parenting; but in contrast with Berge et al. (2010b), they found that fruit and vegetable consumption was positively associated with perceived paternal authoritarian parenting. Lytle et al. (2003)

suggested that this reflected traditionally different roles of mothers and fathers in child nutrition.

Van der Horst et al. (2006) found that lower sugar sweetened beverage consumption was associated with perceived moderate strictness (control), and perceived high involvement (care), among 12-17 year Dutch adolescents. Another study found that parenting styles derived from those parenting dimensions were associated with adolescent fruit consumption, among Dutch 16-17 year olds (Kremers et al., 2003). Adolescents who perceived an authoritative style of parenting ate significantly more fruit than adolescents who perceived other styles of parenting. Those who perceived a permissive style of parenting, or an authoritarian style of parenting ate an intermediate amount of fruit, while those who perceived a neglectful style of parenting ate the least fruit. A more recent study found relationships between similarly derived parenting styles and several dietary outcomes (Pearson et al., 2010). Among 12-16 year old adolescents in the UK, a perceived authoritative parenting style, compared to a perceived neglectful parenting style, was associated with more fruit consumption, more regularly eating breakfast, and lower snack consumption (these behaviours are considered indicative of a healthy diet high in fruit and vegetables).

In their study, Kim et al. (2008) found that perceived maternal nurturing was associated with lower consumption of calories and saturated fat, and perceived paternal nurturance was associated with lower adolescent sodium intake, among 13-15 year old American adolescents. The authors claim that these dietary behaviours reflect healthier diets (higher in fruit and vegetables, lower in fast food). In contrast, both perceived maternal and paternal control were associated with lower dietary fibre consumption. Perceived paternal control was also associated with higher percentage kilocalories from fats, and lower percentage kilocalories from carbohydrates. While higher carbohydrate consumption can be indicative of excessive soft drink consumption, the authors claim that a combination of high fat, with low carbohydrates and fibre is indicative of an unhealthy diet (lower in fruit and vegetables, higher in fast food). However, Kim et al. (2008) did not examine the sources of adolescents' dietary carbohydrates, so were unable to substantiate this claim. In this study, the measure of nurturance comprised the dimensions: care, clear behavioural regulation, help, maturity expectation, lack of punishment, high achievement expectations, and praise; whereas, the measure of control comprised the dimensions: immaturity expectations, psychological punishment, punishment by withholding privileges, and harsh punishment. These dimensions can therefore be considered analogous to authoritative and authoritarian parenting styles, respectively.

In contrast, two studies, both using a sample of European 11 year old children, found no associations between parenting styles and dietary behaviours (De Bourdeaudhuij et al., 2009, Vereecken et al., 2009). A major difference between these and studies that found associations between parenting styles and adolescent dietary behaviours is that De Bourdeaudhuij et al. (2009), and Vereecken et al. (2009) used a parent-report measure of parenting styles; previous studies have found inconsistencies between parent-report and child-report measures of parenting that might be responsible for their null findings.

Based on these findings, I hypothesise that, among DASH study participants, higher parental care, and perceived authoritative (compared to permissive) parenting will be associated with higher fruit and vegetable consumption, whereas low parental care, and perceived authoritarian or neglectful (compared to permissive) parenting styles will be associated with lower fruit and vegetable consumption.

#### 4.2.3.5. Physical Activity:

Sleddens et al. (2011) reviewed studies investigating relationships between parenting styles and child and adolescent physical activity, citing only two studies that were relevant to this review with somewhat contradictory findings (Berge et al., 2010b, Schmitz et al., 2002).

In their longitudinal study of 12-18 year old Americans, Berge et al. (2010b) found evidence that perceived parenting styles influenced physical activity levels among males but not females. Males who perceived authoritative paternal parenting engaged in the most physical activity, those who perceived neglectful paternal parenting engaged in the least, and those who perceived authoritarian or permissive paternal parenting engaged in an intermediate amount of physical activity. In their large cross-sectional study, Schmitz et al. (2002) found some different parenting effects. In this study, maternal but not paternal parenting style influenced adolescent physical activity. Females who perceived higher authoritative maternal parenting scores were more physically active, but perceived authoritative maternal parenting was not associated with males' physical activity. Among males, perceived authoritarian maternal parenting score at the 75<sup>th</sup> percentile was associated with greatest physical activity; above or below was associated with less physical activity.

In summary, the little research examining the influence of parenting styles on adolescent physical activity has reported inconsistent relationships between parenting styles and adolescent physical activity. Overall, authoritative parenting appears to be beneficial. However, some inconsistent findings suggest that moderately authoritarian parenting may be associated with better outcomes among males.

Based on these findings, I hypothesise that, among DASH study participants, higher parental care, and perceived authoritative parenting will be associated with higher adolescent physical activity, compared to permissive, authoritarian or neglectful parenting styles.

#### 4.2.3.6. Body size:

The review by Sleddens et al. (2011) cites two longitudinal studies (Mustillo et al., 2003, Berge et al., 2010b), and three cross-sectional studies (Berge et al., 2010a, Kim et al., 2008, Mendelson and White, 1995) which report associations between parenting styles and adolescent body size. Another three cross-sectional studies (Gibson et al., 2007, Kremers et al., 2003, Vereecken et al., 2009) found no associations between parenting styles and adolescent body size.

Both longitudinal studies reported associations between parenting styles and adolescent body size (Mustillo et al., 2003, Berge et al., 2010b). In their study, Mustillo et al. (2003) investigated relationships between perceived negative parenting (harsh discipline, inadequate supervision, and overprotection) and trajectories of obesity among 9-16 year old American young people. Harsh parental discipline (control, authoritarian parenting) was associated the development of obesity in adolescence, whereas neither inadequate supervision nor overprotection were related to adolescent obesity. Berge et al. (2010b) examined whether perceived parenting styles were related to BMI among 12-18 year old Americans. Mothers', but not fathers', parenting styles were related to sons' and daughters' BMI. Sons and daughters who perceived authoritative parenting had the lowest BMI; the highest BMI were found among sons who perceived authoritarian parenting, and daughters who perceived neglectful parenting. These findings from longitudinal studies indicate that authoritative parenting is associated with lower BMI and lower likelihood of obesity among adolescents, while authoritarian or neglectful parenting styles are associated with worse outcomes.

In their cross-sectional study examining differences in parenting styles and family functioning between healthy weight, overweight, and obese Canadian teenagers, Mendelson and White (1995) found that, compared to healthy weight girls, obese girls perceived lower family cohesion and expressiveness. Greater family cohesion and expressiveness might indicate a more authoritative style of parenting. They reported no differences in perceived parenting styles and family functioning by weight status among boys.

Kim et al. (2008) investigated whether perceived parenting dimensions of nurturance (care) and control, and authoritative versus, non-authoritative parenting styles, were

related to various measures of body size among 13-15 year old Americans. Participants' responses to questions were used to derive 11 parenting component scores; six of these scores were used to derive a nurturance score (e.g. help, and praise), the other five were used to derive a control score (e.g. immaturity expectations, psychological punishment). This perceived parental control dimension includes some particularly negative parenting components such as harsh punishment. Kim et al. (2008) carried out cluster analysis on parenting components to derive parenting styles: adolescents who perceived authoritative parenting tended to have lower scores for components belonging to the control scale, and higher scores for components belonging to the nurturance scale, vice versa the non-authoritative parenting style. Therefore, in this case, the connection between authoritative parenting and parental control is different to studies that have orthogonalised parental care and control to categorise parenting styles. Kim et al. (2008) found that maternal, but not paternal, parenting dimensions/styles were associated with better adolescent outcomes. Those who perceived greater nurturance, or an authoritative parenting style, were less likely to be overweight or obese; those who perceived an authoritative parenting style also tended to have lower BMI, skinfold thickness, and waist circumference measures. In contrast, those who perceived greater control were more likely to be overweight or obese, and have higher BMI, skinfold thickness, and waist circumference measures.

In their cross-sectional study, Berge et al. (2010a) used parental responsiveness (care) and demandingness (control) dimensions to categorise parenting styles, and also measured parenting practices related to adolescent nutrition and physical activity (modelling and/or encouraging healthy behaviours). Berge et al. found that sons of authoritarian mothers had higher BMI than sons of authoritative mothers. Maternal parenting style had no effect on daughters' BMI; paternal parenting style had no effect on sons/daughters' BMI. Berge et al. also found that mothers who used modelling and encouraging parenting practices were more likely to use authoritative parenting styles than authoritarian, neglectful, or permissive parenting styles.

In summary, evidence from longitudinal and cross-sectional studies suggests that greater parental care and an authoritative style of parenting are associated with healthy adolescent body size, whereas greater parental control and an authoritarian style of parenting are associated with higher adolescent body size. Based on these findings I hypothesise that among DASH study participants higher parental care and an authoritative (compared to a permissive) parenting style will be associated with healthy weight, whereas greater parental control and authoritarian (compared to permissive) parenting will be associated with being overweight or obese.

#### 4.2.3.7. Research question:

In this part of my literature review related to objective C of my thesis, investigating relationships between parenting styles and adolescent health behaviours. Overall there do appear to be relationships between parenting styles and health behaviours. These relationships can be complex and existing evidence draws on a wide range of parenting measures that are not necessarily equivalent. Nevertheless, the authoritative parenting style, which combines high care with high control, seems to emerge most often as associated with healthier behaviours. On the other hand, there is some evidence that authoritarian parenting (high control-low care) can be associated with more negative health behaviours. Again, the existing literature has focused predominantly on health behaviours in isolation, rather than examining how parenting styles are related to the clustering of health behaviours. Based on this literature I formulated a single research questions for the DASH study (Box 4-3). Analyses were carried out to address that research question are presented in Chapter 8 of this Thesis.

Box 4-3. Objective C - Research question:

- Were perceived parenting styles associated with adolescent health behaviours?



#### 4.2.4. Parenting styles and ethnic variations in adolescent health behaviours

In this part of my literature review, I look at existing knowledge about the central question of my Thesis - whether parenting styles mediate or moderate ethnic variations in adolescent health behaviours. In this focussed part of my literature review, I include evidence from primary studies only.

Figure 4-2: summarises the process by which these studies were identified for inclusion in that review.

As described in Section 4.1, my electronic database searches combined terms related to ethnicity, health behaviours, parenting styles as well as the key words 'mediation' and 'moderation'. These searches yielded 224 records of which 51 were removed as duplicates. The remaining 173 titles and abstracts were screened, retaining 53 potentially relevant records. At that stage, a cautious approach was taken by only excluding the 122 records that were clearly not relevant. The remaining 51 articles were reviewed in full based on whether the paper met the specific aims of my literature review.

Forty-one records were excluded at this stage. The most common reason for exclusion was that they looked at the effects of parenting on adolescent health behaviours within a single ethnic group (30 records). Some of these examined mediation of that relationship by another variable (e.g. academic achievement); others looked at whether parenting mediated the relationship between another variable (e.g. alcohol availability) and adolescent health behaviours. Seven studies were excluded because they looked at another family-related variable (e.g. religiosity) rather than parenting styles as a mediator or moderator of ethnic variations in adolescent health behaviours. A single study was excluded because it looked at internet addiction, which is not covered by this Thesis. Two records were excluded because they relate to conference abstracts, another because it related to a review article. This process yielded 10 primary studies that looked at the mediation or moderation of ethnic variations in adolescent health behaviours and checking the reference lists of those studies yielded a further two that had not been identified by electronic database searches.

Key characteristics of these 12 studies are summarised in Table 4-4. Studies included in parenting styles and ethnic variations in adolescent health behaviours literature review: Eight looked at whether ethnic variations in adolescent health behaviours are moderated and four looked at whether ethnic variations in adolescent health behaviours are mediated by parenting styles. In the following sections these two groups of studies

are described with consideration given to their strengths and limitations, how their findings relate to my own research, and any gaps in the literature.

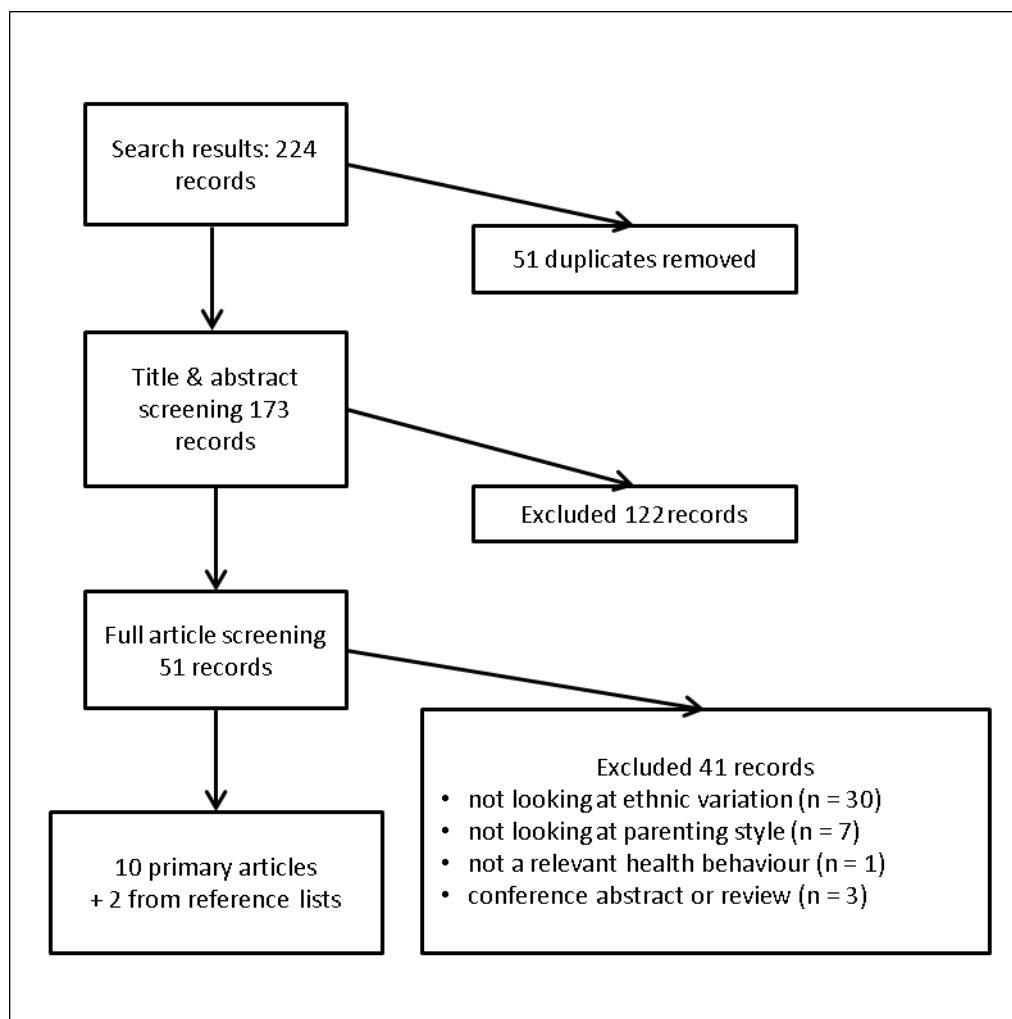


Figure 4-2: parenting styles and ethnic variations in adolescent health behaviours literature review flow diagram

Nine of the 12 studies were carried out in the USA, one in Australia and two in Europe (one in the Netherlands, one in Slovakia). None was carried out in the UK. Each looks at whether any observed ethnic variation in adolescent health behaviours were mediated or moderated by differences in parenting. Six studies used a cross-sectional design; five were large longitudinal cohort studies, and the other a smaller longitudinal study. Quality assessment was carried out against eight criteria chosen to support critical synthesis of the available evidence (Table 4-5. ).

The Australian study (Chan et al., 2016) categorised immigrant adolescents ethnicity according to country and region of birth (e.g. Asian, African, etc.) and compared their alcohol use to native-born adolescents, and the Dutch study (Delforterie et al., 2016)

compared substance use of non-Western immigrant adolescents to native-born Dutch adolescents.

One of the US studies compared alcohol use between White and non-White American adolescents. The other eight US studies used major ethnic categories (Black or African Americans, Latino or Hispanic Americans, and Asian Americans).

Each of these studies looks at adolescent substance use behaviours, none look at body-size and related behaviours. Eight studies looked at alcohol use, three cannabis use, two tobacco use, one externalising behaviours including substance use, and one a combined measure of substance use behaviours.

Each study includes measures of parenting. Some of these measures relate to parental care (parental warmth, communication, and involvement, family cohesion) whereas others relate more to parental control (parental monitoring, and knowledge). One study uses a measure of parental involvement, combining responsiveness and demandingness, analogous to authoritative parenting, and another uses a measure of psychological control, analogous to authoritarian parenting.

Each study provides evidence as to whether parenting moderates or mediates ethnic variations in adolescent health behaviours. In line with the aims of this central section of my literature review, I discuss the findings of the 12 studies as they relate to those two possible relationships.

Table 4-4. Studies included in parenting styles and ethnic variations in adolescent health behaviours literature review:

Authors	Geographical context	Study design	Sample	Ethnicities	Parenting styles	Health behaviours	Mediation or moderation effects
Bobakova et al. (2012)	Slovakia	Cross-sectional	330 Roma (12-17 years old, 49% boys) and 722 non-Roma (13-17 years old, 53% boys aged)	Roma and non Roma	Parental monitoring (parents always know who they are with when they go out)	Drunkenness (drunk at least once in the past four weeks)	Mediation: multiple regression analysis
Chan et al. (2016)	Australia	Cross-sectional	10,273 adolescents from grades 7 (Mean age = 12.5 years), 9 (14.5 years) and 11 (16.4 years)	Countries/ regions of birth	Parental monitoring and disapproval	Alcohol use in last 30 days	Mediation: multiple regression analysis
Delforterie et al. (2016)	Netherlands	Cross-sectional	705 adolescents aged 15–17 years (mean age 16.2; 47.2% female; 25.2% immigrant background)	Native and immigrant Dutch	parental solicitation, parental control, child disclosure	Alcohol use in the past four weeks (weekly vs none) and cannabis use in the last year (y/n)	Moderation: regression analysis with interactions
Fowler et al. (2009)	USA	Cross-sectional	214 adolescents aged 13-17 years at risk of community violence; 65% female; 53% homeless	White (51%) and African American (49%) adolescents	Parental monitoring and parental warmth	Externalising behaviours (conduct problems and substance use)	Moderation: stratified regression analysis
Gottfredson et al. (2019)	USA	Longitudinal cohort study (Context study)	6189 adolescents (grade 6 to 12); 50% female;	Black (40%) and White American (60%)	Parental involvement (responsiveness and demandingness)	Alcohol involvement (combining quantity and frequency of use, binge drinking, getting drunk, getting drunk alone, being	Moderation: regression analysis with interactions

						hungover, and other related consequences)	
Kopak et al. (2011)	USA	Cross-sectional	11,703	White American and Hispanic American	Parental supervision, parental knowledge and parental attachment	Alcohol use and cannabis use in the last 30 days	Moderation: stratified regression analysis
Luk et al. (2017)	USA	Longitudinal	352 adolescents grade 7 to 12	Asian Americans and White Americans	Parental warmth, psychological control, and parental knowledge in Grade 7	Lifetime alcohol use, substance use problems, and alcohol/ cannabis dependence at grades 7, 9, and 12	Moderation: regression analysis with interactions
Nowlin and Colder (2007)	USA	Longitudinal cohort study (Add Health); baseline and 1 year follow-up	9,463 adolescents; 49% male; mean age at baseline 15.45 (SD = 1.74) years	Black (28%) and White (72%) adolescents	Paternal and maternal involvement (care), control, quality of parenting (parental care) at baseline	Cigarette use(quantity and frequency in the last 30 days) at baseline and follow-up	Moderation: regression analysis with interactions
Reeb et al. (2015)	USA	Longitudinal cohort study (Add Health),	10,992 adolescents (grades 7 to 12) 50% female	White American (58%), Black American (20%), Hispanic American (16%), and Asian American (5%).	Family cohesion (support and connectedness)	Frequency of alcohol-related problems	Moderation: regression analysis with interactions
Shakib et al. (2003)	USA	Cross-sectional	3,109 adolescents, mean age 11.3 years, SD =0.51; 53% female	48% Hispanic American, 23% Asian American, 12% White American, and 17% Mixed ethnicity	Parental communication; Parental monitoring	Tobacco use (ever smoked y/n)	Moderation: regression with interactions and stratified regression analyses
Tyler et al. (2006)	USA	Longitudinal cohort study (NLSY79)	542 adolescents 12-14 at wave 1, 14-16 at wave 2, and 16-18 years old at wave 3	White, and non-white	Maternal attachment and maternal monitoring at 14-16 years old	Alcohol misuse at waves 14-16 and 16-18 years old	Mediation: multiple regression analysis
Wang et al. (2009)	USA	Longitudinal cohort study (HBSC)	8,795 adolescents (10-18 years old)	White American, African American	Maternal and paternal knowledge(latent variable combining	Substance use(latent variable combining frequency, in the last 30 days, of tobacco use,	Mediation: structural

				and Hispanic adolescents	questions about 5 different subjects)	alcohol use, drunkenness, and cannabis use)	equation modelling
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Table 4-5. Quality assessment of studies

Quality criteria	Study*											
	1	2	3	4	5	6	7	8	9	10	11	12
Study design (1 if large cohort study, longitudinal or interventional studies, 0.5 if cross-sectional)	0.5	0.5	0.5	0.5	1	0.5	0.5	1	1	1	1	1
Response rate (1 if =>70%, 0.5 if 50-70% or not specified, 0 if <50%)	1	1	0.5	0.5	0.5	1	0.5	1	1	1	0	1
Age group (1 if specific to adolescents)	1	1	1	1	1	1	1	1	1	1	1	1
Ethnicities (1 if ethnicities well defined)	1	0	0	1	1	1	0	1	1	1	0	1
Relevant parenting measures	1	1	1	1	1	1	1	1	1	1	1	1
Relevant health behaviours (0.5 for measures including other outcomes)	1	1	1	0.5	1	1	1	1	1	1	1	1
Analysis of moderation (1 for interaction terms or stratified regression analysis)	0	0	1	1	1	1	1	1	1	1	0	0
Analysis of mediation, (1 for appropriate treatment of structural inequalities)	0	0	0	0	0	0	0	0	0	0	0	0
Score (maximum 8 points)	5.5	4.5	5	5.5	6.5	6.5	5	7	7	7	4	6
<b>*Studies:</b>												
1	Bobakova et al. (2012)	4	Fowler et al. (2009)	7	Luk et al. (2017)	10	Shakib et al. (2003)					
2	Chan et al. (2016)	5	Gottfredson et al. (2019)	8	Nowlin and Colder (2007)	11	Tyler et al. (2006)					
3	Delforterie et al. (2016)	6	Kopak et al. (2011)	9	Reeb et al. (2015)	12	Wang et al. (2009)					

#### 4.2.4.1. Moderation

Eight studies provide evidence related to whether ethnic variations in substance use behaviours were moderated by measures of parenting. Seven were based in the US (Fowler et al., 2009, Gottfredson et al., 2019, Koval et al., 2000, Luk et al., 2017, Nowlin and Colder, 2007, Reeb et al., 2015, Shakib et al., 2003), the other was based in the Netherlands (Delforterie et al., 2016).

Each study employs either regression analysis with interactions between parenting and ethnicity, or regression analysis stratified by ethnicity.

Stratified regression (or subgroup) analysis estimates the effects of parenting separately for each ethnicity. Where the effects of parenting on adolescent health behaviours are different, there are two possible interpretations. On the one hand, the effects of parenting could be moderated by ethnicity, but on the other hand, the effects of ethnicity could be moderated by parenting.

Although it is a useful approach, stratified regression analysis has some limitations. Firstly, differences in the effect of parenting between ethnic groups are not tested for statistical significance, and secondly, dividing a sample into smaller groups makes spurious findings more likely.

Regression analysis with interactions is considered a more reliable statistical approach than stratified regression analysis as it uses data from the whole sample to estimate the effect of the exposure, within and across levels of the moderator. However, the inclusion of interaction terms will reduce the statistical power of a regression analysis, and insufficient sample sizes will often preclude significant findings. Independent variables are designated as exposure or moderator by the researcher, but are statistically interchangeable. Therefore, parenting-ethnicity interaction terms with significant effects can either be interpreted as ethnicity moderating the effects of parenting, or parenting moderating the effects of ethnicity, on adolescent health behaviours.

Although the study authors interpret their interaction terms as ethnicity moderating the effects of parenting, I have interpreted them in terms of parenting moderating the effects of ethnicity, in accordance with the aims of my literature review.

Various measures of parenting have been used. I group these according to the dimensions of parental care and control to facilitate critical analysis in line with my own research. One study used a measure of parental involvement that combines



parental care and control and is analogous to an authoritative parenting. This study is discussed under the heading of parental control.

*Moderation of ethnic variations in adolescent health behaviours by parental care:*

Three studies provide evidence that parental care, including measures of parenting quality, family cohesion, and parental communication, moderated ethnic variations in adolescent tobacco and alcohol use (Nowlin and Colder, 2007, Reeb et al., 2015, Shakib et al., 2003). Another found no evidence that parental warmth moderated ethnic variations in adolescent substance use (Luk et al., 2017).

Nowlin and Colder (2007) used data from the large US Add Health study to investigate whether parenting quality influenced tobacco use among Black and White adolescents using regression analysis with interactions between parenting quality and ethnicity. Levels of adolescent tobacco use were higher among White, compared to Black adolescents, at around 15 years old, and at a one-year follow-up. Parenting quality is related to parental care with items such as “Most of the time, your mother/ father is warm and loving toward you”.

Baseline analysis found that maternal and paternal parenting quality were associated with less tobacco use among the White adolescents, but significant interactions between parenting quality and ethnicity were associated with more tobacco use cancelling out those effects amongst Black adolescents. Similarly, in the longitudinal analysis, maternal and parental parenting quality predicted less tobacco use one year later, but that effect was cancelled out among Black adolescents by a significant interaction between maternal (but not paternal) parenting quality and ethnicity that was associated with more tobacco use. These findings suggest that ethnic variations in tobacco use were moderated by parenting quality, with higher levels of tobacco use concentrated among White adolescents who reported lower levels of parenting quality (care).

Reeb et al. (2015) also used data from the Add Health study, and longitudinal regression analyses with interactions, to investigate whether family cohesion influenced alcohol related problems among White, Black, Latino, and Asian American 15 year olds. White and Hispanic adolescents were more likely to report alcohol related problems than Black and Asian adolescents at one-year follow-up. Family cohesion was measured with questions related to parental care such as “How much do you feel that your family pays attention to you?”. Greater cohesion was associated with fewer alcohol related problems among White adolescents, but significant interactions with ethnicity, which were associated with more alcohol related problems, cancelled that effect out among

the ethnic minority adolescents. These findings suggest that family cohesion moderated ethnic variations in adolescent alcohol related problems with higher levels of alcohol related problems among White American adolescents concentrated among those that reported less family cohesion (care).

Shakib et al. (2003) looked at whether parental communication influenced ethnic variations in adolescent tobacco use. In their cross-sectional sample of 11 year olds, Latino Americans were more likely to use tobacco than Whites and Asians. Parental communication was measured with questions related to parental care such as “If you had a problem would you be able to talk to your parents about it?” and “How often do you tell your parents your secrets?”. They carried out regression analyses with interactions between parenting and ethnicity. Among the Latino reference group parental communication was associated with less tobacco use (OR = 0.73, 95% CI: 0.62 - 0.86), but this was cancelled out by a significant interaction between communication and White ethnicity that was associated with more tobacco use (OR = 2.44, 95% CI: 1.15 - 5.17). Additional stratified regression analyses were used to illustrate their findings. Among the Latino adolescents parental communication was associated with less tobacco use (OR = 0.63, 95% CI: 0.50 - 0.78), whereas among the White adolescents, parental communication was associated with more tobacco use (OR = 1.48, 95% CI: 0.70 - 3.13), although the latter association was not conclusive based on the 95% confidence interval. Therefore, the findings of that study suggest that ethnic variations in tobacco use were moderated by parental communication (care). Specifically, tobacco use was concentrated among Latino adolescents who reported lower care, but among White adolescents who reported higher care.

Shakib et al. (2003) suggested that their findings might highlight cultural differences in the meaning of their measure of communication, and specifically the aspect of children disclosure. Among White adolescents, child disclosure could reflect more permissive parenting with less parental control. This type of parenting could create an environment in which adolescents have more freedom to experiment with tobacco use while maintaining high levels of communication with their parents. In contrast, high levels of communication among Latino adolescents might reflect parental control and more authoritative parenting. Latino adolescents might refrain from using tobacco out of respect for their parents’ disapproval of tobacco use, thereby maintaining high levels of communication. The study analysis did include parental tobacco use, which could reflect parental disapproval, and adolescents whose parents used tobacco were more likely to use tobacco themselves, but there were no significant interactions between parental tobacco use and ethnicity.

Luk et al. (2017) found no evidence that parental warmth at 12 to 13 years old moderated variations in adolescent substance use between White and Asian and Pacific Islander (API) American, using regression analyses with interactions. Surprisingly, paternal, but not maternal, warmth predicted more substance use problems at 14 to 15 years old. There were no significant interactions between parental warmth and ethnicity. The findings of additional ethnically stratified mediation models suggests that, among White American adolescents, the effect of paternal warmth on adolescent substance use problems could have been mediated by academic achievement, such that paternal warmth predicted better academic achievement that in turn predicted less substance use problems. Relationships between parenting, academic achievement and adolescent substance use may be important here, and warrant further investigation, but that question is beyond the remit of this literature review. A key limitation of this study is its small sample size which could both preclude statistically significant ethnic differences (the overall sample size was 352 and the API group was only 97).

Nowlin and Colder (2007) and Reeb et al. (2015) reported similar findings with tobacco and alcohol use concentrated among White American adolescents who reported greater parental care (parenting quality, and family cohesion). Shakib et al. (2003) reported a different pattern of moderation with tobacco use concentrated among White American adolescents who perceived greater parental communication (care), but among Latino adolescents who perceived lower parental communication (care). Differences between sample characteristics and parenting measures could have resulted in different findings. Since Nowlin and Colder (2007) and Reeb et al. (2015) both used data from the Add Health study this could explain the fact that their findings are consistent with each other but different from those reported by Shakib et al. (2003).

*Moderation of ethnic variations in adolescent health behaviours by parental control:*

Four studies provide evidence that ethnic variations in adolescent substance use behaviours were moderated by parental control, including measures of supervision, monitoring, and knowledge (Fowler et al., 2009, Kopak et al., 2011, Nowlin and Colder, 2007, Shakib et al., 2003). Another study used a measure of parental involvement that combines parental demandingness (control) with responsiveness (care) and is analogous to an authoritative style of parenting. Three studies provide no evidence of moderation by measures of parental monitoring, knowledge, and psychological control (Bobakova et al., 2012, Delforterie et al., 2016, Luk et al., 2017).

Shakib et al. (2003) looked at whether parental monitoring (control) influenced ethnic variations in tobacco use, using regression analysis with interactions. Latino Americans were more likely to use tobacco than Whites and Asians. Parental monitoring, measured

with responses to questions related to parental control such as “Are you allowed to go out with friends that your parents don’t know?”, was associated with less tobacco use among Latino adolescents and a statistically significant interaction with ethnicity increased that effect among White adolescents. We can interpret these findings as evidence that parental monitoring moderated ethnic variations in tobacco use with the higher levels of tobacco use concentrated among Latino adolescents who reported less parental control (monitoring).

Kopak et al. (2011) used stratified logistic regression analyses to look at whether parental knowledge or parental supervision (control) influenced ethnic variations in adolescent alcohol and cannabis use. Hispanic American adolescents were more likely to have used alcohol or cannabis in the last 30 days than White American adolescents. Parental knowledge was associated with less alcohol and cannabis use among Hispanic but not White American adolescents. Parental supervision was associated with less alcohol and cannabis use in both ethnic groups although associations were stronger among White adolescents.

These findings suggest that parental control moderated ethnic variations in substance use behaviours among White and Hispanic adolescents differently depending on the type of measure. Parental supervision was more important among White than Hispanic adolescents. Parental knowledge, important among Hispanic but not White adolescents, consisted of three items such as “when I am not at home one of my parents know where I am and who I am with”. Agreement with that statement may reflect adolescents’ respect for parental disapproval of substance use, or more permissive parenting combined with adolescent disclosure of their substance use behaviours.

Nowlin and Colder (2007) looked at whether parental control (whether parents made decisions for children) influenced ethnic variations in the frequency and quantity of adolescent tobacco use, using regression analyses with interactions between ethnicity and parental control to investigate moderation. Frequency and quantity of tobacco use were lower among Black than White adolescents, lower among adolescents who reported more parental control, however, the interaction between maternal control and Black ethnicity associated with more adolescent tobacco use cancelling out the protective effects of parental control seen among White adolescents. Nowlin and Colder (2007) suggest two possible explanations for this difference. Firstly, it may be down to early socialisation of Black American adolescents may be socialised against tobacco use early allowing them to self-regulate tobacco use regardless of levels of parental control; and secondly, peer influence is less important among Black compared to White adolescents who may be protected by parental control.

Fowler et al. (2009) looked at whether parental monitoring (control) influenced adolescent externalising behaviours, which included abuse of alcohol, cannabis, and other illicit substances as well as other conduct problems, using ethnically stratified structural equation models. Parental monitoring was associated with fewer externalising behaviours among White, but not African American adolescents, which we can interpret as evidence that parental control moderated ethnic variations in externalising behaviours; African American adolescents who reported externalising behaviours were concentrated among those who reported less parental monitoring. This study used a sample of adolescents who were at risk of homelessness and therefore their findings should be generalised to the wider population with caution.

Gottfredson et al. (2019) looked at whether authoritative parenting influenced ethnic variations in alcohol involvement among 11 to 18 year olds, using linear growth models with interactions. Alcohol involvement was a measure combining quantity of use and frequency of use, binge drinking, getting drunk, getting drunk while alone, being hungover, and other related consequences. Compared to White American adolescents, Black adolescents were less likely to report alcohol involvement at baseline and had slower trajectories over time. Parental involvement, a measure of authoritative parenting that combines responsiveness (care) and demandingness (control), was associated with less alcohol involvement among White adolescents, but an interaction between parental involvement and ethnicity was associated with more alcohol involvement cancelling out that effect was among the Black adolescents.

Three studies failed to find evidence that measures of parental control moderated ethnic variations in substance use behaviours. Luk et al. (2017) found that various measures of substance use were more likely among White than among Asian and Pacific Islander (API) adolescents. Adolescents who reported greater maternal control were more likely to report substance use problems at 14 to 15 years old, and adolescents who reported greater parental knowledge were more likely to report alcohol use or substance use problems at 14 to 15 years old, and substance use problems or alcohol dependence at 17 to 18 years old. However, there were no significant interactions between either maternal psychological control or parental knowledge, and ethnicity. In their Slovakian study, Bobakova et al. (2012) found that alcohol use was less likely among Roma girls, and girls who reported more parental monitoring, but there were no significant interactions between parenting and ethnicity. In their Australian study, Delforterie et al. (2016) found that alcohol use was less likely among immigrant Australians compared to native-born counterparts, and among those who reported more parental monitoring, but there were no significant interactions between parental monitoring and ethnicity. These three studies' capacities to detect ethnic differences

may have been limited by small sample sizes or the use of broad ethnic categories that might obscure socio-cultural heterogeneity.

#### 4.2.4.1. Mediation

Four studies looked at whether ethnic variations in adolescent substance use behaviours were mediated by parenting styles including measures of parental knowledge, and monitoring (Bobakova et al., 2012, Chan et al., 2016, Tyler et al., 2006, Wang et al., 2009).

Wang et al. (2009) used data from the large nationally representative Health Behaviour in School-aged Children (HBSC) study and structural equation modelling to look at whether sociodemographic (ethnicity, age, and gender) variations in adolescent substance use behaviours were mediated by parental knowledge and peer substance use. Compared to White adolescents, Black American adolescents reported lower, and Hispanic American adolescents reported higher levels of substance use behaviours, adjusted for age, gender, and structural inequalities (family structure and family affluence). Black and Hispanic American adolescents reported lower levels of parental knowledge, and Black American adolescents reported lower levels of peer substance use. Upon the inclusion of the mediators in the final model, ethnic variations in adolescent substance use were attenuated, losing statistical significance. Compared to White American adolescents, Black Americans were less likely to report peer substance use, which was strongly associated with adolescent substance use. Therefore, it is quite likely that peer substance use mediated lower levels of substance use among Black American adolescents. In contrast, Hispanic American adolescents reported similar levels of peer substance use to White Americans but lower levels of parental knowledge so the latter pathway is more likely to have mediated their higher levels of substance use.

In the HBSC study parental knowledge was measured separately for mothers and fathers and recorded adolescent perceptions of parental knowledge of who their friends were, how they spent their money, where they were after school, where they went at night, and what they did with their free time. This measure of parental knowledge may reflect higher levels of parental control, or greater parental respect among adolescents, effectively restricting adolescent behaviour. On the other hand, it may reflect more permissive parenting (lower levels of parental control combined with high levels of parental care), that encourages adolescents to share information.

Strengths of this study include its large sample size (n=8795), and the use of structural equation modelling, which allow for mediation analysis. On the other hand, as Wang et

al. (2009) acknowledge weakness lies in the use of cross-sectional data. In particular, they recognise that peer influence is intimately involved in the aetiology of adolescent substance use so longitudinal analysis is needed to substantiate its role in mediating adolescent substance use.

Another limitation lies in the inclusion of structural inequalities (family structure and family affluence) as covariates in their structural equation model. This may lead to bias because it excludes effects via these structural inequalities from their estimates of the direct effects of ethnicity on substance use (not mediated via parenting), and effects of ethnicity on parenting via these structural inequalities are excluded from their estimates for indirect effects of ethnicity on substance use via parenting. However, because structural inequalities are determined by ethnicity and may influence both mediator and outcome, they are likely to be intermediate confounders of the mediator-outcome relationship and unadjusted estimates could be biased. Another approach, such as inverse probability weighted marginal structural models, could be used to adjust for intermediate confounding without blocking those parts of the effect of ethnicity on adolescent substance use that go via the structural inequalities (VanderWeele, 2009).

Wang et al. (2009) acknowledge that relationships between parental knowledge and adolescent substance use might vary by ethnicity but did not carry out analysis to investigate this possibility. As described in the previous section of my review, other researchers have carried out such analysis and several provide evidence of moderation (Fowler et al., 2009, Kopak et al., 2011, Nowlin and Colder, 2007, Shakib et al., 2003). As suggested by Wang et al. (2009) qualitative studies might also improve understanding of the 'real-life actualizations' of parental knowledge.

Another study, by Chan et al. (2016), used cross-sectional data from the Australian HSBC study looked at whether parental monitoring and parental disapproval mediated variations in alcohol use between Australian adolescents by country of birth.

Their sample of 10,283 adolescents, between the ages of 12 and 18, were categorised by country of birth. Countries reported by fewer than 50 adolescents were grouped by region (e.g. Africa, South-East Asia, and Western Asia). The authors acknowledge that this approach masks social and cultural heterogeneity within regions. The Australian-born reference group, for instance, would include Australian-born children of immigrants along with other Australian-born adolescents, despite important social and cultural differences. To address the issue Chan et al. (2016) carried out a sensitivity analysis, limiting the Australian-born group to adolescents with two Australian-born parents, this validating their findings.

Regression models, adjusted for age, gender, family affluence and peer alcohol use, were used to estimate the direct effects of ethnicity (country of birth) on adolescent alcohol use, and on the parenting mediators, and to the effects of the parenting mediators on alcohol use. Mediated effect sizes were calculated and statistical significance was tested by bootstrapping estimates.

Alcohol use in the last 30 days, adjusted for age, gender, family affluence and peer alcohol use, was more likely among adolescents born in Australia or other Western countries. There were robust negative associations between the two parenting mediators and alcohol use (parental disapproval: OR = 0.52, and parental monitoring: OR = 0.51;  $p$  values <0.001). Non-Western-born adolescents reported greater parental disapproval of alcohol. Adolescents born in Africa, Southern Asia, and India also reported greater parental monitoring, whereas adolescents born in China and South-East Asia reported similar levels of monitoring to Australian-born adolescents. Pathways via parenting mediators explained 21 to 35% of lower likelihoods of alcohol use among non-Western-born adolescents. The largest proportions explained (34 to 35%) were among the Indian and South Asian-born adolescents who had reported the highest levels of parental disapproval, compared to the Australian-born adolescents, and upon adjustment for parenting the ethnic variation among the South Asian-born adolescents was no longer significant. These findings provide evidence of mediation of ethnic variations in adolescent alcohol use by parenting styles.

Similarly to Wang et al. (2009), by adjusting for family affluence they exclude effects via these structural inequalities from their estimates of the direct effects of ethnicity on alcohol use (not mediated via parenting), and effects of ethnicity on parenting via these structural inequalities are excluded from their estimates for indirect effects of ethnicity on alcohol use via parenting. However, because structural inequalities are determined by ethnicity and may influence both mediator and outcome, they are likely to be intermediate confounders of the mediator-outcome relationship and unadjusted estimates could be biased. Another statistical approach used for causal mediation analysis, such as inverse probability weighted marginal structural models, could be used to account for confounding of the relationship between parenting and alcohol use by structural inequalities without removing the effect of ethnicity on adolescent alcohol use via structural inequalities (VanderWeele, 2009).

Bobakova et al. (2012) also used a cross-sectional sample, and logistic regression analysis, to investigate whether differences in alcohol use between Roma and non-Roma Slovakian 12 to 17 year olds were mediated by parental monitoring or peer influence. They found that Roma girls were less likely to report alcohol use (drunkenness at least



once in the last four weeks) than non-Roma girls. Roma girls were also less likely to report a lack of parental monitoring, and upon adjustment for lack of parental monitoring the ethnic variation in alcohol use was ethnic variation was reduced by 26%, suggesting partial mediation.

A key strength of this study lie in its reasonably large sample size with well-defined ethnic groups (330 Roma and 722 non-Roma, with roughly equal numbers of boys and girls). Furthermore, the logistic regression analysis shines light on possible mediation of the effect of ethnicity on adolescent alcohol use, despite methodological limitations.

A key methodological limitation lies in their treatment of structural inequalities (parental education). Specifically, since ethnicity (exposure) influences structural inequalities (parental education levels were lower among Roma adolescents), where structural inequalities influence both parental monitoring (mediator) and adolescent alcohol use (outcome), they should be treated as intermediate confounders. Increasing parental education was associated with adolescent alcohol use and it is plausible, if not likely, that parental education also influenced parental monitoring, although Bobakova et al. (2012) did not investigate the latter relationship in their analysis. Therefore, as they are not adjusted for structural inequalities, their estimate of the indirect effect of ethnicity on adolescent alcohol use via parental monitoring may be biased. However, subsequently adjusting for parental education will have excluded the part of the direct effect of ethnicity on adolescent alcohol use that goes via structural inequalities and produce biased estimates of the indirect effect. Another approach to causal mediation analysis, such as inverse probability weighted marginal structural models, could be used to account for confounding of the relationship between parental monitoring and adolescent alcohol use by parental education without removing the effect of ethnicity on adolescent alcohol use that goes via parental education.

Tyler et al. (2006) used longitudinal data from a US community sample, and logistic regression analysis, to investigate whether adolescent alcohol use was influenced by ethnicity, structural inequalities, and psychosocial factors (including maternal attachment and maternal monitoring). They did not carry out mediation analysis but their findings provide relevant information despite the methodological limitations.

Adolescent alcohol use (having drunk five or more alcoholic drinks on any one occasion in the past 30 days) was first regressed on ethnicity and structural inequalities (family structure, maternal education, and maternal drinking). Compared to the non-White reference group, which included both Black and Hispanic adolescents, White adolescents were more likely to report alcohol misuse at 16-18 years old. However, by adjusting for structural inequalities, which are influenced by ethnicity, the part of the

effect that goes via those structural inequalities will be excluded from the estimated effect of ethnicity on adolescent alcohol use. Parent-child relations were then introduced to the model where greater maternal attachment (not attachment) predicted less adolescent alcohol use, but this had little effect on the magnitude of ethnic variations. Given the presence of structural inequalities in the model, these estimates are also likely to be biased. In order to investigate whether parenting mediated any ethnic variations in that sample another analytical approach, for example an inverse probability weighted marginal structural model, should be employed.

This study's strengths include the use of longitudinal data that demonstrates a prospective relationship between maternal attachment and adolescent alcohol use. However, with regard its contribution to the investigation of possible mediation of ethnic variation by parenting there are substantial methodological limitations. In addition to the issues with the treatment of structural inequalities in their models that are likely to introduce bias to their findings, there are two main limitations. Firstly, the use of a non-White group comprised of two distinct ethnic groups limits the usefulness of the ethnic variations measured, and secondly, the study has a relatively small sample size and issues with missing data.

#### *Key findings:*

The evidence described in this review suggest that parenting styles may moderate or mediate ethnic variations in adolescent substance use behaviours.

Moderation studies suggest that substance use behaviours are concentrated among White American adolescent who live in households characterised by greater family cohesion, and parenting quality. These factors do not appear to be important for Black, Hispanic, and Asian adolescents (Nowlin and Colder, 2007, Reeb et al., 2015). The findings regarding parental communication are equivocal (Shakib et al., 2003), with tobacco use concentrated among Latino adolescents who reported less communication, and White adolescents who perceived more communication. Studies that have looked at measures of parental control consistently suggest that substance use is concentrated among White adolescents who report less parental monitoring, and knowledge, effects that are either weaker or absent among Black, and Hispanic or Latino adolescents. Similarly, another study found that among Whites but not Black Americans, adolescent alcohol use was concentrated among those that reported more authoritative parenting (high care and high control). Broadly speaking, the available evidence suggests that parental care (family cohesion, parenting quality) and parental control (monitoring, knowledge) are important protective factor amongst White adolescents, but less so among ethnic minority adolescents.

Mediation studies also suggest that parental control (monitoring) is more important among White than ethnic minority adolescents. Each study found that White adolescents reported higher levels of substance use, and lower levels of parental control, which were in turn associated with more substance use, partially explaining the ethnic variations. The finding that parenting styles have less influence on ethnic minority adolescent substance use might reflect cultural values, such as parental respect and negative attitudes towards substance use that help them to avoid substance use independently of parent styles.

*Limitations:*

This review identified a number of high quality studies that have looked at whether parenting styles moderated or mediated ethnic variations in adolescent health behaviours. I assessed studies against quality criteria, the findings of which are presented in this review. No studies were excluded based on those assessments, but knowledge of study limitations supported critical analysis of findings. Some key limitations are summarised below.

While this review identified a reasonable amount of relevant literature there are important gaps. A minority of the studies included in this review looked at whether parenting styles mediated ethnic variations in adolescent health behaviours. There exists a substantial body of research looking at the effects of parenting within single ethnic groups, which is not included because they do not look at whether parenting styles mediated ethnic variations. Studies of mediation inappropriately included measures of structural inequalities in their analyses thereby introducing bias to their findings. None of the reviewed studies looked at whether parenting moderated or mediated ethnic variations in adolescent body size or related behaviours and findings from studies of substance use behaviours should be generalised with extreme caution.

Three quarter of the studies were US based, with other three studies based in Australia, The Netherlands, and Slovakia. Although these studies are considered somewhat relevant to ethnic variations in health behaviours in the UK, findings should be generalised with caution, and further research is needed to fill this a gap in the literature.

There are limitations to the methodologies used by the studies. Moderation studies used logistic regression stratified by ethnicity or with interactions between ethnicity and parenting. These are both appropriate approaches to investigating moderation but reduce the power to detect significant differences. Therefore, it is likely that studies have overlooked important interactions based on the  $p$  value. Mediation studies

generally used regression analyses to compare the effects of ethnicity on adolescent health behaviours before and after adjustment for parenting styles. While this is an acceptable approach, it is important to consider how covariates have been treated in these models as this can lead to biased findings.

#### 4.2.4.2. Research questions:

Here, I reviewed studies related to objectives D and E of my thesis - whether parenting styles mediate or moderate ethnic variations in adolescent health behaviours. As described there is evidence that. Based on my key findings that parenting styles can either moderate or mediate ethnic variations in adolescent health behaviours I have posed two research questions for the DASH study (Box 4-4). Analyses carried out to address these research questions are presented in Chapter 9.

Box 4-4. Objective D and E research question:

1. Were ethnic variations in adolescent health behaviours, or in the clustering of adolescent health behaviours, mediated by perceived parenting?
2. Were ethnic variations in adolescent health behaviours, or in the clustering of adolescent health behaviours, moderated by perceived parenting?

## 5. Data and methods

### 5.1. Data

Participant responses to the DASH follow-up questionnaire were used as measures of health behaviours at 14-16 years, including current tobacco and alcohol use, lifetime illicit drug use, fruit and vegetable consumption, and physical activity. The mid-adolescent follow-up rather than the baseline survey was though more appropriate for this investigation, because the prevalence of tobacco, alcohol and drug use was very low at the earlier baseline survey. Measurements of body size are included as a marker of energy balance related to diet and physical activity. Participants' responses at the same follow-up survey were used as measures of cultural and structural inequality factors that are hypothesised to be related to ethnic variations in adolescent health behaviours, perceived parenting styles, and the role of perceived parenting styles in variations in health behaviours.

#### 5.1.1. Ethnicity

DASH study participants' ethnicities were self-identified at baseline (from 25 available ethnicities). Where possible missing values were imputed based on parents' and grandparents' countries of birth. Ethnic minorities were then categorised as Black Caribbean, Black African, Indian, Pakistani/ Bangladeshi or Other ethnicities. Adolescents who identified as Black British or Asian British were categorised based on parents' and grandparents' countries of birth.

#### 5.1.2. Adolescent health behaviours

*Current tobacco use:* Adolescents identified themselves as smoking regularly (one or more cigarettes a week), smoking occasionally, having given up smoking, having tried smoking once, or never having smoked. Those responding as either regular or occasional smokers were categorised as current smokers; those responding as ex-smokers, having tried smoking once or never having smoked were categorised as non-smokers.

*Current alcohol use:* Adolescents self-reported alcohol use frequency as: daily; bi-weekly; weekly; fortnightly; monthly; a few times a year; as no longer using alcohol; or as never having used alcohol. Those who identified as no longer using or never having used alcohol were categorised as not currently using alcohol, all others were categorised as currently using alcohol.

*Lifetime illicit drug use:* Adolescents self-reported lifetime use of cannabis, solvents, ecstasy, cocaine or crack, heroin, amphetamines, and LSD, responses were aggregated

as having ever used illicit drugs, or not. Ever use was more appropriate than current use for this measure because the behaviour is less socially acceptable (e.g. it is illegal) and use would therefore tend to be rarer, especially at ages 14-16.

*Fruit and vegetable consumption:* Adolescents were asked to estimate how many portions of fruit and how many portions of vegetables they ate per day. Responses quantified consumption from zero to five or more portions, or as not eating them every day. The responses to the two questions were combined into a single fruit and vegetable consumption variable which was then categorised as less than 2 portions/day, 2 to 5 portions/day, and at least 5 portions/day. The higher cut-off of 5 portions per day reflects national 5-a-day recommendations (NHS Choices, 2002).

*Physical activity:* Adolescents reported durations of any physical activities they had engage in over the preceding 7 days. The total duration of physical activity was calculated and this was categorised as less than 7 hours/week, 7 to 14 hours/week, and at least 14 hours/week. The lower cut-off of 7 hours/week reflects national recommendations (UK Department of Health, 2011).

*Body size:* Adolescents' body mass index (BMI) was calculated from height and weight measures. Using gender specific British 1990 Growth Charts, adolescents were assigned to categories based on predicted BMI at 18 years old, using the standard International Obesity Taskforce (IOTF) cut-offs.

### 5.1.3. Perceived parenting measures

Perceived parental care and control were measured using a brief current form of the Parental Bonding Instrument (BC-PBI) as developed by (Klimidis et al., 1992c) for use with adolescents in an ethnically diverse Australian sample. Whereas the Parental Bonding Instrument was developed to be completed by adults to retrospectively report the parenting that they had perceived as children, the BC-PBI was developed to be completed by adolescents to report currently perceived parenting.

Table 5-1 shows questions used to measure perceived parental care and control. In the DASH study the BC-PBI was used to measure how participants perceived their relationship with their parents; perceived parenting of mothers and fathers were not measured separately. Possible responses were 'Always'; 'almost always'; 'sometimes'; and 'never'. Responses were scored 1-4 and combined to give separate 4-16 scales for perceived parental care and control. Higher scores reflect greater perceived parental care and control. Four questions, referring to positive, caring, aspects of the participant's relationship with their parents, are used to quantify perceived parental care scores. The remaining four questions are used to quantify perceived parental control scores: two questions refer to negative, controlling, parenting, and two questions refer to positive, autonomy-granting parenting (responses to these two items were inverted before calculating the control score).

Table 5-1: Brief current form of the Parental Bonding Instrument

		<i>My parents always</i>
Parental care		Help me as much as I need  Are loving  Understand my problems and worries  Make me feel better when I am upset
Parental control	Autonomy-granting	Let me do the things I like doing  Like me to make my own decisions
	Controlling	Try to control everything I do  Treat me like a baby

Pearson's correlation coefficients were computed to assess the relationship between measures of perceived parental care and control at waves 1 and 2. There were moderate positive correlations (Pearson's  $r = 0.35$ ,  $p=0.000$ ) between time-points for both perceived parental care and control scores (see Figures 5-1 and 5-2). Based on these findings, and for reasons of practicality, perceived parental care and control measures at wave 2 were selected for subsequent analyses. Nevertheless, considering these correlations with earlier parenting perceptions, the wave 2 measures may be considered to represent more than just current parenting, giving an indication of how adolescents have perceived earlier parenting too.

Based on findings from my literature review (4.2.2) I hypothesised there to be ethnic variations in correlations between perceived parental care and control. Specifically, I expected that care and control would be negatively correlated among White UK adolescents, whereas I expected there to be less negative or positive correlations among ethnic minority adolescents. Pearson's correlation coefficients were computed to test this hypothesis. There was a moderately strong negative correlation (Pearson's  $r = -0.49$ ,  $p=0.000$ ) between perceived parental care and control scores (Figure 5-3). In other words adolescent who perceived higher parental control tended to perceived lower parental care. To investigate ethnic variations in that relationship, I regressed perceived parental care on interactions between control and ethnicity. Interactions between perceived parental control and ethnicity were not statistically significant ( $p = 0.54$ ). This suggests that there were no ethnic variations in the relationship between the two parenting dimensions.

Figure 5-4 and Figure 5-5 show distributions of perceived parental care and control scores. Care scores were right-skewed and control scores were left-skewed. Because these variables were not normally distributed they were categorised into 3 levels. Perceived parental care scores of 16 (the maximum possible score) were categorised as *High*, scores of 14-15 were categorised as *Medium*, and scores less than 14 were categorised as *Low* care. Perceived parental control scores less than 7 were categorised as *Low*, scores of 7-8 were categorised as *Medium*, and scores of at least 9 were categorised as *High* control. These categorical variables were cross-classified to define four parenting styles similar to Baumrind's typology (Table 5-2).



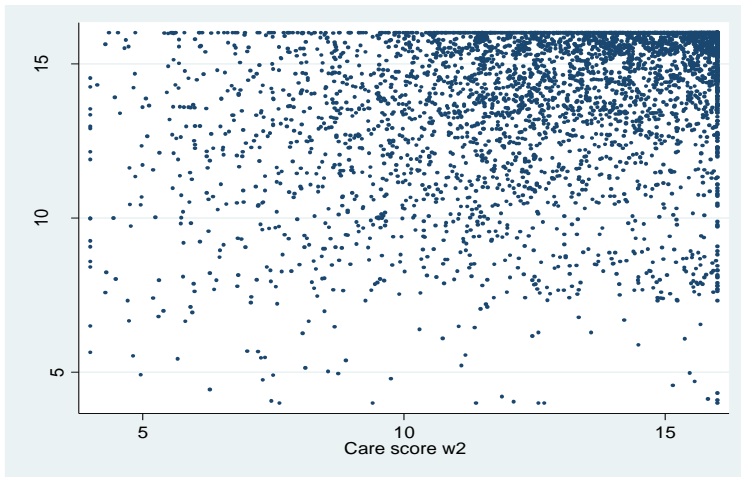


Figure 5-1: Correlation between perceived parental care at waves 1 and wave 2.

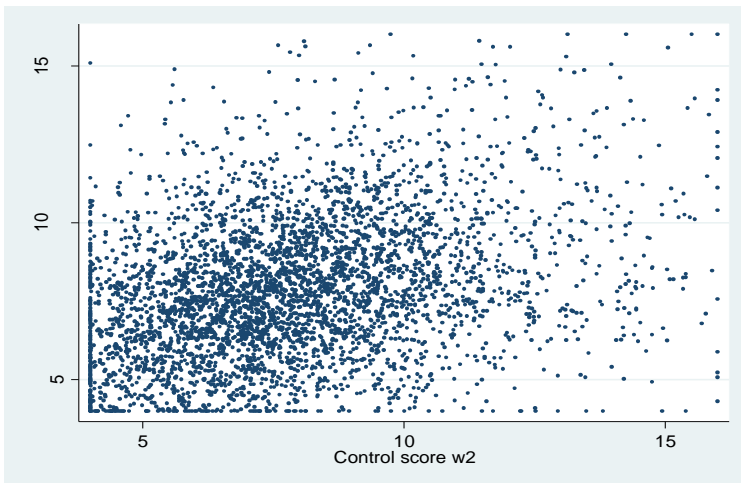


Figure 5-2: Correlation between perceived parental control at waves 1 and wave 2.

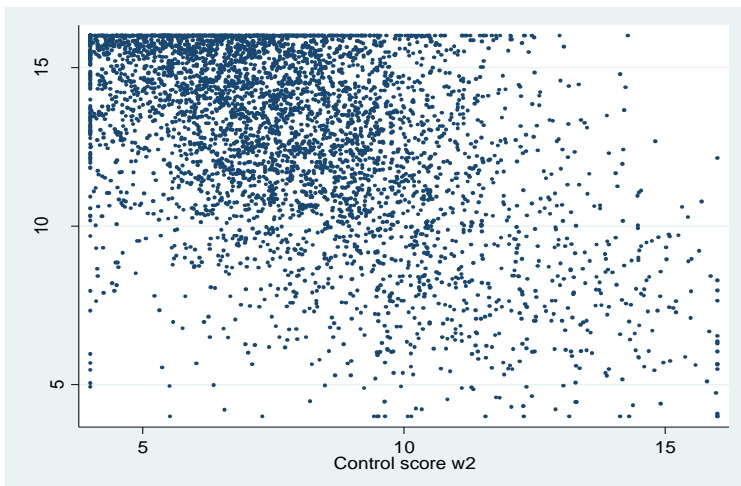


Figure 5-3: Correlation between perceived parental care and control at wave 2.

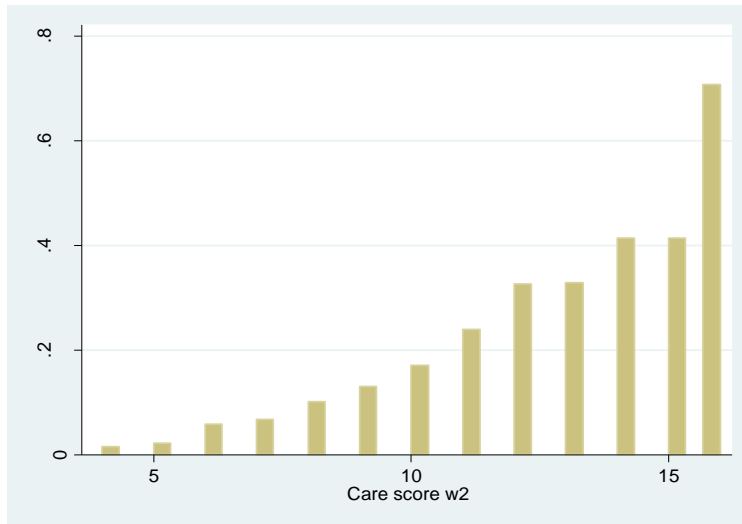


Figure 5-4: Distribution of perceived parental care scores at wave 2.

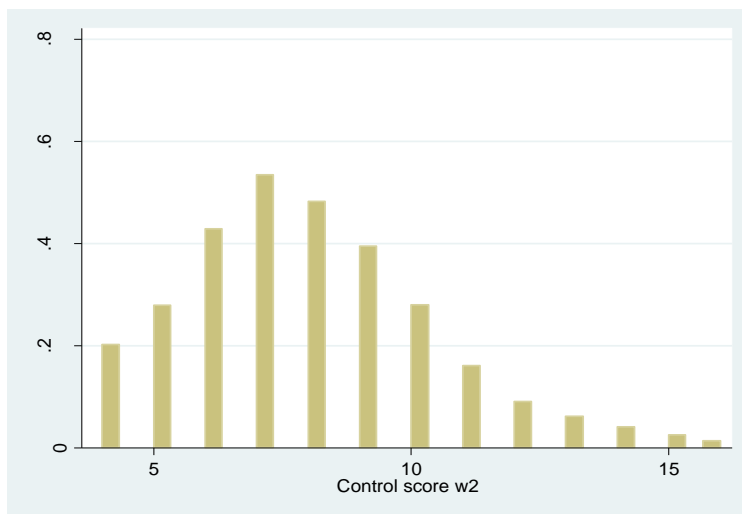


Figure 5-5: Distribution of perceived parental control scores at wave 2.

Table 5-2: Parenting styles derived from categorical perceived parental care and parental at wave 2.

	<i>(Medium-) High</i> perceived parental care	<i>Low</i> perceived parental care
<i>Low</i> perceived parental control	<i>Permissive</i> parenting High care; Low control	<i>Neglectful</i> parenting Low care; Low control
<i>(Medium - ) High</i> perceived parental control	<i>Authoritative</i> parenting High care; High control	<i>Authoritarian</i> parenting Low care; High control

#### 5.1.4. Cultural values

Generational status, religious attendance, and English language use with family were used as measures of cultural values, and may give an indication of acculturation. Details of these variables are provided here.

##### *Generational status*

Questions at baseline and follow-up asked which country participants were born in. Responses to these questions were used to derive a generational status variable indicating whether they were born in the UK, or abroad. Being born in the UK was thought to indicate greater acculturation than being born abroad.

##### *Religious attendance*

Respondents indicated at follow-up whether they attended a place of worship weekly, monthly, a few times a year, or never. Those who attended a place of worship at least monthly were categorised as regular attendees, those who attended less were categorised as seldom/non-attendees. Seldom/non-attendees were thought to be more acculturated than regular attendees.

##### *English language use with family*

Questions at baseline and at follow-up asked how often participants spoke English with: siblings and cousins and with parents, aunts and uncles. Possible responses were: “most of the time or always”; “quite a lot of the time”; “some of the time”; or “not at all”. An English language use with family variable was derived from these responses.

Participants who spoke English “most of the time or always” or “quite a lot of the time” with parents, aunts and uncles, as well as siblings and cousins were categorised as speaking English *Most or quite a lot of the time* with family.

Those who spoke English “most of the time or always” or “quite a lot of the time” either with parents, aunts and uncles, or with siblings and cousins were categorised as speaking *some English* with family, irrespective of how much English they spoke with grandparents.

Those who spoke English “some of the time” or “not at all” with siblings and cousins, or with their parents, aunts and uncles, were categorised as speaking *little or no English* with family. Respondents who spoke more English with their family were thought to represent greater acculturation than among respondents who spoke less English with their families.

### 5.1.5. Structural inequalities

Household material disadvantage, family structure, household overcrowding and experiences of racism were used as measures of structural inequalities. Further details of these variables are provided here.

#### *Household material disadvantage:*

The DASH study questionnaire asked respondents whether they had access to each of 17 household material resources. These included: Car or van; CD player or Hi Fi system; Video or DVD player; Garage; Bedrooms; Television; Telephone; Home computer; Toilet; Holiday abroad each year; Deep freeze or fridge freezer Dishwasher; Garden; Washing machine; Microwave oven; Satellite, cable, digital TV; and, Tumble dryer. As the data were skewed towards most respondents having access to most of these items, those with access to at least 15 items were categorised as least household material disadvantage; those with access to 13-14 items were categorised as medium household material disadvantage; those who had access to less than 13 of these items were categorised as being at most household material disadvantage.

#### *Family structure:*

The DASH study questionnaire asked participants who lived in their household with them: those who lived with both biological parents were categorised as having a *two-parent* family; those who lived with one biological parent plus their biological parent's partner were categorised as living in a *reconstituted/cohabiting* family; those who lived with one biological parent but not with a partner of their biological parent were categorised as living in a *single-parent* family, while those who lived with neither biological parent were categorised as living in an '*other*' family structure.

#### *Household overcrowding:*

The DASH study questionnaire asked participants how many people lived with them and how many bedrooms there were in their house. An index of household overcrowding was calculated by dividing the number of people in the household (adjusted for parents and their partners assumed to share a bedroom) by the number of bedrooms. Households with at least 2 people/ per bedroom were categorised as overcrowded according to the World Health Organisation definition and UK housing law (Shelter, 2015).

#### *Experiences of racism:*

Participants were asked: "Has anyone made you feel bad or hassled you because of your race, skin colour or where you were born?" Separate tick boxes were provided for

events *at school, at home, and in the street or in public*. Responses were combined into one variable identifying whether they had ever experienced racism.

#### 5.1.6. Descriptive statistics

Descriptive statistics are presented in Table 5-3 to Table 5-7. For each variable the percentages for each valid response category is calculated as the percentage of all valid responses, the percentages of missing values are calculated as the percentage of all responses. Percentages may not add up to one due to rounding.

##### *Sample at baseline and follow-up:*

Table 5-3 shows that the breakdown of the DASH study sample by ethnicity and gender was roughly the same at baseline and follow-up. The total sample size at baseline was 6,639. At follow-up 4,785 adolescents took part again. This represents roughly 28% attrition. The main reasons for attrition include two schools not taking part at follow-up, and adolescents having left the school between time points. The breakdown of the sample by ethnicity and gender was roughly the same at baseline and follow-up.

##### *Adolescent health behaviours:*

Table 5-4 shows distributions of adolescent health behaviours by ethnicity. White UK adolescents were relatively the most likely to report substance use behaviours with almost a quarter (23%) reporting tobacco use, around two thirds (67%) reporting alcohol use, and over a third (36%) reporting illicit drug use. There were varying levels of substance use behaviours amongst ethnic minority groups.

Tobacco use was higher amongst Other ethnicity adolescent (14%), lower amongst Black Caribbean and Pakistani/ Bangladeshi adolescent (both 10%), and lowest among Black African (4%) and Indian adolescents (5%). Alcohol use was highest amongst Black Caribbean (46%) and Other ethnicity (40%) adolescents, lower amongst Black African (24%) and Indian (21%) adolescents, and very low amongst Pakistani/ Bangladeshi (1%) adolescents. Illicit drug use was highest amongst Black Caribbean (26%) and Other ethnicity (25%) adolescents, and lower amongst Black African (15%), Pakistani/ Bangladeshi (15%), and Indian adolescents (15%).

Around a quarter of Black Caribbean (27%), Black African (25%), and Other ethnicity adolescents (23%) were either overweight or obese. Lower levels were seen amongst Indian (19%) and Pakistani/ Bangladeshi adolescents (19%), while the lowest levels were amongst White UK adolescents (17%). White UK and Indian adolescents were relatively the most likely to eat at least five portions of fruit and vegetables per day (38% and 37%, respectively), and the least likely to eat fewer than two portions per day (31% and 100

27%, respectively). In contrast, Black Caribbean, Black African, and Pakistani/ Bangladeshi adolescents were relatively less likely to eat at least five portions per day (27%, 24%, and 25%, respectively), and more likely to eat fewer than two portions per day (47%, 48% and 43%, respectively). Levels of physical activity were fairly consistent across ethnic groups. Indian adolescents (74%) were relatively the most likely to report fewer than seven hours of activity per week, compared to Pakistani/ Bangladeshi and Other ethnicity adolescents who were the least likely (both 67%).

Clusters of adolescent health behaviours derived from individual health behaviours varied by ethnicity. White UK adolescents were relatively the most likely to be in the *High substance use: physically inactive* cluster, whereas ethnic minority adolescents were relatively more likely to be in the *Low substance use: unhealthy diet*, and the *Low substance use: healthy diet* clusters.

Levels of missing data for substance use behaviours, fruit and vegetable consumption and physical activity were low and consistent across ethnic groups. There were higher levels of missingness for body size among White UK (18%) and Other ethnicity adolescents (75%).

#### *Perceived parenting styles:*

Table 5-5. shows distributions of perceived parenting variables by ethnicity. Black Caribbean and Black African adolescents were relatively more likely to report *Low care* (both 54%), and less likely to report *High care* (19% and 20%, respectively), whereas Indian and Pakistani/ Bangladeshi adolescents were relatively more likely to report *High care* (both 29%), compared to White UK adolescents (*High care*: 25%, *Low care*: 44%). White UK adolescents were relatively more likely than ethnic minority adolescents to report *Low control* (46%) and less likely to report *High control* (20%). In comparison, Black African adolescents were relatively the most likely to report *High control* (43%), and the least likely to report *Low control* (25%). Compared to ethnic minority adolescents, White UK adolescents were relatively more likely to report *Permissive* (*High care, Low control*; 50%) or *Neglectful* (*Low care, Low control*; 30%) parenting, and less likely to report *Authoritarian* (*Low care, High control*; 14%) or *Authoritative* (*High care, High control*; 6%) parenting. In contrast, Indian adolescents reported relatively less, *Low control, Permissive* and *Neglectful* parenting (44% and 17%, respectively), and more, *High control, Authoritative* and *Authoritarian* parenting (14% and 25%, respectively). Levels of missingness were consistently low across ethnic groups.

### *Cultural values:*

Table 5-6. shows distributions of cultural values by ethnicity. Compared to ethnic minorities, White UK adolescents were relatively less likely to have been born abroad (2%), regularly attend a place of worship (10%), and to not speak English with their family (2%). In comparison, Black African adolescents were more likely to have been born abroad (41%), frequently attend a place of worship (80%), and not speak English with their family (31%). Levels of missingness were consistently low across ethnic groups.

### *Structural inequalities:*

Table 5-6. shows distributions of structural inequalities by ethnicity. White UK and Indian adolescents were relatively the most likely to live in the least disadvantaged (White UK 53% and Indian 50%) and least likely to live in the most disadvantaged households (White UK 14% and Indian 11%). In comparison, 27% of Black African adolescents lived in the most disadvantaged, and 23% of Black African adolescents lived in the least advantaged households. Ethnic differences in family structure were multifaceted. Black Caribbean adolescents were the most likely to live *Single-parent* or *Other* families (43% and 10% respectively), whereas Indian and Pakistani/ Bangladeshi adolescents were the least likely to live in *Single-parent* (8% and 13%, respectively) or *Reconstituted* families (1% and 2%, respectively). Household overcrowding was higher among Black African and Pakistani/ Bangladeshi adolescents (9% and 10%, respectively) compared to other ethnic groups (2-3%). Ethnic minority adolescents were more likely to have experienced racism (e.g. Black African adolescents, compared to White UK adolescents (19%). Distributions of structural inequalities varied by cultural values as shown in Table 5-7. Adolescents who were born abroad were more likely to live in the most disadvantaged households (30%) and less likely to live in the least disadvantaged households (27%) than adolescent who were born in the UK (17% and 41%, respectively). Compared adolescents who mostly spoke English with their family, those who spoke less English were more likely to live in the most disadvantaged households (24% compared to 19%) and less likely to live in the least disadvantaged households (32% compared to 40%). Family structures also varied by measures of cultural values. For example, adolescents who spoke more English with their family were more likely to live in *Single-parent* families than *Two-parent* families (29% compared to 22%), while adolescents who attended a place of worship less frequently were less likely to live in *Two-parent* families than less religious adolescents (53% compared to 59%). Levels of missingness for measures of structural inequalities were consistently low across ethnic groups, and cultural values.

Table 5-3. DASH study sample at baseline and follow-up by gender and ethnicity:

Ethnicity	Baseline			Follow-up		
	Male	Female	Total	Male	Female	Total
<b>White UK</b>	652 (18%)	585 (19%)	1,237 (19%)	492 (19%)	381 (18%)	873 (18%)
<b>Black Caribbean</b>	524 (15%)	486 (16%)	1,010 (15%)	391 (15%)	389 (18%)	780 (16%)
<b>Black African</b>	540 (15%)	617 (20%)	1,157 (17%)	417 (16%)	475 (22%)	892 (19%)
<b>Indian</b>	287 (8%)	229 (7%)	516 (8%)	237 (9%)	182 (8%)	419 (9%)
<b>Pakistani/Bangladeshi</b>	398 (11%)	219 (7%)	617 (9%)	306 (12%)	140 (6%)	446 (9%)
<b>Other ethnicities</b>	1,144 (32%)	958 (31%)	2,102 (32%)	773 (30%)	602 (28%)	1,375 (29%)
<b>Total</b>	<b>3,545 (100%)</b>	<b>3,094 (100%)</b>	<b>6,639 (100%)</b>	<b>2,616 (100%)</b>	<b>2,169 (100%)</b>	<b>4,785 (100%)</b>



Table 5-4. Descriptive statistics, adolescent health behaviours by ethnicity:

		White UK	Black Caribbean	Black African	Indian	Pakistani/ Bangladeshi	Other
Current tobacco use	No	668 (77 %)	688 (90 %)	839 (96 %)	396 (95 %)	400 (90 %)	1169 (86 %)
	Yes	199 (23 %)	79 (10 %)	38 (4 %)	22 (5 %)	42 (10 %)	183 (14 %)
	Missing	6 (1 %)	13 (2 %)	15 (2 %)	1 (0 %)	4 (1 %)	23 (2 %)
Current alcohol use	No	284 (33 %)	413 (54 %)	665 (76 %)	330 (79 %)	433 (99 %)	810 (60 %)
	Yes	584 (67 %)	353 (46 %)	210 (24 %)	87 (21 %)	6 (1 %)	542 (40 %)
	Missing	5 (1 %)	14 (2 %)	17 (2 %)	2 (0 %)	7 (2 %)	23 (2 %)
Lifetime illicit drug use	No	553 (64 %)	565 (74 %)	748 (85 %)	374 (89 %)	375 (85 %)	1013 (75 %)
	Yes	312 (36 %)	202 (26 %)	129 (15 %)	44 (11 %)	67 (15 %)	336 (25 %)
	Missing	8 (1 %)	13 (2 %)	15 (2 %)	1 (0 %)	4 (1 %)	26 (2 %)
Fruit and vegetable consumption	<2 portions/day	267 (31 %)	366 (47 %)	425 (48 %)	113 (27 %)	192 (43 %)	457 (33 %)
	2-4 portions/day	271 (31 %)	198 (26 %)	250 (28 %)	150 (36 %)	143 (32 %)	433 (32 %)
	5+ portions/day	330 (38 %)	207 (27 %)	213 (24 %)	155 (37 %)	109 (25 %)	480 (35 %)
	Missing	5 (1 %)	9 (1 %)	4 (0 %)	1 (0 %)	2 (0 %)	5 (0 %)
Physical activity	≥14 hours/week	59 (7 %)	66 (9 %)	64 (7 %)	27 (7 %)	32 (7 %)	108 (8 %)
	7-14 hours/week	196 (23 %)	171 (23 %)	197 (23 %)	78 (19 %)	111 (26 %)	333 (25 %)
	<7 hours/week	605 (70 %)	515 (68 %)	605 (70 %)	305 (74 %)	288 (67 %)	895 (67 %)
	Missing	13 (1 %)	28 (4 %)	26 (3 %)	9 (2 %)	15 (3 %)	39 (3 %)
Body size	Not overweight	599 (83 %)	519 (73 %)	626 (75 %)	323 (81 %)	337 (80 %)	265 (77 %)
	Overweight	86 (12 %)	124 (17 %)	149 (18 %)	60 (15 %)	61 (14 %)	57 (17 %)
	Obese	33 (5 %)	72 (10 %)	62 (7 %)	18 (4 %)	23 (5 %)	22 (6 %)
	Missing	155 (18 %)	65 (8 %)	55 (6 %)	18 (4 %)	25 (6 %)	1031 (75 %)
Clusters of health behaviours	High substance use, physically active	55 (6 %)	37 (5 %)	20 (2 %)	12 (3 %)	23 (5 %)	85 (6 %)
	High substance use, physically inactive	283 (32 %)	152 (20 %)	75 (8 %)	30 (7 %)	21 (5 %)	250 (18 %)
	Low substance use, unhealthy diet	185 (21 %)	267 (34 %)	391 (44 %)	111 (27 %)	180 (40 %)	337 (25 %)
	Low substance use, healthy diet	349 (40 %)	321 (41 %)	405 (45 %)	265 (63 %)	222 (50 %)	698 (51 %)
	Missing	1 (0 %)	3 (0 %)	1 (0 %)	1 (0 %)	0 (0 %)	5 (0 %)

Table 5-5. Descriptive statistics, parenting styles by ethnicity:

		White UK	Black Caribbean	Black African	Indian	Pakistani/ Bangladeshi	Other
Perceived parental care	High	216 (25 %)	148 (19 %)	174 (20 %)	121 (29 %)	126 (29 %)	327 (24 %)
	Medium	266 (31 %)	204 (27 %)	227 (26 %)	121 (29 %)	116 (26 %)	368 (27 %)
	Low	383 (44 %)	412 (54 %)	468 (54 %)	175 (42 %)	198 (45 %)	665 (49 %)
	Missing	8 (1 %)	16 (2 %)	23 (3 %)	2 (0 %)	6 (1 %)	15 (1 %)
Perceived parental control	Low	397 (46 %)	229 (30 %)	213 (25 %)	107 (26 %)	100 (23 %)	385 (28 %)
	Medium	292 (34 %)	265 (35 %)	285 (33 %)	144 (35 %)	157 (36 %)	456 (34 %)
	High	175 (20 %)	270 (35 %)	371 (43 %)	166 (40 %)	184 (42 %)	517 (38 %)
	Missing	9 (1 %)	16 (2 %)	23 (3 %)	2 (0 %)	5 (1 %)	17 (1 %)
Perceived parenting styles	Permissive	431 (50 %)	281 (37 %)	296 (34 %)	182 (44 %)	186 (42 %)	535 (40 %)
	Neglectful	256 (30 %)	211 (28 %)	199 (23 %)	69 (17 %)	69 (16 %)	303 (22 %)
	Authoritative	51 (6 %)	71 (9 %)	100 (12 %)	59 (14 %)	56 (13 %)	157 (12 %)
	Authoritarian	124 (14 %)	199 (26 %)	267 (31 %)	106 (25 %)	128 (29 %)	359 (27 %)
	Missing	11 (1 %)	18 (2 %)	30 (3 %)	3 (1 %)	7 (2 %)	21 (2 %)

Table 5-6. Descriptive statistics, cultural values and structural inequalities by ethnicity:

		White UK		Black Caribbean		Black African		Indian		Pakistani/ Bangladeshi		Other	
Generational status	Born UK	856	(98 %)	605	(78 %)	527	(59 %)	335	(80 %)	367	(82 %)	912	(66 %)
	Born Abroad	17	(2 %)	174	(22 %)	365	(41 %)	84	(20 %)	79	(18 %)	462	(34 %)
	Missing	0	(0 %)	1	(0 %)	0	(0 %)	0	(0 %)	0	(0 %)	1	(0 %)
Religious attendance	Often-regular	89	(10 %)	377	(50 %)	695	(80 %)	250	(60 %)	307	(70 %)	497	(37 %)
	Seldom-never	768	(90 %)	383	(50 %)	176	(20 %)	165	(40 %)	130	(30 %)	845	(63 %)
	Missing	16	(2 %)	20	(3 %)	21	(2 %)	4	(1 %)	9	(2 %)	33	(2 %)
English Language use with family	Mostly-all	843	(98 %)	678	(90 %)	587	(69 %)	227	(56 %)	198	(46 %)	791	(60 %)
	Some-little/no	15	(2 %)	72	(10 %)	260	(31 %)	180	(44 %)	228	(54 %)	533	(40 %)
	Missing	15	(2 %)	30	(4 %)	45	(5 %)	12	(3 %)	20	(4 %)	51	(4 %)
Household material disadvantage	Most advantaged	456	(53 %)	237	(32 %)	199	(23 %)	208	(50 %)	151	(35 %)	486	(37 %)
	Medium	282	(33 %)	324	(44 %)	422	(50 %)	159	(38 %)	208	(48 %)	545	(41 %)
	Most disadvantaged	124	(14 %)	169	(23 %)	231	(27 %)	46	(11 %)	76	(17 %)	299	(22 %)
	Missing	11	(1 %)	50	(6 %)	40	(4 %)	6	(1 %)	11	(2 %)	45	(3 %)
Family structure	Two parents	534	(61 %)	208	(27 %)	438	(50 %)	365	(87 %)	366	(82 %)	732	(54 %)
	Reconstituted	133	(15 %)	154	(20 %)	79	(9 %)	6	(1 %)	7	(2 %)	163	(12 %)
	Single-parent	171	(20 %)	332	(43 %)	286	(33 %)	33	(8 %)	59	(13 %)	398	(29 %)
	Other	31	(4 %)	74	(10 %)	76	(9 %)	14	(3 %)	13	(3 %)	75	(5 %)
	Missing	4	(0 %)	12	(2 %)	13	(1 %)	1	(0 %)	1	(0 %)	7	(1 %)
Household overcrowding	No	842	(98 %)	741	(97 %)	791	(91 %)	402	(97 %)	400	(90 %)	1303	(97 %)
	Yes	19	(2 %)	22	(3 %)	79	(9 %)	11	(3 %)	43	(10 %)	47	(3 %)
	Missing	12	(1 %)	17	(2 %)	22	(2 %)	6	(1 %)	3	(1 %)	25	(2 %)
Experiences of racism	No	706	(81 %)	545	(71 %)	579	(66 %)	287	(69 %)	317	(72 %)	943	(70 %)
	Yes	162	(19 %)	219	(29 %)	296	(34 %)	130	(31 %)	124	(28 %)	407	(30 %)
	Missing	5	(1 %)	16	(2 %)	17	(2 %)	2	(0 %)	5	(1 %)	25	(2 %)

Table 5-7. Descriptive statistics, structural inequalities by cultural values:

		Generational status				Religious attendance				English language use with family			
		Born UK		Born Abroad		Often-regular		Seldom-never		Mostly-all		Some-little/no	
<b>Household material disadvantage</b>	<b>Most advantaged</b>	1436	(41 %)	301	(27 %)	738	(34 %)	976	(41 %)	1302	(40 %)	397	(32 %)
	<b>Medium</b>	1461	(42 %)	478	(43 %)	953	(44 %)	941	(39 %)	1333	(41 %)	537	(43 %)
	<b>Most disadvantaged</b>	608	(17 %)	336	(30 %)	451	(21 %)	480	(20 %)	606	(19 %)	302	(24 %)
	<b>Missing</b>	97	(3 %)	66	(6 %)	73	(3 %)	70	(3 %)	83	(2 %)	52	(4 %)
<b>Family structure</b>	<b>Two parents</b>	2046	(57 %)	595	(51 %)	1308	(59 %)	1299	(53 %)	1727	(52 %)	855	(66 %)
	<b>Reconstituted</b>	398	(11 %)	144	(12 %)	230	(10 %)	303	(12 %)	448	(14 %)	78	(6 %)
	<b>Single-parent</b>	969	(27 %)	310	(27 %)	522	(24 %)	737	(30 %)	947	(29 %)	279	(22 %)
	<b>Other</b>	166	(5 %)	117	(10 %)	151	(7 %)	125	(5 %)	196	(6 %)	75	(6 %)
	<b>Missing</b>	23	(1 %)	15	(1 %)	4	(0 %)	3	(0 %)	6	(0 %)	1	(0 %)
<b>Household overcrowding</b>	<b>No</b>	3412	(96 %)	1066	(93 %)	2059	(94 %)	2356	(96 %)	3181	(96 %)	1172	(92 %)
	<b>Yes</b>	137	(4 %)	84	(7 %)	131	(6 %)	89	(4 %)	118	(4 %)	98	(8 %)
	<b>Missing</b>	53	(1 %)	31	(3 %)	25	(1 %)	22	(1 %)	25	(1 %)	18	(1 %)
<b>Experiences of racism</b>	<b>No</b>	2582	(73 %)	794	(68 %)	1534	(69 %)	1813	(74 %)	2384	(72 %)	906	(70 %)
	<b>Yes</b>	972	(27 %)	366	(32 %)	675	(31 %)	650	(26 %)	932	(28 %)	380	(30 %)
	<b>Missing</b>	48	(1 %)	21	(2 %)	6	(0 %)	4	(0 %)	8	(0 %)	2	(0 %)

## 5.2. Statistical Methods

Here I describe the methods used in my Thesis. Unless stated otherwise these were carried out using Stata 14 (StataCorp., 2015).

### 5.2.1. Regression analysis:

Regression analysis is a group of statistical techniques used to estimate relationships between variables. More specifically, they estimate how the value of a dependent (or outcome) variable changes when in an independent (or exposure) variable changes.

In simple linear regression the relationship between the exposure variable ( $X$ ) and a continuous outcome variable ( $Y$ ) is modelled as a straight line where  $a$  is the intercept and the coefficient  $b$  is the slope of the line:

$$Y = a + bX.$$

Coefficient  $b$  estimates how much outcome  $Y$  changes as a result of a unit change in exposure variable  $X$ . Implicit in regression analysis is the null hypothesis that there is no change in outcome  $Y$  associated with a unit change in exposure  $X$ . The probability value, or  $p$  value, is widely used to test null hypotheses with a threshold traditionally set at 0.05. (Nuzzo, 2014).

For example, linear regression analysis could be used to estimate the relationship between standing height (centimetres) and body weight (kilograms). In this case coefficient  $b$  is the estimated change in body weight in kilograms associated with a change in standing height of one centimetre.

Logistic regression analysis may be used where the outcome variable is categorical (binomial, or multinomial). In a simple logistic regression, a logistic function is used to model the probability of a categorical outcome on the exposure variable. In a logistic regression formula the coefficient  $b$  is the estimated change in the log odds of the outcome  $Y$  that results from a unit change in the exposure  $X$ , and these are exponentially transformed to produce odds ratios (OR). The OR is used to compare the relative odds of the outcome given an exposure of interest (Szumilas, 2010). For example, logistic regression analysis could be used to estimate the relationship between ever having used tobacco and age (years). In this case the OR is the estimated change in the likelihood of having used tobacco associated with each year of age. Logistic regression analysis can also be used to estimate the relationships between an exposure variable and a multinomial outcome variable and the results are interpreted as a series of binary logistic regressions. For example, multinomial regression analysis could be

used to estimate the relationships between caloric intake (continuous) and body size where the outcome variable has three categories (*Not Overweight*, *Overweight*, and *Obese*). In this case, one OR estimates the change in the likelihood of being *Overweight* rather than the *Not Overweight* associated with a unit increase in caloric intake, and another OR estimates the change in the likelihood of being *Obese* category rather than *Not Overweight* associated with a unit increase in caloric intake.

Each of my outcome variables is categorical so logistic regression (both binomial and multinomial) is used throughout my Thesis. This method is also used as the basis for analysis of moderation and mediation that are described in sections 5.2.3 and 5.2.4, respectively.

### **5.2.2. Latent class analysis:**

To investigate clustering of adolescent health behaviours Latent Class Analysis was carried out using Mplus version 7.4 (Muthén and Muthén, 2019). The aim of LCA is to identify distinct groups of respondents who have very similar responses to survey items, and so is well-suited to examining clustering of adolescent health behaviours.

I compared the fit of latent class models with sequentially increasing numbers of classes using sample size adjusted Akaike Information Criterion (AIC), and Bayesian Information Criterion (BIC). Latent class models were also assessed for entropy, separation, and homogeneity. Entropy is a measure of the certainty of class assignment; values range from 0 to 1, with a value around 0.80 indicating adequate level of certainty (Tein et al., 2013). Separation refers to members of classes being distinct from members of other classes and homogeneity refers to individuals within a class being similar to one another. I also took into account the principle of parsimony (preference for fewer latent classes). The chosen model was assessed, using the Wald chi<sup>2</sup> test, for measurement invariance by gender, or in other words, whether the latent class structure was the same for males and females. Since the Wald test is sensitive to differences, latent class structures were also plotted as bar charts by gender and assessed for qualitative differences in latent class structure, homogeneity, and separation.

Most likely latent class (cluster) membership is then used as a categorical variable in my analyses to investigate ethnic variations in the clustering of adolescent health behaviours.

### 5.2.3. Moderation analysis:

Moderation occurs when the strength or direction of the effect of an exposure variable on an outcome variable varies as a function of the moderator variable. Moderation analysis aims to investigate how the effect of an exposure changes depending on individual characteristics or contexts (Marsh et al., 2013). A common analytical approach to investigate moderation is to include interactions between the exposure and moderator variables in a regression of the outcome on the exposure. Joint statistical significance across interaction terms should be tested using Wald chi<sup>2</sup> tests (Magee, 1990); interaction effects can then be considered alongside the main effects of the exposure. Another approach to investigating moderation is to stratify the analysis on the moderator variable. The interaction approach was chosen here because it is more parsimonious, it only allows the effect of the exposure to vary with the moderator, whereas stratification allows all model parameter estimates to vary with the moderator. An interaction approach also allows multiple moderators to be included in the same model, whereas this quickly becomes infeasible with stratification on multiple variables. In my thesis I conceptualise cultural values as characteristics of ethnic groups that may moderate ethnic variations in adolescent health behaviours or perceived parenting styles. Particularly, indications from these variables of greater acculturation is expected to be associated with weaker ethnic variations in health behaviours (i.e. health behaviours more similar to the White majority adolescents). I use moderation analysis to investigate how ethnic variations in adolescent health behaviours (Chapter 6) and perceived parenting styles (Chapter 7) change depending on the cultural values held by ethnic minority adolescents. I also consider moderation of ethnic variations in adolescent health behaviours by perceived parenting styles (Chapter 9).

### 5.2.4. Mediation analysis:

A mediation model attempts to explain a mechanism whereby an exposure leads to an outcome via a mediator. Following a seminal paper by Baron and Kenny (1986), the following conditions tend to be seen as necessary requirements for mediation:

- 1) In a regression of the outcome variable on the exposure variable, the exposure is a significant predictor of the outcome
- 2) In a regression of the mediator variable on the exposure variable, the exposure is a significant predictor of the mediator
- 3) In a regression of the outcome variable on both the exposure and mediator variables, the mediator is a significant predictor of the outcome, and the effect of the exposure on the outcome is changed

While reduction of the exposure's effect on the outcome upon adjustment for the mediator may indicate a traditional mediation model, an increase of the exposure's effect on the outcome upon adjustment for the mediator indicates 'inconsistent mediation' or suppression of larger effects (MacKinnon et al., 2000). I consider structural inequalities as possible mediators of ethnic variations in adolescent health behaviours or perceived parenting styles. I use mediation analysis to investigate whether structural inequalities mediate any ethnic variations in adolescent health behaviours (Chapter 6) and perceived parenting styles (Chapter 7). I estimated direct effects of ethnicity using this Baron and Kenny approach of regressing the outcome variable on both the exposure and the mediator (Goetgeluk et al., 2008) to investigate whether structural inequalities mediated ethnic variations in adolescent health behaviours (Chapter 6), and ethnic variations in perceived parenting styles (Chapter 7). The percentage difference between unadjusted and controlled direct effects is considered to be the effect of the mediator, and is calculated using Equation 1.

Equation 1. Calculating mediated effects (%) from direct effect estimates:

$$\text{Mediated (\%)} = ((\text{Unadjusted OR} - \text{Adjusted OR}) / (\text{Unadjusted OR} - 1)) * 100$$

However, the Baron and Kenny approach to mediation analysis assumes no interaction between the exposure and the mediator in their effect on the outcome, and is susceptible to bias if there are confounders of the mediator-outcome relationship that are influenced by the exposure (exposure-induced mediator-outcome confounding). For the central aim of my thesis I wanted to investigate whether perceived parenting styles mediated and/or moderated ethnic variations in adolescent health behaviours (Chapter 9), and structural inequalities were assumed to be caused or influenced by ethnicity and to be potential confounders of relationships between perceived parenting and adolescent health behaviours, thus they may represent exposure-induced mediator-outcome confounders. In chapter 9, therefore, I estimated controlled direct effects using marginal structural models with inverse probability of treatment weights (VanderWeele, 2009). The controlled direct effect can be interpreted as the effect of the exposure on the outcome if you were to intervene on the mediator and set it to some specified value. Controlled direct effects can be estimated without bias even in the presence of exposure-induced mediator-outcome confounding and allow for investigation of moderation because the controlled direct effect of the exposure (ethnicity) can be different for each value of the mediator (e.g. for each parenting style).



## 6. Ethnic variations in adolescent health behaviours

### 6.1. Introduction

The analysis presented in this chapter addresses thesis objective A (Figure 6-1), to investigate ethnic variations in adolescent health behaviours and clusters of health behaviours, and whether variations are moderated by cultural values, or mediated by structural inequalities.

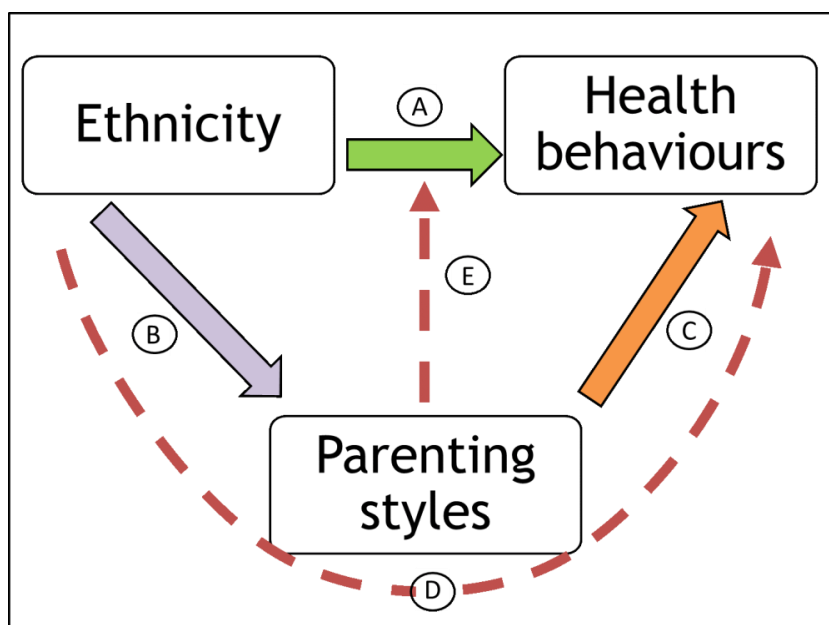


Figure 6-1: Thesis objective A: to investigate ethnic variations in health behaviours among DASH study adolescents.

I reviewed literature that has investigated, and sought to explain, ethnic variations in adolescent health behaviours (4.2.1). With some exceptions ethnic minority adolescents in the US and in the UK were less likely to engage in substance use behaviours, ate fewer fruit and vegetables, engaged in less physical activity, and were more likely to be overweight or obese, than White counterparts. The literature also suggests that cultural values may moderate, and structural inequalities may mediate, ethnic variations in adolescent health behaviours. Based on my literature review findings I formulated four research questions (Box 6-1).

Box 6-1. Objective A - Research questions:

1. Was there clustering of adolescent health behaviours?
2. Were there ethnic variations in adolescent health behaviours or the clustering of adolescent health behaviours?
3. Were ethnic variations in health behaviours or the clustering of health behaviours moderated by cultural values?
4. Were ethnic variations in health behaviours or the clustering of health behaviours mediated by structural inequalities?

## 6.2. Methods

Adolescent health behaviour outcome variables are tobacco use, alcohol use, illicit drug use, fruit and vegetables consumption, physical activity, body size, and clusters of health behaviours. Covariates include age, gender cultural values (generational status, English language use with family, and religious attendance) and structural inequalities (household material disadvantage, family structure, household overcrowding, and experiences of racism). Detailed information on these variables can be found in Chapter 5.

I used latent class analysis to investigate clustering of health behaviours among DASH study adolescents. Latent class analysis is described in more detail in 5.2.1.

Logistic regression was used to investigate ethnic variations in adolescent health behaviours and clusters of health behaviours. Health behaviours were regressed on age, gender, and ethnicity. Wald chi<sup>2</sup> tests were used to test the joint significance ( $p < 0.05$ ) of ethnic variations, and predicted probabilities were plotted as bar charts for their interpretation. Moderation of ethnic variations by cultural variable was investigated by sequentially adding interactions between with ethnicity to the existing models. Each cultural value variable was added as an interaction with ethnicity and tested for joint significance ( $p < 0.05$ ) of its effects using the Wald chi<sup>2</sup> test. Where evidence of moderation was found, predicted probabilities of the outcome by ethnicity and relevant cultural variable were plotted for interpretation of moderated ethnic variations. Next, for each outcome variable was regressed on age, gender, ethnicity, and interactions between ethnicity and cultural variables that were found to have jointly significant effects.

Mediation by structural inequalities was investigated by adding structural inequality variables to these models. These were each tested for joint significance of their effects using chi<sup>2</sup> tests. Ethnic variations are presented unadjusted and adjusted for structural inequalities with estimates of the percentage mediated by structural inequalities. Final

models include all significant moderators and mediators with estimates of the percentage of ethnic variations mediated by the combined structural inequalities calculated using Equation 1, described in 5.2.4.

### 6.3. Results

#### *Was there clustering of health behaviours?*

Latent class models with the number of classes specified between two to seven were examined and compared using model statistics. Models with seven or more classes did not fit the data without errors. Latent class model statistics are shown in Table 6-1. To choose the optimal model these statistics were compared then and plots of item response probabilities were examined for interpretability.

According to estimates of Akaike Information Criterion (AIC), and sample size adjusted Bayesian Information Criterion (BIC) solutions with three and four latent classes appeared to have the best fit of the data. The model with three latent classes has a superior sample size adjusted BIC (35737.592) than the model with four latent classes (35750.013); whereas, the model with four latent classes has a superior AIC (35621.575) than the model with three latent classes. The model with four latent classes also has a marginally better entropy value (0.757), compared to the model with three latent classes (0.738) indicating greater certainty in class membership.

Plots of item response probabilities for the models with three and four latent classes were assessed for interpretability to identify the most useful latent class model. The four class model was chosen (Figure 6-2) because it provides more information about the clustering of adolescent health behaviours: in the model with three classes, a single class included individuals who were unlikely to engage in substance use behaviours; in the solution with four classes, two classes included individuals unlikely to engage in substance use behaviours, distinguished by fruit and vegetable consumption.

In the four class model, individuals in the first and second classes were more likely to engage in substance use behaviours than individuals in the third and fourth classes. Individuals in the smaller (n=232) first class all engaged in at least 7 hours physical activity per week; whereas individuals in the larger (n=811) second class were more likely to engage in less than 7 hours physical activity per week. As such these clusters are characterised as *High substance use: physically active* and *High substance use: physically inactive* clusters, respectively. Individuals in the third (n=1471) and the fourth, and largest (n=2260) latent classes were unlikely to engage in substance use behaviours. Individuals in the third cluster were likely to consume at least five portions of fruit and vegetables per day; whereas those in the fourth cluster were likely to

consume less than five portions of fruit and vegetables per day. As such, these clusters are characterised as *Low substance use: healthy diet* and *Low substance use: unhealthy diet*, respectively.

Subsequently this model was assessed for differences in latent class structures by gender using the Wald test. Since the Wald test is sensitive to differences, latent class structures were also plotted as bar charts by gender and assessed for qualitative differences in latent class structure, homogeneity, and separation.

Table 6-1. Model fit statistics for solutions with 2-6 latent classes:

Number of latent classes	Akaike Information Criterion (AIC)	Sample size adjusted Bayesian Information Criterion (BIC)	Entropy
2	35689.501	35752.074	0.763
3	35642.086	35737.592	0.738
4	35621.575	35750.013	0.757
5	35631.862	35793.234	0.780
6	35641.358	35835.663	0.740

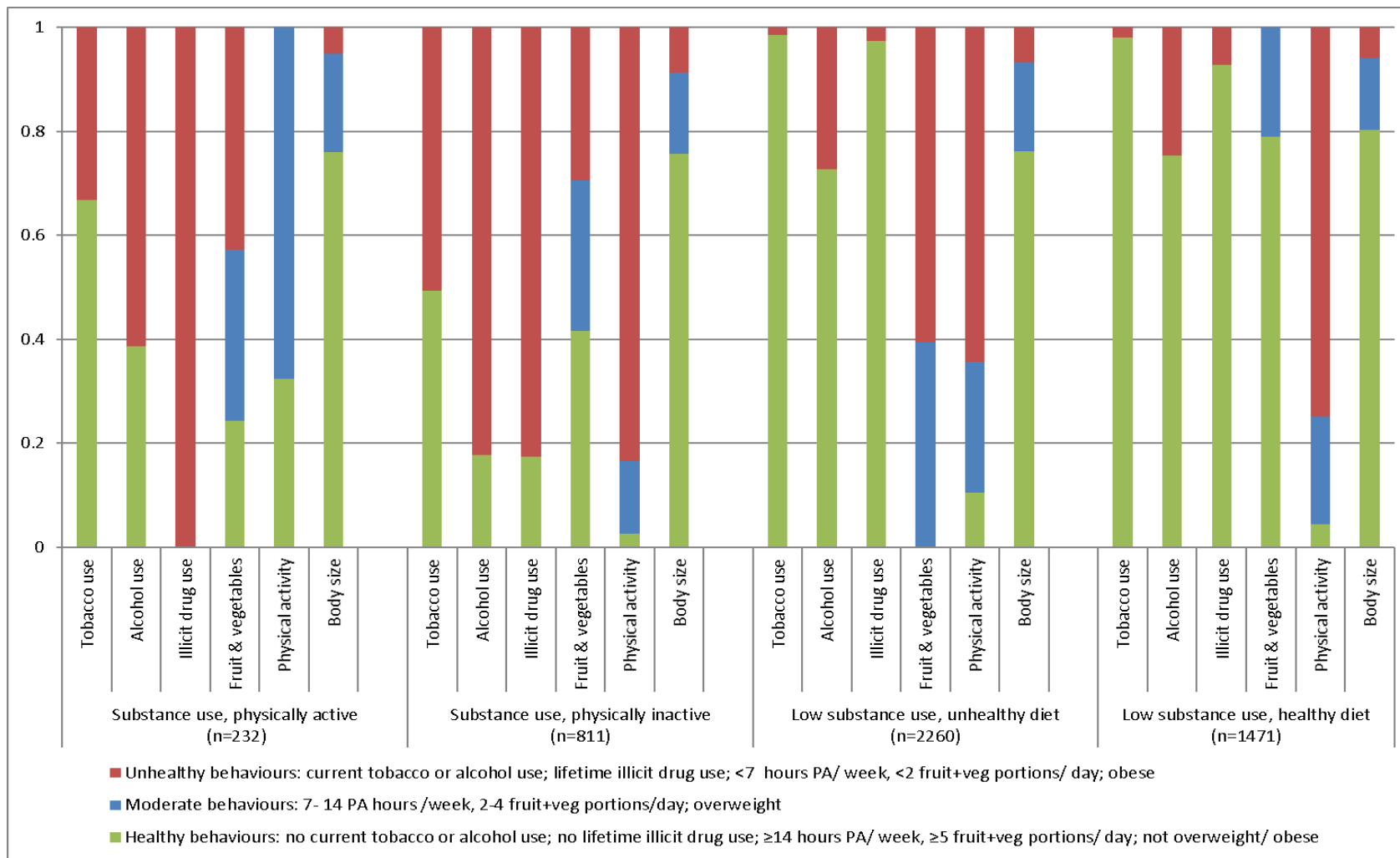


Figure 6-2. Item response probabilities for model consisting of four latent classes of adolescent health behaviours:

*Were there ethnic variations in adolescent health behaviours or the clustering of health behaviours?*

6.3.1.1. Substance use behaviours:

Multinomial logistic regression models to investigate ethnic variations in adolescent substance use behaviours are shown in Table 6-2. Older age and female gender are positively associated with substance use. There were significant ethnic variations in current tobacco use, current alcohol use, and lifetime illicit drug use: adolescents in each ethnic minority group were less likely to report substance use than White UK adolescents. Predicted probabilities were calculated from model estimates and plotted graphically to more clearly illustrate ethnic variations in tobacco use (Figure 6-3), alcohol use (Figure 6-4), and illicit drug use (Figure 6-5).

Table 6-2. Multinomial regression predicting current tobacco, alcohol and lifetime illicit drug use, by ethnicity, age, and gender:

	Current tobacco use (ref. no current use)	Current alcohol use (ref. no current use)	Lifetime illicit drug use (ref. no lifetime use)
<b>Age (years):</b>	<b>1.55 (1.32 - 1.81)*</b>	<b>1.62 (1.44 - 1.82)*</b>	<b>1.57 (1.39 - 1.78)*</b>
<b>Gender (ref. male):</b>			
Female	<b>1.7 (1.39 - 2.08)*</b>	<b>1.36 (1.16 - 1.6)*</b>	<b>1.24 (1.05 - 1.45)*</b>
<b>Ethnicity (ref. White UK):</b>			
Black Caribbean	<b>0.39 (0.29 - 0.53)*</b>	<b>0.48 (0.39 - 0.6)*</b>	<b>0.68 (0.54 - 0.86)*</b>
Black African	<b>0.15 (0.1 - 0.22)*</b>	<b>0.16 (0.12 - 0.2)*</b>	<b>0.32 (0.25 - 0.41)*</b>
Indian	<b>0.19 (0.12 - 0.31)*</b>	<b>0.14 (0.1 - 0.19)*</b>	<b>0.21 (0.15 - 0.3)*</b>
Pakistani/ Bangladeshi	<b>0.37 (0.26 - 0.55)*</b>	<b>0.01 (0 - 0.02)*</b>	<b>0.35 (0.25 - 0.48)*</b>
Other ethnicity	<b>0.56 (0.44 - 0.71)*</b>	<b>0.38 (0.31 - 0.46)*</b>	<b>0.63 (0.52 - 0.77)*</b>
Chi2 test <i>p</i> value	<b>&lt;0.01</b>	<b>&lt;0.01</b>	<b>&lt;0.01</b>
<b>Sample size:</b>	<i>n</i> = 4,723	<i>n</i> = 4,717	<i>n</i> = 4,718

\**p*≤0.05

The predicted probabilities of substance use behaviours are lower among adolescents in each ethnic minority UK group, than among White UK adolescents. Black Caribbean and Other ethnicity adolescents were the most similar to White UK adolescents; Black African, Indian, and Pakistani/ Bangladeshi adolescents had the lowest probabilities of substance use behaviours making them least similar dissimilar to White UK adolescents. Alcohol use was very unlikely among Pakistani/ Bangladeshi adolescents.

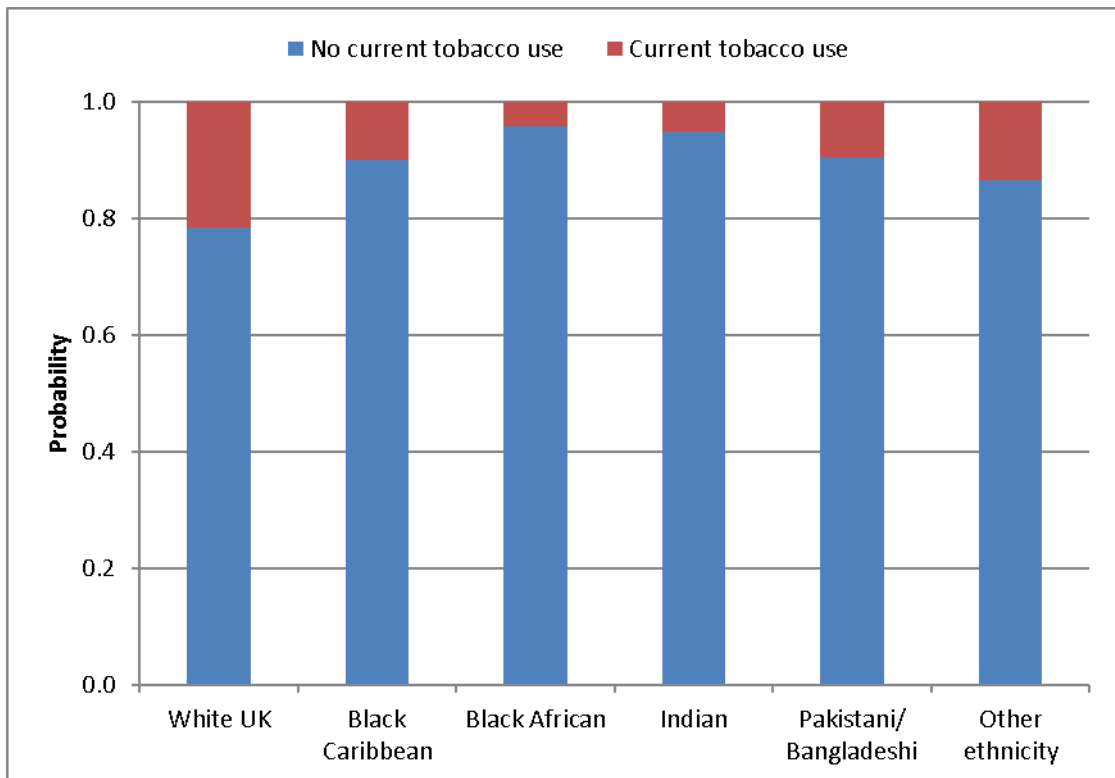


Figure 6-3: Predicted probabilities of current tobacco use by ethnicity, adjusted by age and gender

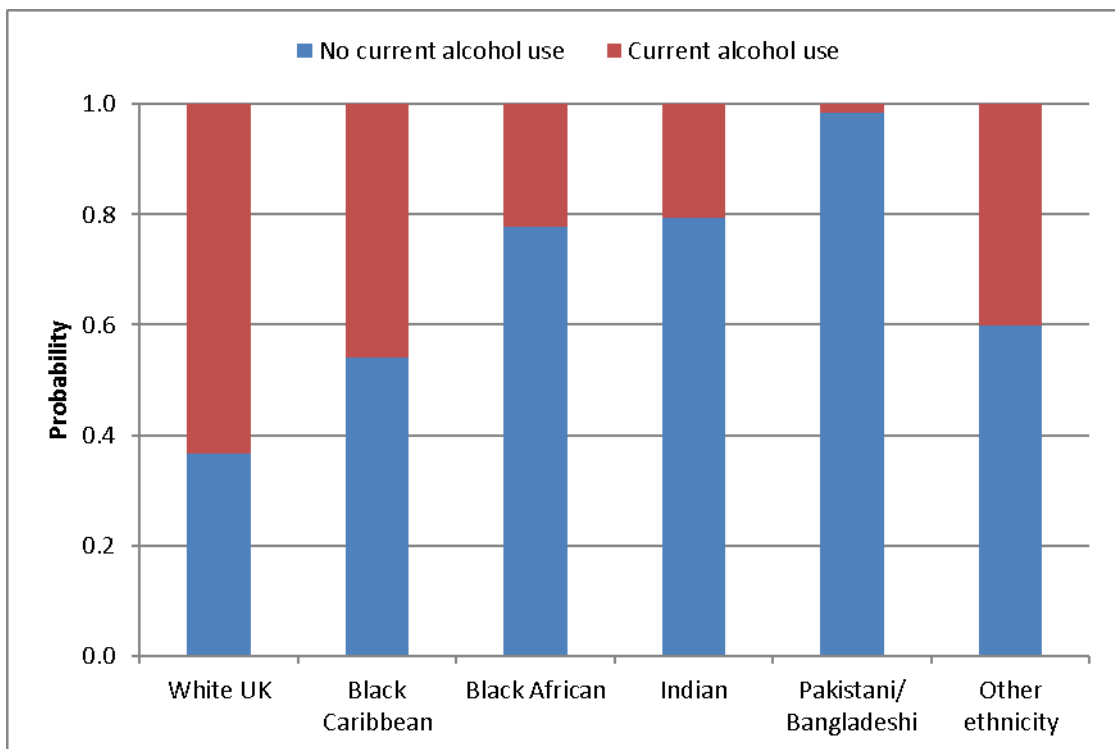


Figure 6-4: Predicted probabilities of current alcohol use by ethnicity, adjusted for age and gender

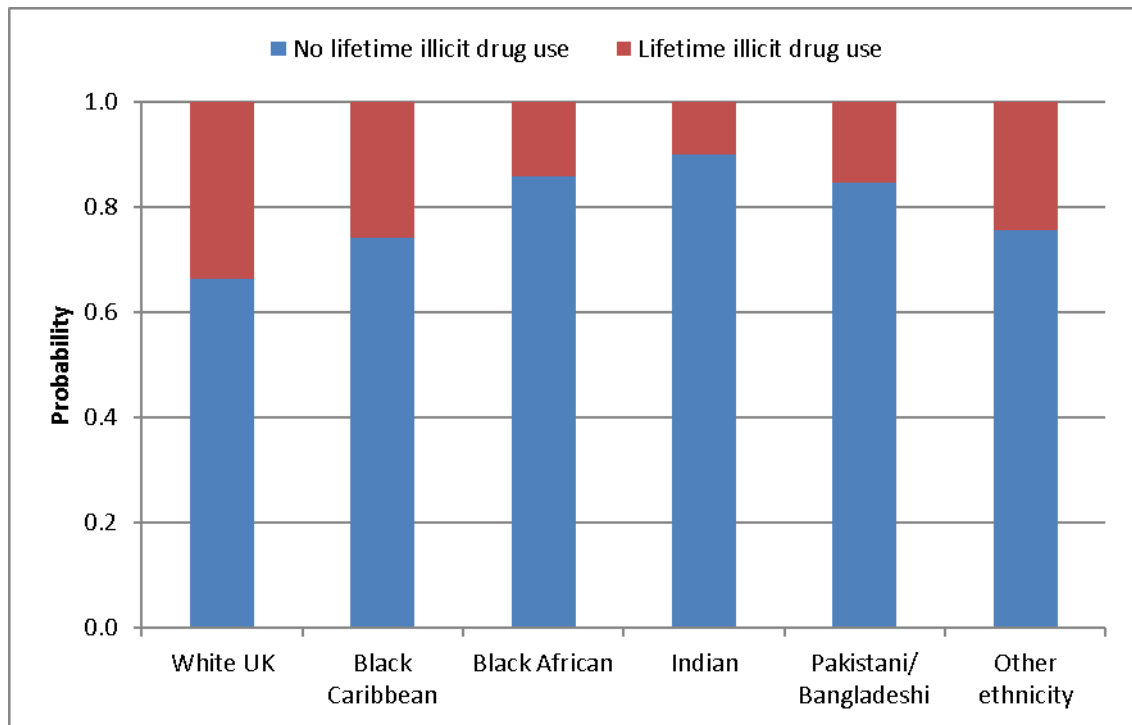


Figure 6-5: Predicted probabilities of lifetime illicit drug use by ethnicity, adjusted for age and gender

#### 6.3.1.2. Body size, and related behaviours:

Multinomial logistic regression models were used to investigate ethnic variations in adolescent body size and related behaviours (Table 6-3). Predicted probabilities were calculated from model estimates and plotted graphically to more clearly illustrate ethnic variations in fruit and vegetable consumption (Figure 6-6), physical activity (Figure 6-7), and body size (Figure 6-8).

Older age was positively associated with being overweight and positively associated (with borderline statistical significance;  $p=0.09$ ) with  $<7$  hours physical activity per week. Female gender was positively associated with engaging in  $7-14$  hours and  $<7$  hours, rather than  $\geq 14$  hours physical activity per week. There were significant ethnic variations in fruit and vegetable consumption and body size. Compared to White UK adolescents, Black African and Pakistani/ Bangladeshi adolescents were more likely to eat less than 5 portions, and Black Caribbean adolescents were more likely to eat  $<2$  portions, than  $\geq 5$  portions of fruit and vegetables per day; Black Caribbean and Black African adolescents were more likely to be overweight or obese. These ethnic variations are illustrated by the predicted probabilities shown in Figure 6-6, and Figure 6-8, respectively. While ethnic variations in physical activity were not jointly significant, there was a significant negative association between Black Caribbean ethnicity and  $<7$  hours, rather than  $\geq 14$  hours, physical activity per week. This ethnic variation is illustrated by the predicted probabilities shown in Figure 6-7.



Table 6-3. Multinomial regression analyses predicting fruit and vegetable consumption, physical activity and body size, by ethnicity, age, and gender:

	Fruit and vegetable consumption (ref. $\geq 5$ portions/day)		Physical activity (ref. $\geq 14$ hours/week)		Body size (ref. Not overweight)	
	2-4 portions/ day	<2 portions/day	7-14 hours/ week	<7 hours/ week	Overweight	Obese
<b>Age (years):</b>	1.03 (0.88 - 1.12)	1 (0.91 - 1.15)	1.14 (0.94 - 1.4)	1.17 (0.97 - 1.42)	<b>0.83 (0.7 - 0.97)*</b>	1.09 (0.87 - 1.37)
<b>Gender (ref. male):</b>						
Female	0.9 (0.84 - 1.14)	1.05 (0.77 - 1.02)	1.59 (1.19 - 2.13)*	<b>4.55 (3.47 - 5.96)*</b>	1.24 (1.02 - 1.52)*	1.17 (0.89 - 1.54)
<b>Ethnicity (ref. White UK):</b>						
Black Caribbean	1.16 (0.9 - 1.51)	<b>2.17 (1.69 - 2.77)*</b>	0.75 (0.5 - 1.13)	<b>0.68 (0.46 - 0.99)*</b>	<b>1.59 (1.17 - 2.16)*</b>	<b>2.46 (1.59 - 3.79)*</b>
Black African	<b>1.43 (1.11 - 1.84)*</b>	<b>2.45 (1.91 - 3.13)*</b>	0.88 (0.59 - 1.33)	0.78 (0.53 - 1.15)	<b>1.54 (1.13 - 2.09)*</b>	<b>1.73 (1.1 - 2.72)*</b>
Indian	1.24 (0.93 - 1.66)	0.98 (0.72 - 1.34)	0.86 (0.51 - 1.46)	1.13 (0.69 - 1.84)	1.3 (0.89 - 1.9)	1.01 (0.56 - 1.83)
Pakistani/ Bangladeshi	<b>1.58 (1.16 - 2.14)*</b>	<b>2.21 (1.63 - 3)*</b>	1.07 (0.65 - 1.74)	1.05 (0.66 - 1.67)	1.29 (0.89 - 1.86)	1.26 (0.72 - 2.18)
Other ethnicity	1.1 (0.89 - 1.36)	1.19 (0.96 - 1.47)	0.92 (0.64 - 1.32)	0.8 (0.57 - 1.12)	1.44 (0.99 - 2.09)	1.49 (0.85 - 2.61)
Chi2 test <i>p</i> value		<b>&lt;0.01</b>		0.15		<b>&lt;0.01</b>
Sample size		<i>n</i> = 4,759		<i>n</i> = 4,655		<i>n</i> = 3,436

\* $p \leq 0.05$

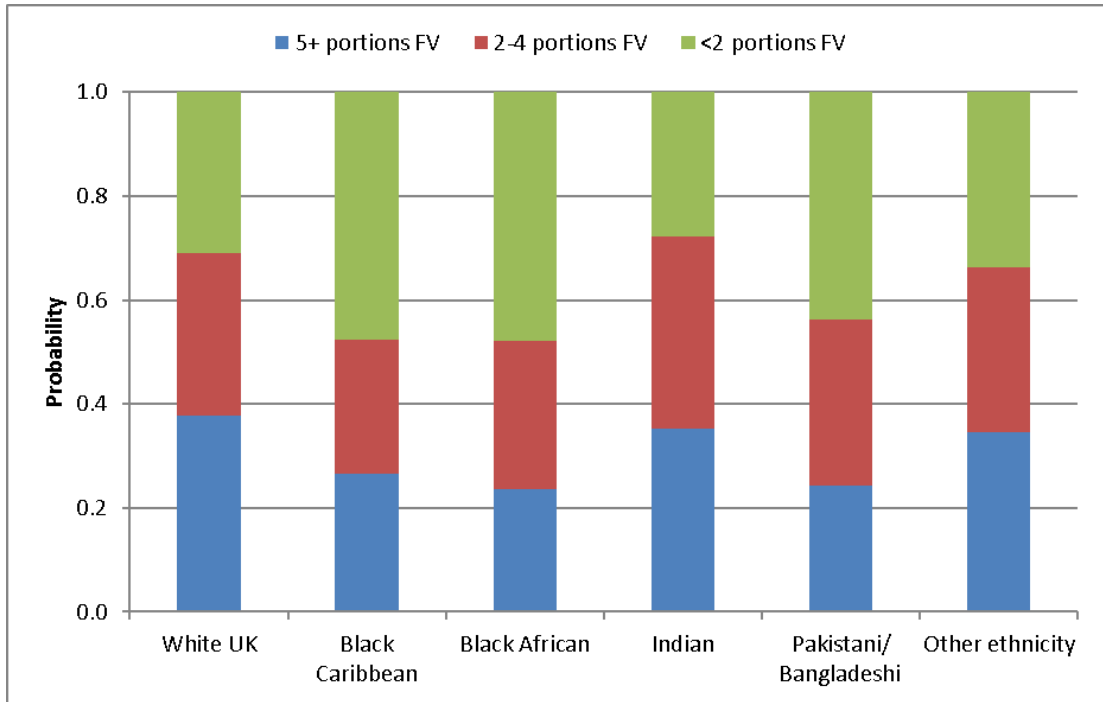


Figure 6-6: Predicted probabilities of eating <2 portions, 2-4 portions, and  $\geq 5$  portions of fruit and vegetables per day by ethnicity, adjusted for age, and gender.

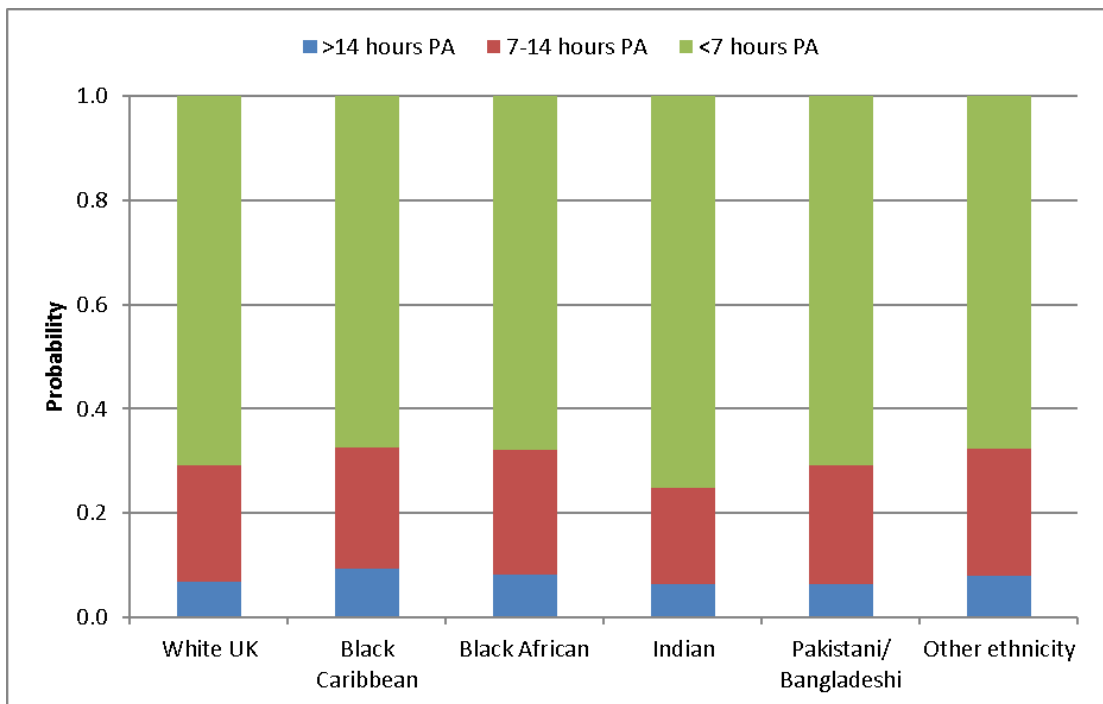


Figure 6-7: Predicted probabilities of engaging in <7 hours, 7-14 hours, and  $\geq 14$  hours physical activity per week by ethnicity, adjusted for age, and gender.

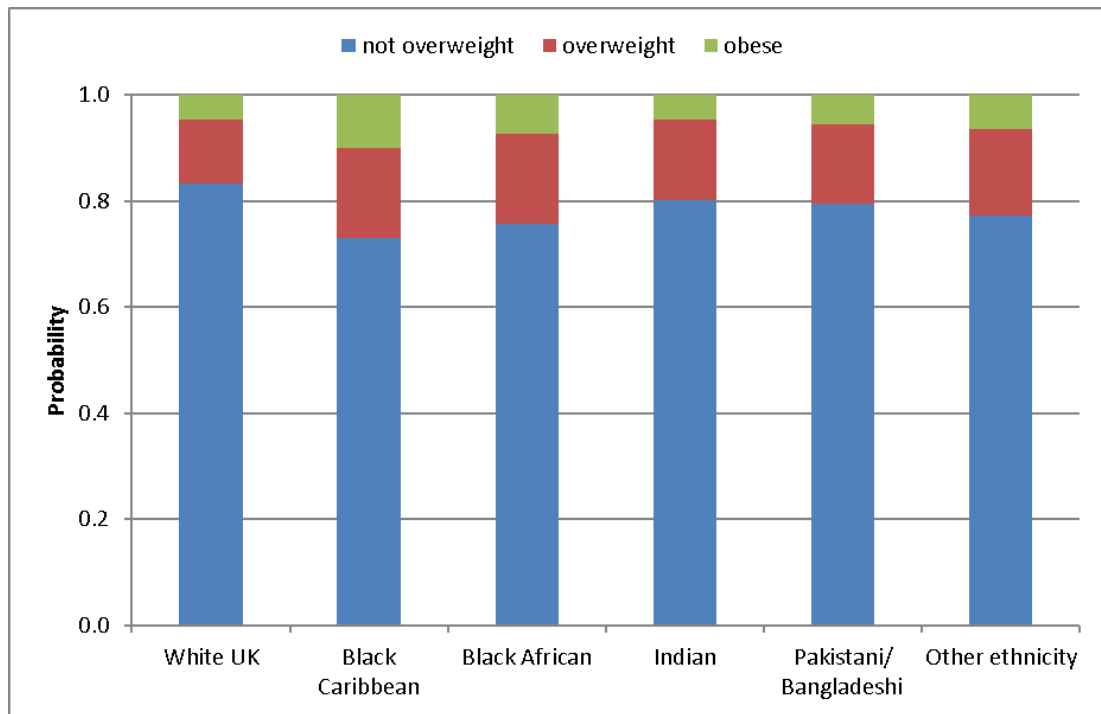


Figure 6-8: Predicted probabilities of *Not overweight*, *Overweight*, and *Obese* body size by ethnicity, adjusted for age, and gender.

#### 6.3.1.3. Clustering of health behaviours:

Multinomial logistic regression analysis used to investigate ethnic variations in the clustering of adolescent health behaviours is shown in Table 6-4. Ethnic variations, which were statistically significant, are illustrated by predicted probabilities (Figure 6-9).

Older age was positively associated with membership of the *High substances use: physically inactive*, and the *High substance use: physically active*, compared to the *Low substance use: healthy diet* reference cluster. Females were more likely than males to be in the *High substance use: physically inactive*, and less likely than males to be in the *High substance use: physically active*, in relation to the *Low substance use: healthy diet* cluster. Ethnic variations, compared to White UK adolescents, were statistically significant ( $p < 0.01$ ). Compared to membership of the *Low substance use: healthy diet* cluster, Black African and Indian adolescents were less likely to be in the *High substance use: physically active* cluster; adolescents in each ethnic minority group were less likely to be in the *High substance use: physically inactive* cluster; and Black Caribbean, Black African, and Pakistani/ Bangladeshi adolescents were more likely to be in the *Low substance use: unhealthy diet* cluster, compared to the *Low substance use: healthy diet* cluster.

Table 6-4. Multinomial regression predicting membership of clusters of health behaviours by ethnicity, age, adjusted for gender:

	Health behaviour clusters (ref. Low substance use: healthy diet):		
	High substance use: physically active	High substance use: physically inactive	Low substance use: unhealthy diet
<b>Age (years):</b>	<b>1.36 (1.08 - 1.71)*</b>	<b>1.65 (1.42 - 1.91)*</b>	0.97 (0.87 - 1.09)
<b>Gender (ref. male):</b>			
Female	<b>0.53 (0.39 - 0.72)*</b>	<b>1.77 (1.47 - 2.13)*</b>	1.01 (0.88 - 1.16)
<b>Ethnicity (ref. White UK):</b>			
Black Caribbean	0.86 (0.54 - 1.35)	<b>0.61 (0.47 - 0.8)*</b>	<b>1.53 (1.2 - 1.95)*</b>
Black African	<b>0.37 (0.22 - 0.64)*</b>	<b>0.23 (0.17 - 0.31)*</b>	<b>1.77 (1.41 - 2.23)*</b>
Indian	<b>0.3 (0.15 - 0.58)*</b>	<b>0.14 (0.09 - 0.21)*</b>	0.79 (0.59 - 1.05)
Pakistani/ Bangladeshi	0.7 (0.41 - 1.19)	<b>0.13 (0.08 - 0.22)*</b>	<b>1.5 (1.14 - 1.95)*</b>
Other ethnicity	0.85 (0.58 - 1.23)	<b>0.47 (0.38 - 0.6)*</b>	0.97 (0.87 - 1.09)
Chi2 test <i>p</i> value			<b>&lt;0.01</b>
<b>Sample size:</b>			<i>n</i> = 4,774

\**p*≤0.05

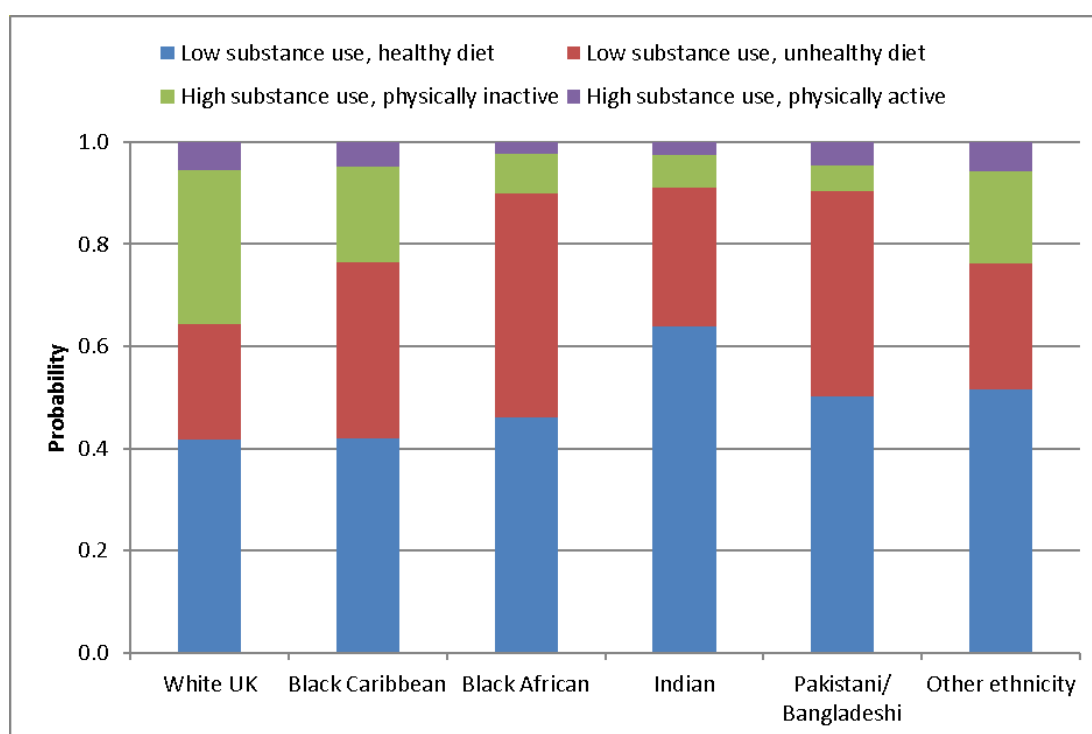


Figure 6-9: Predicted probabilities of membership of clusters of health behaviours, by ethnicity, adjusted by age and gender.

### 6.3.2. Moderation of ethnic variations in health behaviours by gender

Interactions between ethnicity and gender were included in logistic regression models predicting health behaviours and clustering of health behaviours by ethnicity, adjusted for age. Results of chi2 tests for joint significance of interactions terms are shown in Table 6-5; these were significant in the models predicting current tobacco use and body size.

Table 6-5. Chi2 tests for the joint significance of interactions between ethnicity and gender predicting adolescent health behaviours:

	Chi2:
Current tobacco use	<b>22.9 (df=5) <math>p&lt;0.01</math></b>
Current alcohol use	5.0 (df=5) $p=0.42$
Lifetime illicit drug use	7.6 (df=5) $p=0.18$
Fruit and vegetable	10.4 (df=10) $p=0.41$
Physical activity	6.4 (df=10) $p=0.78$
Body size	<b>18.2 (df=5) <math>p=0.05</math></b>
Clusters of health behaviours	16.5 (df=5) $p=0.35$

#### 6.3.2.1. Substance use behaviours

The results of the model investigating moderation of ethnic variations in tobacco use by gender are presented in Table 6-6. Females were more likely to use tobacco than males, and adolescents in all ethnic minority groups were less likely to use tobacco than White UK adolescents. Interactions between ethnicity and gender show that among Indian, and Pakistani/ Bangladeshi adolescents, ethnic variation was stronger among females, than among males; in fact, after adjustment for interactions between ethnicity and gender, ethnic variation was not significant among Pakistani/ Bangladeshi males. The effects of this interaction are more clearly illustrated by predicted probabilities as shown in Figure 6-10. Among White UK, Black Caribbean, Black African, and Other ethnicity adolescents, there were higher probabilities of using tobacco among females compared to males; whereas among Indian, and, to a greater extent, among Pakistani/ Bangladeshi adolescents, the probabilities of using tobacco were lower among females compared to males.

In summary, these findings demonstrate heterogeneity of ethnic variations of tobacco use by gender: compared to White UK adolescents, there is greater variation among Indian and Pakistani/ Bangladeshi females than among their male counterparts.

Table 6-6. Multinomial regression predicting current tobacco use by interactions between gender and ethnicity, adjusted for age:

	<b>Current tobacco use (ref=no current use)</b>
<b>Age (years):</b>	<b>1.55 (1.32 - 1.82)*</b>
<b>Gender (ref. male):</b>	
Female	<b>2.25 (1.61 - 3.13)*</b>
<b>Ethnicity (ref. White UK):</b>	
Black Caribbean	<b>0.4 (0.25 - 0.64)*</b>
Black African	<b>0.15 (0.08 - 0.29)*</b>
Indian	<b>0.35 (0.19 - 0.63)*</b>
Pakistani/ Bangladeshi	0.75 (0.49 - 1.16)
Other ethnicity	<b>0.61 (0.44 - 0.86)*</b>
<b>Ethnicity x gender:</b>	
Black Caribbean; female	0.92 (0.51 - 1.67)
Black African; female	0.93 (0.43 - 2.03)
Indian; female	<b>0.26 (0.1 - 0.7)*</b>
Pakistani/Bangladeshi; female	<b>0.05 (0.01 - 0.2)*</b>
Other ethnicity; female	0.84 (0.53 - 1.33)
<b>Sample size:</b>	<i>n</i> = 4,723

\*p≤0.05

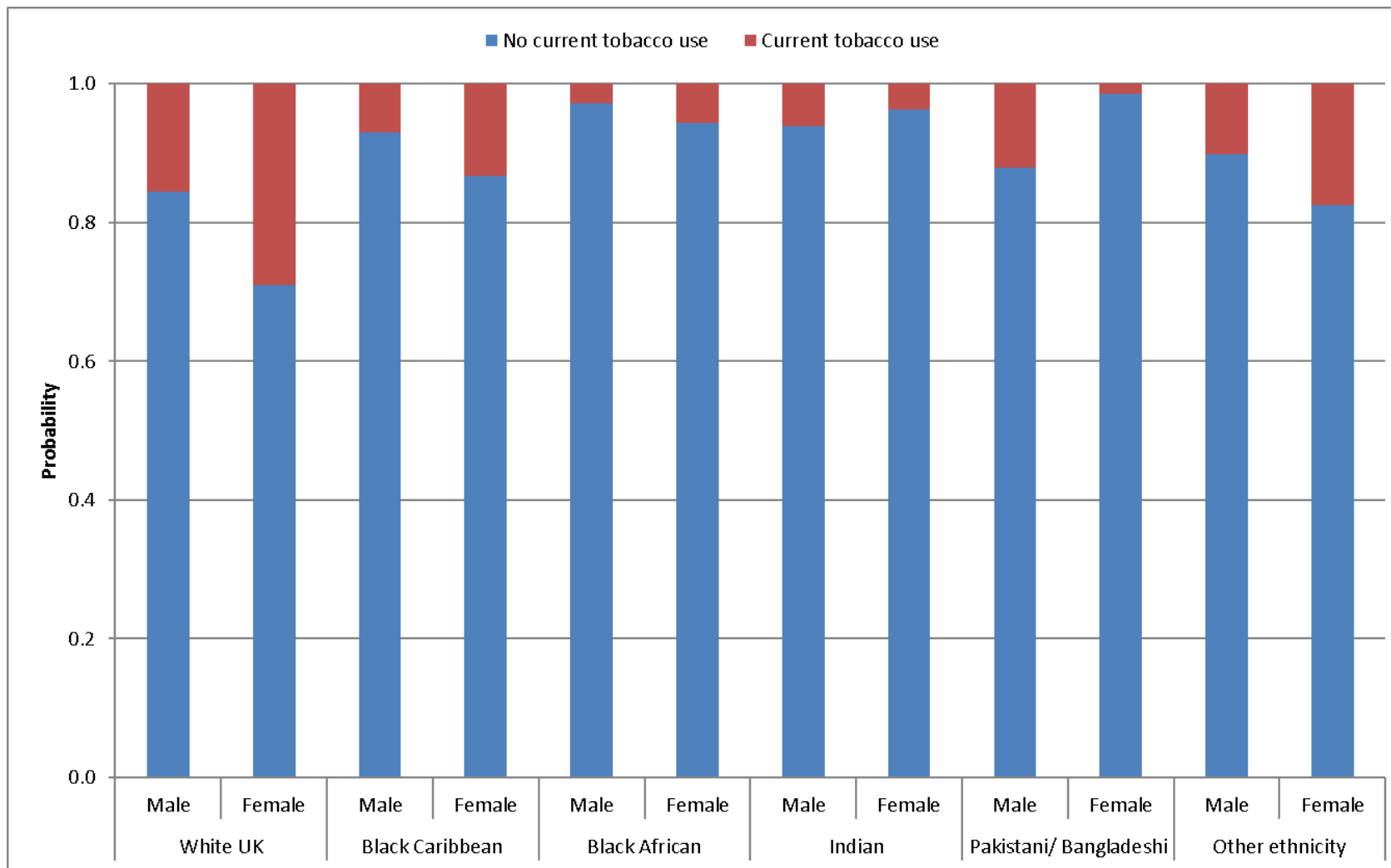


Figure 6-10: Predicted probabilities of current tobacco use by gender and ethnicity, adjusted for age

#### 6.3.2.2. Body size:

The results of the model investigating moderation of ethnic variations in body size by gender are presented in Table 6-7. As described in 6.3.1.2, females were more likely to be overweight than males and Black Caribbean and Black African adolescents were more likely than White UK adolescents to be overweight or obese.

Interactions between ethnicity and gender suggest that among Black Caribbean adolescents ethnic variations in the likelihood of being *Overweight*, compared to *Not overweight* were stronger among females, than among males (borderline significant  $p=0.09$ ). Black Caribbean females were also more likely than males to be *Obese*, although this pattern was far from statistically significant ( $p=0.29$ ). Similarly, among Black African adolescents there were stronger ethnic variations among females compared to males in the likelihood of being *Overweight* ( $p=0.05$ ), and *Obese* (borderline significant  $p=0.07$ ), rather than *Not overweight*. Ethnic variations in the likelihood of being *Overweight*, rather than *Not overweight*, among Black Caribbean males, and in the likelihood of being *Overweight*, or *Obese*, among Black African adolescents were no longer statistically significant after adjustment for interactions between ethnicity and gender. Furthermore, the joint significance of ethnic variations in body size among males was no longer significant after adjustment for the interaction between ethnicity and gender.

The effects of this interaction are more clearly illustrated by the predicted probabilities shown in Figure 6-11. Among White UK, Black Caribbean, and Black African adolescents, there were higher probabilities of being *Overweight* or *Obese* among females compared to males. The probabilities of being *Overweight* or *Obese* among Black Caribbean and Black African males was similar to those among White UK males.

In summary, these findings demonstrate heterogeneity of ethnic variations of body size by gender: compared to White UK adolescents, there is greater variation among Black Caribbean and Black African females than among their male counterparts.



Table 6-7. Multinomial regression predicting body size by interactions between ethnicity and gender, adjusted for age:

	Body size (ref= Not overweight)	
	Overweight	Obese
<b>Age (years):</b>	<b>0.83 (0.71 - 0.98)*</b>	1.09 (0.87 - 1.37)
<b>Gender (ref. male):</b>		
Female	0.92 (0.58 - 1.47)	0.94 (0.46 - 1.91)
<b>Ethnicity (ref. White UK):</b>		
Black Caribbean	1.24 (0.81 - 1.9)	<b>1.99 (1.1 - 3.61)*</b>
Black African	1.16 (0.76 - 1.77)	1.12 (0.58 - 2.14)
Indian	1.25 (0.77 - 2.03)	1.28 (0.62 - 2.66)
Pakistani/ Bangladeshi	1.22 (0.77 - 1.93)	1.53 (0.8 - 2.94)
Other ethnicity	1.39 (0.84 - 2.29)	1.51 (0.71 - 3.2)
<b>Ethnicity x gender:</b>		
Black Caribbean; female	1.68 (0.91 - 3.1)	1.59 (0.67 - 3.78)
Black African; female	<b>1.81 (1 - 3.29)*</b>	2.28 (0.93 - 5.62)
Indian; female	1.06 (0.51 - 2.19)	0.51 (0.14 - 1.83)
Pakistani/Bangladeshi; female	1.05 (0.49 - 2.23)	0.34 (0.08 - 1.43)
Other ethnicity; female	1.12 (0.54 - 2.35)	1.01 (0.33 - 3.1)
<b>Sample size:</b>		<i>n</i> = 3,436

\* $p \leq 0.05$

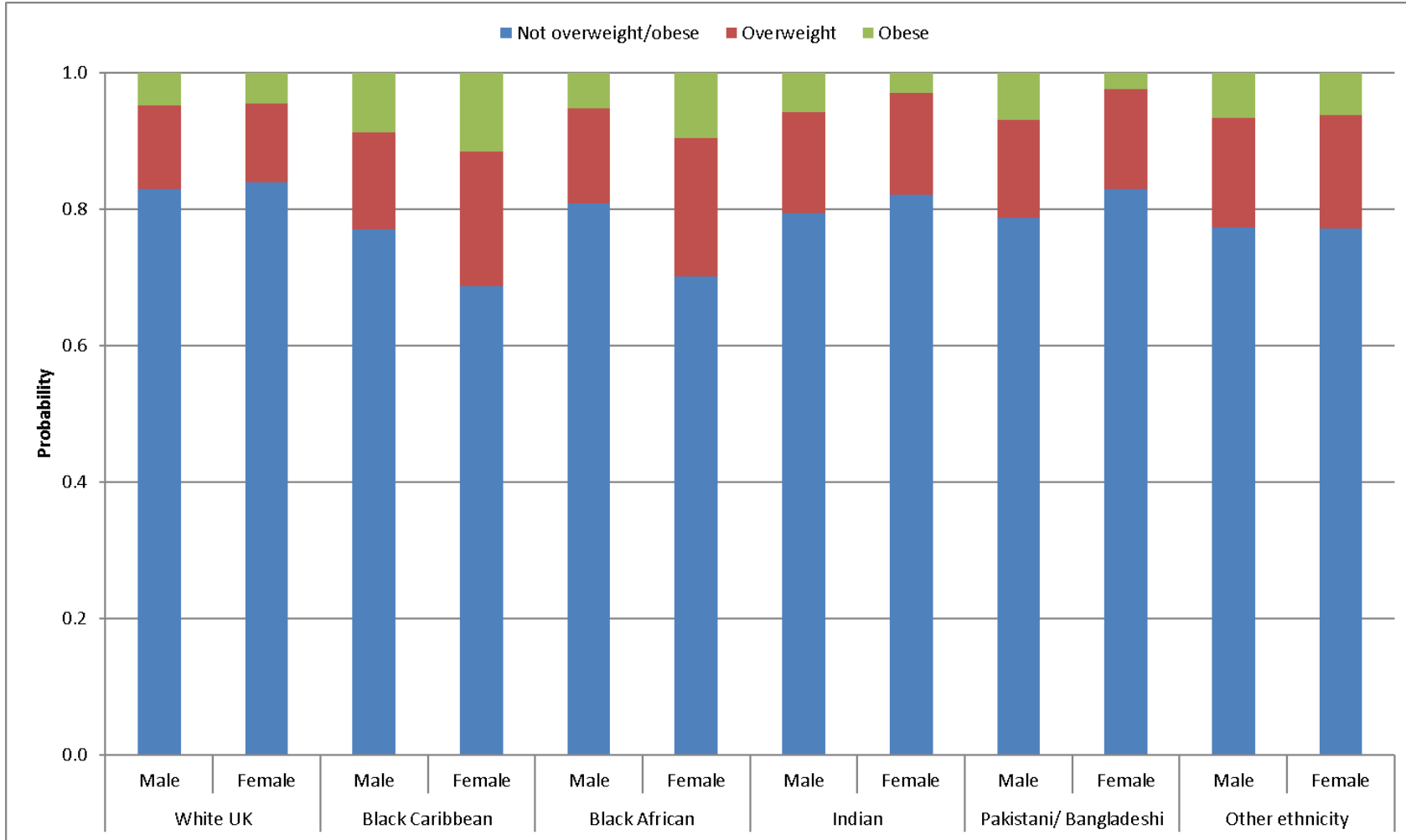


Figure 6-11: Predicted probabilities of *Not overweight*, *Overweight*, and *Obese* body size by gender and ethnicity, adjusted for age

### 6.3.2.1. Clustering of health behaviours:

Interactions between gender and ethnicity were not significant in models predicting clustering of health behaviours.

### 6.3.3. Moderation of ethnic variations in health behaviours by generational status

Interactions between ethnicity and generational status were included in logistic regression models predicting health behaviours and clustering of health behaviours by ethnicity, adjusted for age, and gender. Results of chi<sup>2</sup> tests for joint significance of interactions terms are shown in Table 6-8; these were, borderline, significant only in the model predicting current alcohol use.

Table 6-8. Chi<sup>2</sup> tests of joint significance of interactions between ethnicity and generational status predicting adolescent health behaviours:

	<b>Chi<sup>2</sup>:</b>
Current tobacco use	8.5 (df=5) <i>p</i> =0.13
Current alcohol use	<b>10.1 (df=5) <i>p</i>=0.07</b>
Lifetime illicit drug use	6.9 (df=5) <i>p</i> =0.23
Fruit and vegetable	10.4 (df=10) <i>p</i> =0.41
Physical activity	10.9 (df=10) <i>p</i> =0.37
Body size	5.5 (df=10) <i>p</i> =0.86
Clusters of health behaviours	21.1 (df=15) <i>p</i> =0.13

#### 6.3.3.1. Substance use behaviours

As previously described, there were lower odds of using alcohol among adolescents of each ethnic minority group, compared to White UK adolescents. The inclusion of generational status by ethnicity interactions resulted in no substantial changes to these main effects of ethnicity and no individual interaction terms were statistically significant predictors of alcohol use (Table 6-9).

Table 6-9. Multinomial logistic regression predicting current alcohol use by interactions between ethnicity and generational status, adjusted for age and gender:

	<b>Current alcohol use (ref=no current use):</b>
<b>Age (years):</b>	<b>1.68 (1.5 - 1.89)*</b>
<b>Gender (ref. male):</b>	
Female	<b>1.4 (1.19 - 1.64)*</b>
<b>Ethnicity (ref. White UK):</b>	
Black Caribbean	<b>0.49 (0.39 - 0.62)*</b>
Black African	<b>0.18 (0.13 - 0.23)*</b>
Indian	<b>0.16 (0.12 - 0.22)*</b>
Pakistani/ Bangladeshi	<b>0.01 (0 - 0.02)*</b>
Other ethnicity	<b>0.46 (0.37 - 0.57)*</b>
<b>Generational status (ref. Born UK):</b>	
Born abroad	0.52 (0.19 - 1.44)
<b>Ethnicity x Generational status:</b>	
Black Caribbean; Born abroad	1.37 (0.47 - 4)
Black African; Born abroad	1.29 (0.44 - 3.74)
Indian; Born abroad	0.61 (0.17 - 2.21)
Pakistani/Bangladeshi; Born abroad	4.49 (0.61 - 33.05)
Other ethnicity; Born abroad	0.86 (0.3 - 2.44)
<b>Sample size:</b>	<i>n</i> = 4,716

\* $p \leq 0.05$

#### 6.3.4. Moderation of ethnic variations in adolescent health behaviours by religious attendance

Multinomial logistic regression models including interactions between ethnicity and religious attendance were created to investigate whether religious attendance moderated ethnic variations in health behaviours. Results of Wald tests for joint significance of interaction terms are shown in Table 6-10. Interactions between ethnicity and religious attendance were significant predictors of current tobacco use, and were borderline significant predictors of current alcohol use ( $p=0.08$ ) and lifetime illicit drug use ( $p=0.10$ ).

Table 6-10. Chi2 tests of joint significance of interactions between ethnicity and religious attendance predicting adolescent health behaviours:

	Chi2:
Current tobacco use	<b>27.7 (df=5) <math>p &lt; 0.01</math></b>
Current alcohol use	<b>9.7 (df=5) <math>p = 0.08</math></b>
Lifetime illicit drug use	<b>9.1 (df=5) <math>p = 0.10</math></b>
Fruit and vegetable	7.7 (df=10) $p = 0.65$
Physical activity	9.2 (df=10) $p = 0.52$
Body size	13.3 (df=10) $p = 0.21$
Clusters of behaviours	17.0 (df=15) $p = 0.32$

#### 6.3.4.1. Substance use behaviours

The results of regression models predicting tobacco, alcohol, and illicit drug use by interactions between ethnicity and religious attendance are presented in Table 6-11.

As previously described, there were lower odds of using tobacco, alcohol, and illicit drugs among each ethnic group, compared to White UK adolescents. With the inclusion of religious attendance by ethnicity interactions the main effect of Pakistani/ Bangladeshi ethnicity on tobacco use was attenuated and remained only borderline significant ( $p = 0.07$ ), whereas there were no substantive changes in the main effects of ethnicity on alcohol or illicit drug use.

Black Caribbean and Black African adolescents who attended a place of worship less frequently were significantly more likely to use tobacco and there was a similar pattern among Other ethnicity adolescents with borderline significance ( $p = 0.08$ ); in contrast, Pakistani/ Bangladeshi adolescents who attended a place of worship less frequently were significantly less likely to use tobacco. The combined effects from this model are illustrated by predicted probabilities shown in Figure 6-12: compared to White UK adolescents there was more variation in tobacco use among Black Caribbean, Black African, and Other ethnicity adolescents who attended a place of worship more frequently, and among Pakistani/ Bangladeshi adolescents who attended a place of worship less frequently.

The main effect of frequent religious attendance on alcohol use was borderline significant ( $p = 0.06$ ). Those adolescents who attended a place of worship less, compared to more frequently were more likely to use alcohol; however, there were no significant effects of individual interaction terms.

Black African adolescents who attended a place of worship less frequently were almost twice as likely to have used illicit drugs. The predicted probabilities presented in Figure 6-13 illustrate this effect: There was a higher probability of drug use among Black African adolescents who attended a place of worship less (21%), compared to those who attended a place of worship more frequently (12%). There was a similar effect of religious attendance among Black Caribbean and Other ethnicity adolescents, although these relationships were not statistically significant. These findings show that among Black African, as well as Black Caribbean and Other ethnicity adolescents, there is greater ethnic variation in illicit drug use among those who attended a place of worship more frequently, i.e. compared to those who attended a place of worship less frequently the probability of illicit drug use was lower and less similar to that of the White UK adolescents.

Table 6-11. Multinomial logistic regression predicting substance use behaviours by interactions between ethnicity and religious attendance, adjusted for age and gender:

	Current tobacco use (ref=no use):	Current alcohol use (ref=no use):	Lifetime drug use (ref=no use):
<b>Age (years):</b>	<b>1.56 (1.33 - 1.83)*</b>	<b>1.58 (1.41 - 1.78)*</b>	<b>1.54 (1.36 - 1.75)*</b>
<b>Gender (ref. male):</b>			
Female	<b>1.8 (1.47 - 2.2)*</b>	<b>1.34 (1.14 - 1.57)*</b>	<b>1.24 (1.06 - 1.47)*</b>
<b>Ethnicity (ref. White UK):</b>			
Black Caribbean	<b>0.23 (0.12 - 0.46)*</b>	<b>0.69 (0.42 - 1.14)</b>	<b>0.59 (0.35 - 0.99)*</b>
Black African	<b>0.11 (0.06 - 0.22)*</b>	<b>0.22 (0.13 - 0.35)*</b>	<b>0.27 (0.16 - 0.45)*</b>
Indian	<b>0.22 (0.1 - 0.48)*</b>	<b>0.15 (0.08 - 0.27)*</b>	<b>0.21 (0.11 - 0.4)*</b>
Pakistani/ Bangladeshi	0.55 (0.29 - 1.05)	<b>0.01 (0 - 0.03)*</b>	<b>0.37 (0.21 - 0.66)*</b>
Other ethnicity	<b>0.36 (0.2 - 0.66)*</b>	<b>0.4 (0.24 - 0.65)*</b>	<b>0.47 (0.28 - 0.78)*</b>
<b>Religious attendance (ref. Regular):</b>			
Seldom-never	1.07 (0.62 - 1.87)	1.6 (0.99 - 2.57)	1.02 (0.63 - 1.64)
<b>Ethnicity x Religious attendance:</b>			
Black Caribbean; Seldom-never	<b>2.34 (1.11 - 4.96)*</b>	0.67 (0.38 - 1.17)	1.32 (0.74 - 2.36)
Black African; Seldom-never	<b>2.87 (1.21 - 6.85)*</b>	0.84 (0.45 - 1.56)	<b>1.93 (1.02 - 3.68)*</b>
Indian; Seldom-never	0.72 (0.25 - 2.07)	1.34 (0.67 - 2.69)	0.97 (0.43 - 2.18)
Pakistani/ Bangladeshi; Seldom-never	<b>0.21 (0.07 - 0.64)*</b>	2.61 (0.44 - 15.52)	0.79 (0.37 - 1.71)
Other ethnicity; Seldom-never	1.8 (0.93 - 3.49)	1.07 (0.63 - 1.83)	1.54 (0.89 - 2.68)
<b>Sample size:</b>	<i>n</i> = 4,673	<i>n</i> = 4,668	<i>n</i> = 4,669

\* $p \leq 0.05$

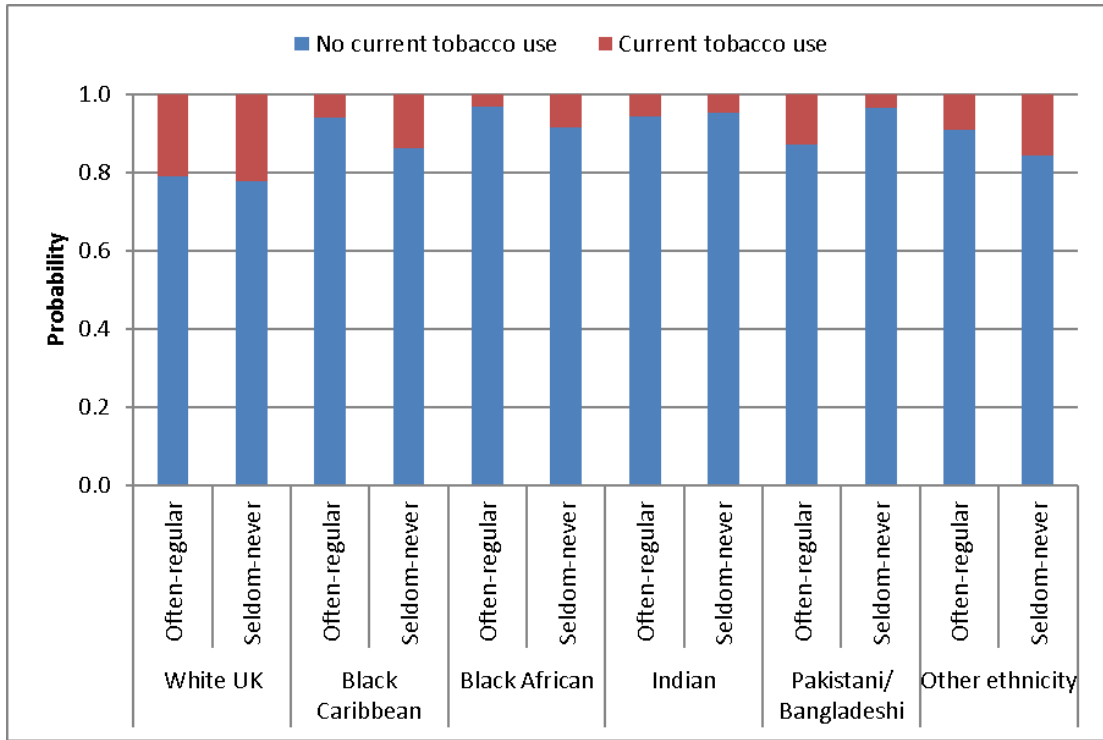


Figure 6-12: Predicted probabilities of current tobacco use by religious attendance and ethnicity, adjusted by age and gender

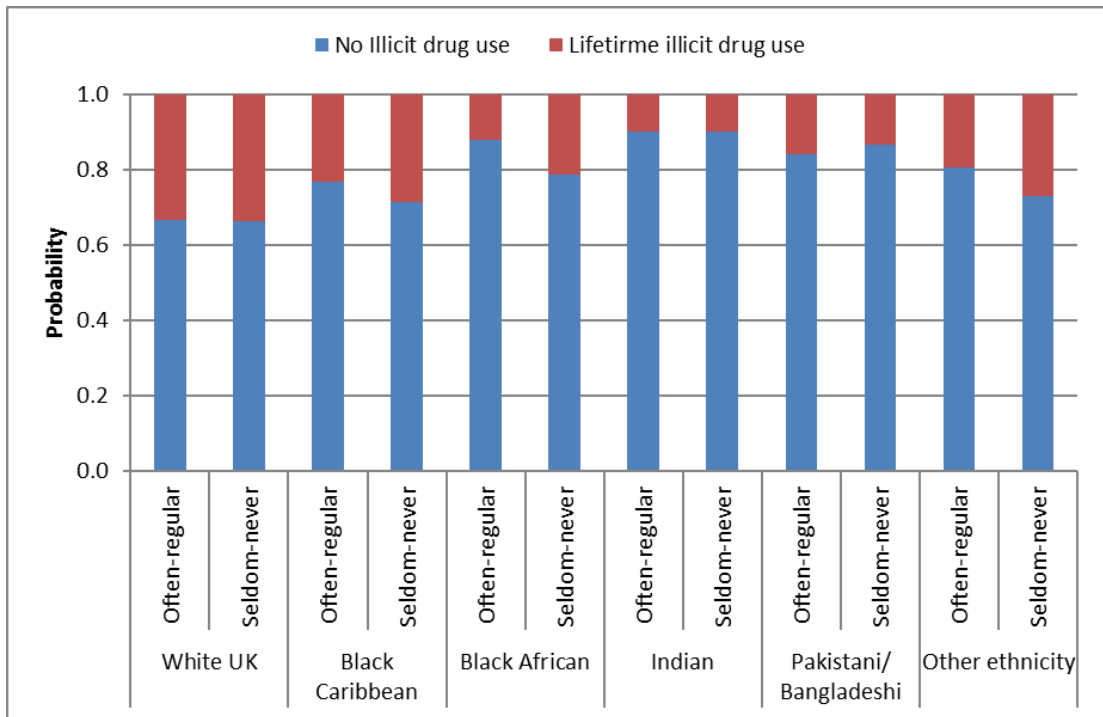


Figure 6-13: Predicted probabilities of lifetime illicit drug use by religious attendance and ethnicity, adjusted by age and gender



### 6.3.5. Moderation of ethnic variations in perceived parenting by English language use with family

Multinomial logistic regression models were created, including interactions between English language use with family and ethnicity, to investigate whether English language use with family moderated ethnic variations in adolescent health behaviours. Results of Wald tests for joint significance of interaction terms are shown in Table 6-12.

Interactions between ethnicity and English language use with family were jointly significant with 95 percent confidence in models predicting current tobacco use, lifetime illicit drug use, and clusters of health behaviours, and were borderline significant in models predicting fruit and vegetable consumption ( $p=0.07$ ) and body size ( $p=0.09$ ).

Table 6-12. Chi2 tests of joint significance of interactions between English language use with family and ethnicity predicting adolescent health behaviours:

	Chi2:
Current tobacco use	<b>27.1 (df=5) <math>p&lt;0.01</math></b>
Current alcohol use	7.7 (df=5) $p=0.17$
Lifetime illicit drug use	<b>24.6 (df=5) <math>p&lt;0.01</math></b>
Fruit and vegetable	<b>17.2 (df=10) <math>p=0.07</math></b>
Physical activity	13.4 (df=10) $p=0.20$
Body size	<b>16.3 (df=10) <math>p=0.09</math></b>
Clusters of behaviours	<b>28.2 (df=15) <math>p=0.02</math></b>

#### 6.3.5.1. Substance use behaviours

The results of models predicting substance use behaviours by interactions between English language use and ethnicity are presented in Table 6-13. As previously described, the inclusion of the interaction resulted in one notable change to the ethnic variations: lower odds of illicit drug use among Other ethnicity adolescents were attenuated and no longer significant to 95 percent confidence levels. However, no individual interaction terms are significant in these models; a plausible explanation for being small numbers of adolescents both speaking *Some/Little-no* English with family and engaging in substance use behaviours resulting in imprecise estimates.

Table 6-13. Multinomial regression analyses predicting current tobacco use, current alcohol use and lifetime drug use by interactions between ethnicity and English language use with family, adjusted for age and gender:

	Current tobacco use (ref=no current use)	Current alcohol use (ref=no current use)	Lifetime illicit drug use (ref=no use)
<b>Age (years):</b>	1.53 (1.3 - 1.81)*	1.61 (1.42 - 1.82)*	1.57 (1.38 - 1.78)*
<b>Gender (ref. male):</b>			
Female	1.68 (1.36 - 2.07)*	1.46 (1.24 - 1.73)*	1.23 (1.04 - 1.45)*
<b>Ethnicity (ref. White UK):</b>			
Black Caribbean	0.35 (0.25 - 0.49)*	0.46 (0.36 - 0.59)*	0.66 (0.52 - 0.84)*
Black African	0.13 (0.08 - 0.22)*	0.17 (0.13 - 0.23)*	0.34 (0.25 - 0.45)*
Indian	0.16 (0.07 - 0.33)*	0.21 (0.14 - 0.32)*	0.18 (0.11 - 0.29)*
Pakistani/ Bangladeshi	0.44 (0.25 - 0.78)*	0.01 (0 - 0.04)*	0.53 (0.36 - 0.79)*
Other ethnicity	0.72 (0.56 - 0.94)*	0.55 (0.44 - 0.69)*	0.83 (0.67 - 1.03)
<b>English language use with family (ref. Mostly-all):</b>			
Some/little-no	0.58 (0.13 - 2.65)	0.44 (0.16 - 1.26)	0.68 (0.21 - 2.22)
<b>Ethnicity x English language use with family</b>			
Black Caribbean; Some/little-no	2.85 (0.55 - 14.79)	2.17 (0.69 - 6.81)	1.51 (0.41 - 5.57)
Black African; Some/little-no	2.64 (0.5 - 13.97)	1.57 (0.52 - 4.78)	1.12 (0.32 - 3.92)
Indian; Some/little-no	2.56 (0.43 - 15.14)	0.93 (0.29 - 3.02)	2.01 (0.53 - 7.69)
Pakistani/ Bangladeshi; Some/little-no	1.18 (0.22 - 6.24)	1.18 (0.17 - 8.1)	0.55 (0.15 - 2.03)
Other ethnicity; Some/little-no	0.78 (0.16 - 3.69)	0.84 (0.29 - 2.47)	0.52 (0.16 - 1.77)
<b>Sample size:</b>	<i>n</i> = 4,603	<i>n</i> = 4,559	<i>n</i> = 4,600

\* $p \leq 0.05$

### 6.3.5.2. Body size, and related behaviours:

The results of models predicting fruit and vegetable consumption and body size by interactions between English language use and ethnicity are presented in Table 6-14; predicted probabilities computed from these models are shown in Figure 6-14, and Figure 6-15, respectively.

There are significant interactions between English language use and ethnicity in the model predicting fruit and vegetable consumption. While adolescents of each ethnic minority who spoke less English with family were more likely than White UK to eat less than five portions of fruit and vegetables per day, the interaction effects were strongest and statistically significant among Pakistani/ Bangladeshi adolescents; among adolescents of other ethnic groups interaction effects were weaker and not statistically significant. Furthermore, the inclusion of the interaction attenuated the main effects of Pakistani/ Bangladeshi ethnicity, variation in the likelihood of eating 2-4 portions of fruit and vegetables was entirely concentrated among those who spoke less English with family. Predicted probabilities computed from these estimates are shown in Figure 6-14, and show that compared to White UK adolescents, there was greater ethnic variation in fruit and vegetable consumption among Pakistani/ Bangladeshi adolescents who spoke less, compared to more, English with family. Pakistani/ Bangladeshi adolescents who spoke less English with family had a higher probability of eating 2-4 *portions* of fruit and vegetables per day than those who spoke more English with family (36%, and 26%, respectively), whereas those who spoke less English with family had a lower probability of eating  $\geq 5$  *portions* (21%), compared to those who spoke more English with family (29%).

In the model predicting body size there is a significant main effect English language use with family: across ethnicities, those who spoke less, compared to more, English with family had substantially greater odds of being obese compared to neither overweight nor obese. In this model there were statistically significant interaction effects between English language use and ethnicity which acted in the opposite direction to the main effects of English language use: among each ethnic minority group those adolescents who spoke less, compared to more, English with family were less likely to be overweight or obese, than neither; interaction terms were significant predictors of obesity among Black Caribbean, Black African, Indian, and Pakistani/ Bangladeshi adolescents; stronger effects are found among Black African, Indian, and Pakistani/Bangladeshi, and weaker effects found among Black Caribbean adolescents causing heterogeneity of ethnic variations as illustrated by the predicted probabilities presented in Figure 6-15. Stronger interaction effects results in lesser probabilities of being obese among

adolescents who spoke less, compared to more, English with family among Black African (5% versus 8%), Indian (4% versus 6%), and Pakistani/ Bangladeshi (4% versus 7%) adolescents; whereas a comparatively weak interaction effect among Black Caribbean adolescents is outweighed by the main effects of English language use with family resulting in a slightly higher probability of being obese among those who spoke less (11%), compared to more (10%), English with family.

Table 6-14. Multinomial regression predicting fruit and vegetable consumption, and body size by interactions between ethnicity and English language use with family, adjusted for age and gender:

	FV portions/day (ref $\geq 5$ portions/day)		Body size (ref= Not overweight or obese)	
	2-4 FV portions/day	<2 FV portions/day	Overweight	Obese
<b>Age (years):</b>	1.03 (0.91 - 1.17)	1.01 (0.9 - 1.15)	<b>0.83 (0.71 - 0.98)*</b>	1.08 (0.86 - 1.37)
<b>Gender (ref. male):</b>				
Female	0.9 (0.76 - 1.05)	1.04 (0.89 - 1.23)	1.21 (0.98 - 1.48)	1.19 (0.9 - 1.57)
<b>Ethnicity (ref. White UK):</b>				
Black Caribbean	1.21 (0.92 - 1.58)	<b>2.11 (1.63 - 2.72)*</b>	<b>1.74 (1.26 - 2.4)*</b>	<b>2.55 (1.62 - 4.01)*</b>
Black African	<b>1.38 (1.03 - 1.85)*</b>	<b>2.59 (1.96 - 3.42)*</b>	<b>1.68 (1.19 - 2.35)*</b>	<b>2.11 (1.3 - 3.42)*</b>
Indian	1.29 (0.9 - 1.85)	1.08 (0.74 - 1.59)	1.34 (0.85 - 2.12)	1.31 (0.66 - 2.6)
Pakistani/ Bangladeshi	1.05 (0.69 - 1.59)	<b>1.87 (1.27 - 2.76)*</b>	1.38 (0.85 - 2.23)	1.76 (0.89 - 3.45)
Other ethnicity	1.1 (0.86 - 1.4)	<b>1.35 (1.06 - 1.73)*</b>	<b>1.52 (1 - 2.31)*</b>	1.09 (0.54 - 2.22)
<b>English language use with family (ref. Mostly-all):</b>				
Some/little-no	0.47 (0.14 - 1.55)	0.23 (0.05 - 1.09)	2.43 (0.48 - 12.38)	<b>6.63 (1.28 - 34.33)*</b>
<b>Ethnicity x English language use with family:</b>				
Black Caribbean; Some/little-no	1.1 (0.27 - 4.47)	3.9 (0.75 - 20.32)	0.25 (0.04 - 1.53)	<b>0.16 (0.03 - 0.99)*</b>
Black African; Some/little-no	2.21 (0.63 - 7.8)	3.3 (0.67 - 16.28)	0.39 (0.07 - 2.07)	<b>0.08 (0.01 - 0.49)*</b>
Indian; Some/little-no	1.86 (0.51 - 6.69)	3.27 (0.64 - 16.72)	0.46 (0.08 - 2.59)	<b>0.1 (0.01 - 0.65)*</b>
Pakistani/ Bangladeshi; Some/little-no	<b>4.04 (1.1 - 14.87)*</b>	<b>5.46 (1.07 - 27.77)*</b>	0.4 (0.07 - 2.24)	<b>0.07 (0.01 - 0.48)*</b>
Other ethnicity; Some/little-no	1.91 (0.56 - 6.5)	2.77 (0.57 - 13.41)	0.35 (0.06 - 2.08)	0.34 (0.05 - 2.24)
<b>Sample size:</b>		$n = 4,661$		$n = 3,338$

\* $p \leq 0.05$ ; FV: fruit and vegetables

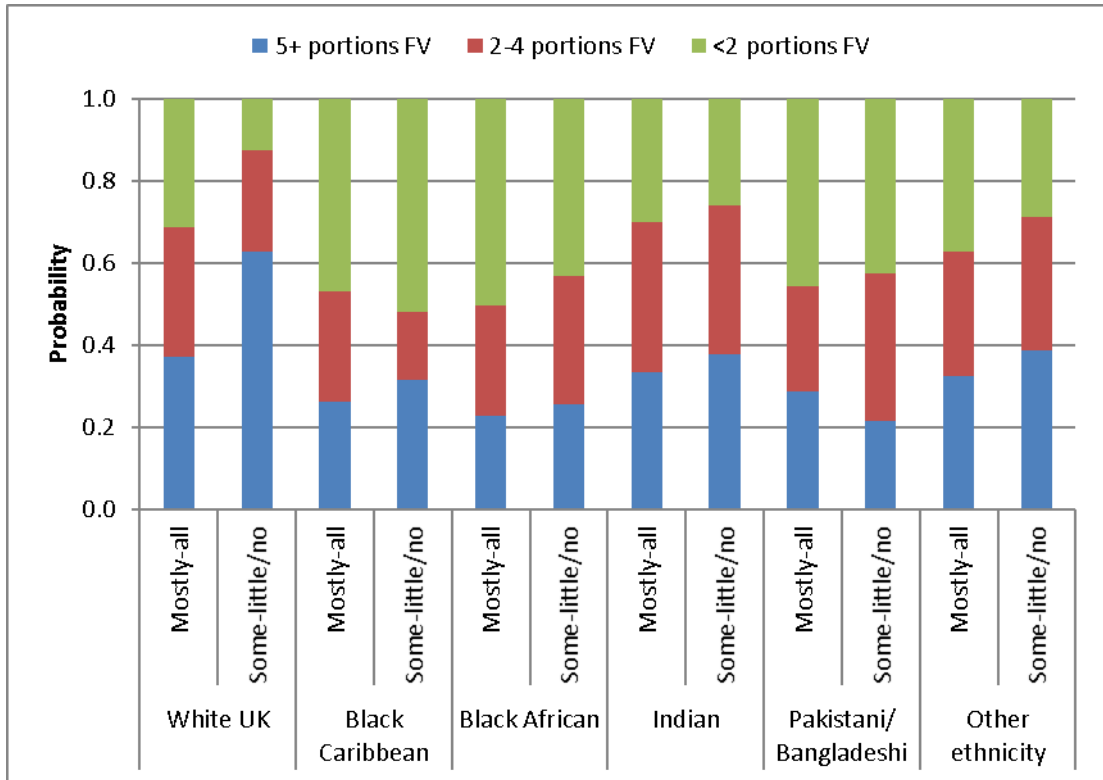


Figure 6-14: Predicted probabilities of fruit and vegetable consumption by ethnicity and English language use with family, adjusted for age and gender

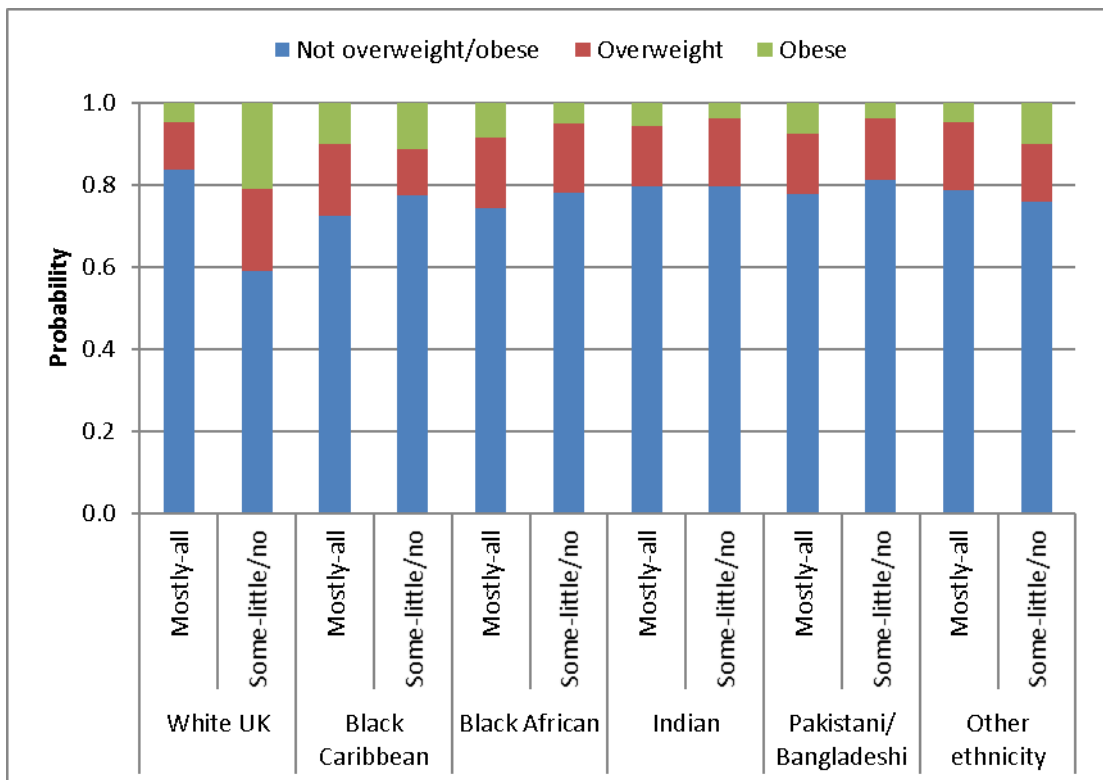


Figure 6-15: Predicted probabilities of body size by ethnicity and English language use with family, adjusted for age and gender

#### 6.3.5.3. Clustering of health behaviours:

The results of the model predicting clustering of health behaviours by interactions between English language use and ethnicity are presented in Table 6-15. Small numbers of White UK adolescents who spoke *Some/Little-no* English with family resulted in extremely unbalanced estimates in an initial model (not shown); to solve this issue the main effects of English language use with family on cluster membership were constrained to equal 1. This step was carried out on the premise that the effects of interest are those of English language use with family, among ethnic minority, not White UK adolescents. Predicted probabilities computed from this model are shown in Figure 6-16. Inclusion of the interaction between English language use and ethnicity did not result in any substantive changes to the main effects of ethnicity on cluster membership previously described in section 6.3.1.3; however, there are several statistically significant interaction effects among Pakistani/ Bangladeshi, and Other ethnicity adolescents.

Among Pakistani/ Bangladeshi adolescents, those who spoke less, compared to more, English with family were significantly less likely to be in the *High substance use: physically active* cluster, compared to membership in the *Low substance use: healthy diet* cluster. These significant interaction effects are reflected by the resultant predicted probabilities: there is a lower probability of being in the *High substance use: physically active* cluster among Pakistani/ Bangladeshi adolescents who spoke less (3%), compared to more English with family (7%); this variation is balanced by a higher probability of being in the *Low substance use: healthy diet* cluster (53% versus 45%). These heterogeneous effects result in greater variations in cluster membership among Pakistani/ Bangladeshi adolescents who spoke less, compared to more, English with family.

Among Other ethnicity, those who spoke less, compared to more, English with family were significantly less likely to be members of the *Low substance use: unhealthy diet*, *High substance use: Physically inactive*, and *High substance use: physically active* clusters, compared to membership in the *Low substance use: healthy diet* cluster. The effect of the interaction between English language use with family Other ethnicity was strongest in the prediction of lower likelihood of being in the *High substance use: physically inactive* cluster; weaker in the prediction of lower likelihood of being in the *High substance use: physically inactive* cluster; and weakest in the prediction of lower likelihood of membership in the *Low substance use: unhealthy diet* cluster. These significant interaction effects are reflected by the resultant predicted probabilities: there are lower probabilities of being in the *High substance use: physically inactive* and

*High substance use: physically active* clusters among Other ethnicity adolescents who spoke less (4%, and 9%, respectively) compared to more English with family (7%, and 9%, respectively); these variations are balanced by a substantially higher probability of being in the *Low substance use: healthy diet* cluster (62% versus 44%). These heterogeneous effects result in greater variation in cluster membership among Other ethnicity adolescents who spoke less, compared to more, English with family.



Table 6-15. Multinomial regression predicting clustering of health behaviours by interactions between ethnicity and English language use with family, adjusted for age and gender:

	Health behaviour clusters (ref: Low substance use: healthy diet):		
	High substance use: physically active	High substance use: physically inactive	Low substance use: unhealthy diet
<b>Age (years):</b>	1.4 (1.11 - 1.77)*	1.67 (1.44 - 1.94)*	0.98 (0.87 - 1.1)
<b>Gender (ref. male):</b>			
Female	0.54 (0.4 - 0.73)*	1.75 (1.46 - 2.11)*	1.01 (0.88 - 1.17)
<b>Ethnicity (ref. White UK):</b>			
Black Caribbean	0.75 (0.47 - 1.19)	0.6 (0.46 - 0.78)*	1.5 (1.16 - 1.94)*
Black African	0.35 (0.18 - 0.65)*	0.26 (0.18 - 0.37)*	1.91 (1.48 - 2.47)*
Indian	0.18 (0.07 - 0.52)*	0.16 (0.09 - 0.27)*	0.84 (0.59 - 1.19)
Pakistani/ Bangladeshi	1.03 (0.55 - 1.92)	0.15 (0.08 - 0.3)*	1.7 (1.19 - 2.42)*
Other ethnicity	1.1 (0.74 - 1.65)	0.7 (0.54 - 0.89)*	1.06 (0.82 - 1.37)
<b>Ethnicity x English language use</b>			
Black Caribbean; Some/little-no	1.34 (0.44 - 4.11)	1.16 (0.59 - 2.3)	1.2 (0.68 - 2.12)
Black African; Some/little-no	0.86 (0.32 - 2.31)	0.61 (0.34 - 1.09)	0.81 (0.59 - 1.1)
Indian; Some/little-no	2.33 (0.68 - 7.93)	0.67 (0.3 - 1.5)	0.93 (0.59 - 1.47)
Pakistani/Bangladeshi; Some/little-no	0.37 (0.15 - 0.92)*	0.72 (0.29 - 1.82)	0.82 (0.55 - 1.23)
Other ethnicity; Some/little-no	0.4 (0.24 - 0.66)*	0.26 (0.18 - 0.38)*	0.69 (0.52 - 0.9)*
<b>Sample size:</b>			n = 4,612

\*p≤0.05; Main effects of English language use with family constrained to equal 1.

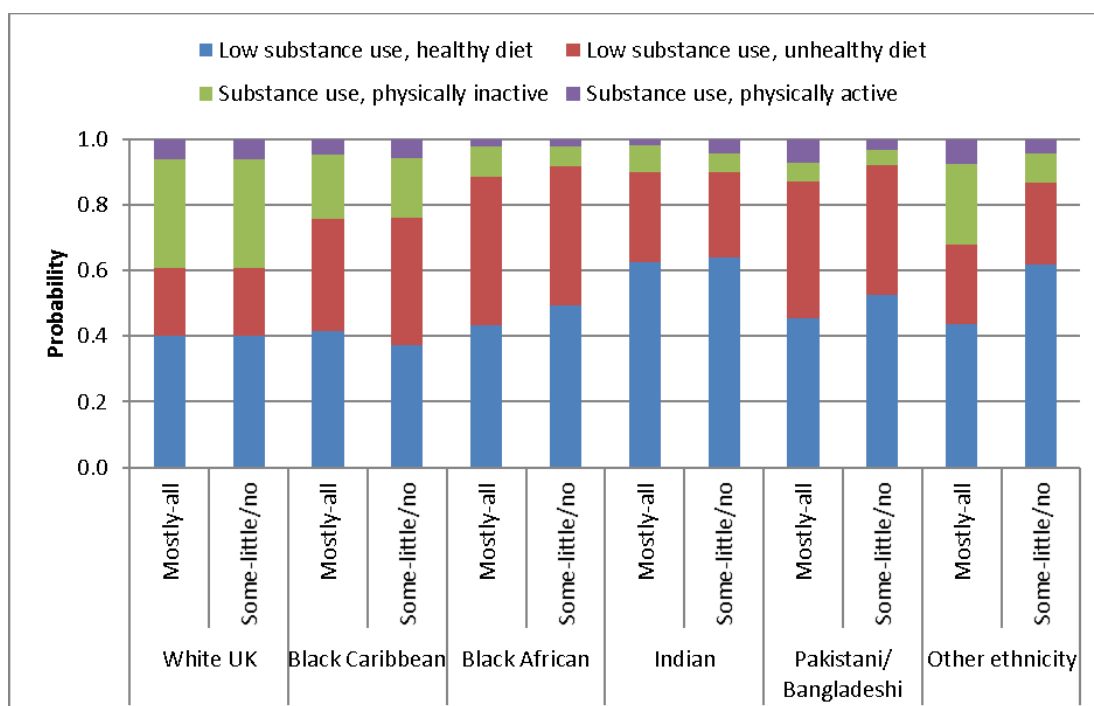


Figure 6-16: Predicted probabilities of clusters of health behaviours by ethnicity and English language use with family, adjusted for age and gender

### 6.3.6. Mediation of ethnic variations in adolescent health behaviours by household material disadvantage

To support the mediational hypothesis we require evidence that there are ethnic differences in household material disadvantage, which are in turn associated with differences in adolescent health behaviours, and that adjustment for household material disadvantage affects the strength or the direction of ethnic variations in adolescent health behaviours.

Ethnic variations in structural inequalities are shown in Table 5-6 (Section 5.1.6): Black Caribbean, Black African, Pakistani/ Bangladeshi, and Other ethnicity adolescents were more likely to live in households of either *Medium* or *Most*, compared to *Least* material disadvantage (among Indian adolescents there was no ethnic variation in household material disadvantage).

Household material disadvantage was added to multinomial logistic regression of health behaviours on ethnicity, adjusted for age and gender. Results of Wald tests for joint significance of the effects of *Medium* and *Most*, compared to *Least* household material disadvantage are shown in Table 6-16: household material disadvantage was significantly related to current alcohol use, fruit and vegetable consumption, physical activity, and clusters of health behaviours. In the following sections the findings of these models are discussed, including the percentage of ethnic variations in health behaviours explained.

Table 6-16. Chi2 tests of joint effects of household material disadvantage on adolescent health behaviours:

	Chi2:
Current tobacco use	1.3 (df=2) $p=0.51$
Current alcohol use	<b>11.4 (df=2) <math>p&lt;0.01</math></b>
Lifetime illicit drug use	4.4 (df=2) $p=0.11$
Fruit and vegetables	<b>33.7 (df=4) <math>p&lt;0.01</math></b>
Physical activity	<b>14.9 (df=4) <math>p&lt;0.01</math></b>
Body size	4.3 (df=4) $p=0.36$
Clusters of behaviours	<b>29.1 (df=6) <math>p&lt;0.01</math></b>

#### 6.3.6.1. Substance use behaviours

Adolescents living in *Medium* or *Most*, compared to *Least*, materially disadvantaged households were less likely to use alcohol; however, adjustment for household material

disadvantage resulted in negligible changes to ethnic variations in current alcohol use (Table 6-17), thus there is no evidence that household material disadvantage mediated any ethnic variations in current alcohol use.

Table 6-17. Multinomial regression predicting current alcohol use by ethnicity, adjusted for household material disadvantage, age, and gender:

	Current alcohol use (ref: no current use):		
	Unadjusted OR	Adjusted OR	Mediated (%)
<b>Age (years):</b>	1.62 (1.44 - 1.82)*	1.63 (1.45 - 1.84)*	
<b>Gender (ref: Male):</b>			
Female	1.36 (1.16 - 1.6)*	1.42 (1.21 - 1.67)*	
<b>Ethnicity (ref: White UK):</b>			
Black Caribbean	0.48 (0.39 - 0.6)*	0.48 (0.39 - 0.61)*	1%
Black African	0.16 (0.12 - 0.2)*	0.17 (0.13 - 0.21)*	1%
Indian	0.14 (0.1 - 0.19)*	0.14 (0.1 - 0.19)*	0%
Pakistani/ Bangladeshi	0.01 (0 - 0.02)*	0.01 (0 - 0.02)*	0%
Other ethnicity	0.38 (0.31 - 0.46)*	0.38 (0.31 - 0.47)*	1%
<b>Household material disadvantage (ref: Least):</b>			
Medium		0.85 (0.73 - 0.99)*	
Most		0.72 (0.59 - 0.87)*	
<b>Sample size:</b>	<i>n</i> = 4,723	<i>n</i> = 4,612	

\* $p \leq 0.05$

### 6.3.6.2. Body size and related behaviours

Adolescents who lived in *Medium* or *Most*, compared to *Least* materially disadvantaged households were at greater risk of eating less than 5 portions of fruit and vegetables per day, and engaging in less <7 hours physical activity per week; furthermore, adjustment for household material disadvantage resulted in small-moderate changes to ethnic variations in fruit and vegetable consumption (Table 6-18), and physical activity (Table 6-19).

Among Black Caribbean, Black African, and Pakistani/ Bangladeshi adolescents (who, compared to White UK were more likely to live in *Medium* or *Most*, compared to *Least*, materially disadvantaged households, and more likely to eat less than 5 portions of fruit and vegetable per day) mediation by household material disadvantage explained 10-16% of ethnic variation in the likelihood of eating <2 portions, and 12-17% of ethnic variations in the likelihood of eating 2-4 portions, of fruit and vegetables per day.

Among Black Caribbean adolescents (who, compared to White UK were more likely to live in *Medium* or *Most*, compared to *Least*, materially disadvantaged households, and less likely than White UK adolescents to engage in <7 hours physical activity per week) mediation by household material disadvantage suppressed 16% of the true ethnic variation in the likelihood of engaging in <7 hours physical activity per week.

In summary, there is evidence to suggest that mediation by household material disadvantage can partially explain lower fruit and vegetable consumption among Black Caribbean, Black African, and Pakistani/ Bangladeshi adolescents; whereas there is evidence to suggest that mediation by household material disadvantage suppresses greater physical activity among Black Caribbean adolescents.

Table 6-18. Multinomial regression predicting fruit and vegetable consumption by ethnicity, age, and gender; before and after adjusting for household material disadvantage:

	2-4 portions FV/day (ref:≥5 portions/ day):			<2 portions FV/day (ref:≥5 portions/ day):		
	Unadjusted OR	Adjusted OR	Mediated (%)	Unadjusted OR	Adjusted OR	Mediated (%)
<b>Age (years):</b>	1.03 (0.88 - 1.12)	1.03 (0.91 - 1.17)		1 (0.91 - 1.15)	1 (0.88 - 1.12)	
<b>Gender (ref. male):</b>						
Female	0.9 (0.84 - 1.14)	0.89 (0.76 - 1.04)		1.05 (0.77 - 1.02)	1.02 (0.87 - 1.2)	
<b>Ethnicity (ref. White UK):</b>						
Black Caribbean	<b>1.16 (0.36 - 0.59)*</b>	1.14 (0.87 - 1.48)	17%	<b>2.17 (0.42 - 0.68)*</b>	<b>2.05 (1.59 - 2.64)*</b>	10%
Black African	<b>1.43 (0.32 - 0.52)*</b>	<b>1.37 (1.06 - 1.78)*</b>	14%	<b>2.45 (0.47 - 0.74)*</b>	<b>2.21 (1.72 - 2.85)*</b>	16%
Indian	1.24 (0.76 - 1.42)	1.21 (0.91 - 1.62)	13%	0.98 (0.97 - 1.76)	0.94 (0.68 - 1.29)	-205%
Pakistani/ Bangladeshi	<b>1.58 (0.34 - 0.62)*</b>	<b>1.51 (1.11 - 2.06)*</b>	12%	<b>2.21 (0.55 - 0.95)*</b>	<b>2.05 (1.5 - 2.79)*</b>	13%
Other ethnicity	1.1 (0.68 - 1.04)	1.06 (0.85 - 1.31)	42%	1.19 (0.75 - 1.16)	1.13 (0.91 - 1.4)	31%
<b>Household material disadvantage (ref. Least):</b>						
Medium		1.15 (0.98 - 1.37)			<b>1.47 (1.24 - 1.73)*</b>	
Most		<b>1.44 (1.17 - 1.78)*</b>			<b>1.67 (1.36 - 2.05)*</b>	
<b>Sample size:</b>				<i>n</i> = 4,759	<i>n</i> = 4,612	

\* $p \leq 0.05$

Table 6-19. Multinomial regression predicting physical activity by ethnicity, age, and gender; before and after adjusting for adjusting for household material disadvantage:

	7-14 hours PA/week (ref:≥14 hours/day):			<7 hours PA/week (ref:≥14 hours/day):		
	Unadjusted OR	Adjusted OR	Mediated (%)	Unadjusted OR	Adjusted OR	Mediated (%)
<b>Age (years):</b>	1.14 (0.94 - 1.4)	1.12 (0.91 - 1.38)		1.17 (0.97 - 1.42)	1.15 (0.95 - 1.4)	
<b>Gender (ref. male):</b>						
Female	<b>1.59 (1.19 - 2.13)*</b>	1.56 (1.16 - 2.09)*		<b>4.55 (3.47 - 5.96)*</b>	<b>4.32 (3.28 - 5.68)*</b>	
<b>Ethnicity (ref. White UK):</b>						
Black Caribbean	0.75 (0.5 - 1.13)	0.7 (0.46 - 1.06)	-22%	<b>0.68 (0.46 - 0.99)*</b>	<b>0.62 (0.42 - 0.92)*</b>	-16%
Black African	0.88 (0.59 - 1.33)	0.84 (0.55 - 1.29)	-33%	0.78 (0.53 - 1.15)	0.73 (0.49 - 1.08)	-26%
Indian	0.86 (0.51 - 1.46)	0.88 (0.51 - 1.49)	8%	1.13 (0.69 - 1.84)	1.16 (0.7 - 1.9)	-19%
Pakistani/ Bangladeshi	1.07 (0.65 - 1.74)	1.08 (0.65 - 1.79)	-18%	1.05 (0.66 - 1.67)	1.02 (0.63 - 1.65)	59%
Other ethnicity	0.92 (0.64 - 1.32)	0.91 (0.63 - 1.31)	-19%	0.8 (0.57 - 1.12)	0.76 (0.53 - 1.07)	-22%
<b>Household material disadvantage (ref. Least):</b>						
Medium		1.23 (0.93 - 1.61)			<b>1.42 (1.1 - 1.84)*</b>	
Most		1.2 (0.84 - 1.7)			<b>1.57 (1.13 - 2.18)*</b>	
<b>Sample size:</b>				<i>n</i> = 4,655	<i>n</i> = 4,513	

\* $p \leq 0.05$



### 6.3.6.3. Clustering of health behaviours

Adolescents who lived in *Medium* or *Most*, compared to *Least*, materially disadvantaged households were at greater risk of being in the *Low substance use: unhealthy diet* cluster, and at lower risk of being in the *High substance use: physically active cluster*; furthermore, adjustment for household material disadvantage resulted in small changes to ethnic variations in cluster membership (Table 6-20).

Among Black Caribbean, and Pakistani/ Bangladeshi adolescents (who, compared to White UK, were more likely to live in *Medium* or *Most*, compared to *Least*, materially disadvantaged households, and were more likely to be in the *Low substance use: unhealthy diet* cluster, and less likely to be in the *High substance use: physically inactive cluster*, than the *Low substance use: healthy diet* cluster), mediation by household material disadvantage explained 9% and 16% of respective ethnic variations in *Low substance use: unhealthy diet* cluster membership.

Among Black African adolescents (who, compared to White UK, were less likely to be in the *High substance use: physically active* cluster or the *Low substance use: unhealthy diet* cluster, than the *Low substance use: healthy diet* cluster), mediation by household material disadvantages explained 7% and 16% of ethnic variation in *High substance use: physically active*, and *Low substance use: unhealthy diet* cluster membership, respectively.

In summary, there is evidence to suggest that mediation by household material disadvantage can partially explain clustering of adolescent health behaviours among Black Caribbean, Black African, and Pakistani/ Bangladeshi adolescents.



Table 6-20. Multinomial regression predicting clusters of health behaviours by ethnicity, age, and gender; before and after adjusting for household material disadvantage:

	High substance use, physically active (ref: Low substance use, healthy diet):			High substance use, physically inactive (ref: Low substance use, healthy diet):			Low substance use, unhealthy diet (ref: Low substance use, healthy diet):		
	Unadjusted OR	Adjusted OR	Mediated (%)	Unadjusted OR	Adjusted OR	Mediated (%)	Unadjusted OR	Adjusted OR	Mediated (%)
<b>Age (years):</b>	<b>1.36 (1.08 - 1.71)*</b>	<b>1.39 (1.1 - 1.76)*</b>		<b>1.65 (1.42 - 1.91)*</b>	<b>1.66 (1.43 - 1.93)*</b>		0.97 (0.87 - 1.09)	0.96 (0.86 - 1.08)	
<b>Gender (ref: Male):</b>									
Female	<b>0.53 (0.39 - 0.72)*</b>	<b>0.54 (0.39 - 0.74)*</b>		<b>1.77 (1.47 - 2.13)*</b>	<b>1.82 (1.51 - 2.2)*</b>		1.01 (0.88 - 1.16)	0.99 (0.86 - 1.14)	
<b>Ethnicity (ref: White UK):</b>									
Black Caribbean	0.86 (0.54 - 1.35)	0.87 (0.54 - 1.39)	6%	<b>0.61 (0.47 - 0.8)*</b>	<b>0.62 (0.47 - 0.82)*</b>	3%	<b>1.53 (1.2 - 1.95)*</b>	<b>1.48 (1.15 - 1.9)*</b>	9%
Black African	<b>0.37 (0.22 - 0.64)*</b>	<b>0.42 (0.24 - 0.72)*</b>	7%	<b>0.23 (0.17 - 0.31)*</b>	<b>0.22 (0.16 - 0.3)*</b>	-1%	<b>1.77 (1.41 - 2.23)*</b>	<b>1.65 (1.3 - 2.09)*</b>	16%
Indian	<b>0.3 (0.15 - 0.58)*</b>	<b>0.3 (0.16 - 0.59)*</b>	0%	<b>0.14 (0.09 - 0.21)*</b>	<b>0.14 (0.09 - 0.21)*</b>	0%	0.79 (0.59 - 1.05)	0.77 (0.57 - 1.02)	-12%
Pakistani/ Bangladeshi	0.7 (0.41 - 1.19)	0.75 (0.44 - 1.3)	19%	<b>0.13 (0.08 - 0.22)*</b>	<b>0.14 (0.08 - 0.22)*</b>	0%	<b>1.5 (1.14 - 1.95)*</b>	<b>1.41 (1.08 - 1.86)*</b>	16%
Other ethnicity	0.85 (0.58 - 1.23)	0.89 (0.61 - 1.3)	31%	<b>0.47 (0.38 - 0.6)*</b>	<b>0.47 (0.38 - 0.6)*</b>	0%	0.97 (0.87 - 1.09)	0.87 (0.69 - 1.09)	-18%
<b>Household material disadvantage (ref: Least):</b>									
Medium		<b>0.68 (0.5 - 0.93)*</b>			1 (0.82 - 1.21)			<b>1.37 (1.17 - 1.6)*</b>	
Most		0.7 (0.47 - 1.05)			0.91 (0.72 - 1.16)			<b>1.32 (1.09 - 1.6)*</b>	
<b>Sample size:</b>							<i>n</i> = 4,774	<i>n</i> = 4,616	

\**p*≤0.05

### 6.3.7. Mediation of ethnic variations in adolescent health behaviours by family structure

To support the mediational hypothesis we require evidence that there are ethnic differences in family structure, which are in turn associated with differences in adolescent health behaviours, and that adjustment for family structure affects the strength or the direction of ethnic variations in adolescent health behaviours.

Ethnic variations in structural inequalities are shown in Table 5-6 (Section 5.1.6): Black Caribbean adolescents were more likely to live in *Reconstituted*, *Single-parent*, and *Other*, than *Two-parent* families; Black African adolescents were less likely to live in *Reconstituted*, but more likely to live in *Single-parent*, or *Other*, than *Two-parent* families; Indian, and Pakistani/ Bangladeshi adolescents were less likely to live in *Reconstituted*, or *Single-parent*, than *Two-parent* families; and Other ethnicity adolescents were more likely to live in *Single-parent*, or *Other*, than *Two-parent* families.

Next, family structure was added to multinomial logistic regression of health behaviours on ethnicity, adjusted for age and gender. Results of Wald tests for joint significance of the effects of living in *Reconstituted*, *Single-parent*, or *Other* compared to *Two-parent* families are shown in Table 6-21: family structure was associated with tobacco, alcohol, and illicit drug use, fruit and vegetable consumption and clusters of health behaviours.

Table 6-21. Chi2 test of joint effects of family structure on adolescent health behaviours:

	Chi2:
Current tobacco use	<b>14.3 (df=3) <math>p&lt;0.01</math></b>
Current alcohol use	<b>20.2 (df=3) <math>p&lt;0.01</math></b>
Lifetime illicit drug use	<b>27.6 (df=3) <math>p&lt;0.01</math></b>
Fruit and vegetables	<b>23.0 (df=6) <math>p&lt;0.01</math></b>
Physical activity	1.3 (df=6) $p=0.97$
Body size	6.3 (df=6) $p=0.39$
Clusters of behaviours	<b>48.1 (df=9) <math>p&lt;0.01</math></b>

#### 6.3.7.1. Substance use behaviours

Adolescents who lived in *Reconstituted*, or *Single-parent*, compared to *Two-parent* families were at greater risk of using tobacco, alcohol, and illicit drugs; furthermore, adjustment for family structure resulted in some small-moderate changes to ethnic variations in substance use behaviours (Table 6-22).

Among Black Caribbean adolescents (who, compared to White UK, were more likely to live in *Reconstituted* or *Single-parent*, compared to *Two-parent* families, but were less likely to use tobacco, alcohol, or illicit drugs), mediation by family structure suppressed ethnic variation in tobacco use by 6%, alcohol use by 7%, and illicit drug use by 23%. Among Pakistani/ Bangladeshi adolescents (who, compared to White UK, were less likely to live in *Reconstituted* or *Single-parent*, compared to *Two-parent* families, and were less likely to use tobacco, alcohol, or illicit drugs), mediation by family structure explained 6% of ethnic variation in tobacco use, and 5% of ethnic variation in illicit drug use. Adjustment for family structure did not result in any changes to ethnic variation in alcohol use among Pakistani/ Bangladeshi adolescents.

In summary, there is evidence that mediation by family structure suppresses some ethnic variations in substance use behaviours among Black Caribbean adolescents, but explains some ethnic variation in tobacco, and illicit drug use among Pakistani/ Bangladeshi adolescents.

Table 6-22. Multinomial regression predicting substance use behaviours by ethnicity, age, and gender; before and after adjusting for family structure:

	Current tobacco use (ref: no current use):			Current alcohol use (ref: no current use):			Lifetime drug use (ref: no lifetime use):		
	Unadjusted OR	Adjusted OR	Mediated (%)	Unadjusted OR	Adjusted OR	Mediated (%)	Unadjusted OR	Adjusted OR	Mediated (%)
<b>Age (years):</b>	1.55 (1.32 - 1.81)*	1.56 (1.33 - 1.82)*		1.62 (1.44 - 1.82)*	1.63 (1.45 - 1.84)*		1.57 (1.39 - 1.78)*	1.57 (1.39 - 1.78)*	
<b>Gender (ref: Male):</b> Female	1.7 (1.39 - 2.08)*	1.56 (1.33 - 1.82)*		1.36 (1.16 - 1.6)*	1.35 (1.15 - 1.59)*		1.24 (1.05 - 1.45)*	1.22 (1.03 - 1.44)*	
<b>Ethnicity (ref: White UK):</b>									
Black Caribbean	0.39 (0.29 - 0.53)*	0.36 (0.26 - 0.48)*	-6%	0.48 (0.39 - 0.6)*	0.45 (0.36 - 0.56)*	-7%	0.68 (0.54 - 0.86)*	0.61 (0.48 - 0.77)*	-23%
Black African	0.15 (0.1 - 0.22)*	0.15 (0.1 - 0.22)*	-1%	0.16 (0.12 - 0.2)*	0.16 (0.12 - 0.2)*	0%	0.32 (0.25 - 0.41)*	0.31 (0.24 - 0.4)*	-1%
Indian	0.19 (0.12 - 0.31)*	0.21 (0.13 - 0.34)*	3%	0.14 (0.1 - 0.19)*	0.15 (0.11 - 0.21)*	1%	0.21 (0.15 - 0.3)*	0.23 (0.16 - 0.34)*	3%
Pakistani/ Bangladeshi	0.37 (0.26 - 0.55)*	0.41 (0.28 - 0.6)*	6%	0.01 (0 - 0.02)*	0.01 (0 - 0.02)*	0%	0.35 (0.25 - 0.48)*	0.38 (0.28 - 0.53)*	5%
Other ethnicity	0.56 (0.44 - 0.71)*	0.55 (0.44 - 0.7)*	-2%	0.38 (0.31 - 0.46)*	0.37 (0.31 - 0.45)*	-1%	0.63 (0.52 - 0.77)*	0.62 (0.5 - 0.75)*	-4%
<b>Family structure (ref: Two parent):</b>									
Reconstructed		1.57 (1.19 - 2.07)*			1.55 (1.25 - 1.92)*			1.49 (1.19 - 1.86)*	
Single parent		1.41 (1.12 - 1.76)*			1.3 (1.1 - 1.53)*			1.51 (1.27 - 1.79)*	
Other		1.21 (0.79 - 1.84)			1.06 (0.79 - 1.41)			1.03 (0.74 - 1.43)	
<b>Sample size:</b>	n = 4,723	n = 4,714		n = 4717	n = 4,707		n = 4,718	n = 4,708	

\*p≤0.05

### 6.3.7.2. Body size and related behaviours

Compared to adolescents who lived in *Two-parent* families, those who lived in *Reconstituted* families were at greater risk of eating <2 *portions*, compared to  $\geq 5$  *portions* of fruit and vegetables per day; furthermore, adjustment for family structure resulted in some moderate changes to ethnic variations in fruit and vegetable consumption (Table 6-23).

Among Black Caribbean adolescents (who, compared to White UK, were more likely to live in *Reconstituted* or *Single-parent*, compared to *Two-parent* families, and were more likely to eat <2 *portions*, than  $\geq 5$  *portions* of fruit and vegetables per day), mediation by family structure explained 17% of ethnic variations in the likelihood of eating <2 *portions* of fruit and vegetables per day. Among Black African adolescents (who, compared to White UK, were less likely to live in *Reconstituted*, but more likely to live in *Single-parent* families, and were more likely to eat <2 *portions*, or 2-4 *portions*, than  $\geq 5$  *portions* of fruit and vegetables per day), mediation by family structure explained 7% of the ethnic variation in the likelihood of eating 2-4 *portions* of fruit and vegetables per day. Among Pakistani/ Bangladeshi adolescents (who, compared to White UK, were less likely to live in *Reconstituted*, or *Single-parent* families, and were more likely to eat <2 *portions*, or 2-4 *portions*, than  $\geq 5$  *portions* of fruit and vegetables per day), mediation by family structure suppressed ethnic variations in the likelihood of eating 2-4 portion fruit and vegetables per day by 9%, and suppressed ethnic variations in the likelihood of eating <2 portions of fruit and vegetables by 15%.

In summary, there is evidence for mediation of ethnic variations in fruit and vegetable consumption by family structure that explains some ethnic variation among Black Caribbean adolescents but suppresses some ethnic variation in fruit and vegetable consumption among Black African, and Pakistani/ Bangladeshi adolescents.

Table 6-23. Multinomial regression predicting fruit and vegetable consumption by ethnicity, age, and gender; before and after adjusting for family structure:

	2-4 portions FV/day (ref:≥5 portions/ day):			<2 portions FV/day (ref:≥5 portions/ day):		
	Unadjusted OR	Adjusted OR	Mediated (%)	Unadjusted OR	Adjusted OR	Mediated (%)
<b>Age (years):</b>	1.03 (0.91 - 1.16)	1.02 (0.91 - 1.16)		1 (0.89 - 1.13)	1.01 (0.9 - 1.14)	
<b>Gender (ref. male):</b>						
Female	0.9 (0.77 - 1.05)	0.89 (0.76 - 1.05)		1.05 (0.89 - 1.23)	1.03 (0.87 - 1.2)	
<b>Ethnicity (ref. White UK):</b>						
Black Caribbean	1.16 (0.9 - 1.51)	1.14 (0.87 - 1.48)	16%	<b>2.17 (1.69 - 2.77)*</b>	<b>1.97 (1.53 - 2.53)*</b>	17%
Black African	<b>1.43 (1.11 - 1.84)*</b>	<b>1.4 (1.09 - 1.81)*</b>	7%	<b>2.45 (1.91 - 3.13)*</b>	<b>2.39 (1.86 - 3.06)*</b>	4%
Indian	1.24 (0.93 - 1.66)	1.29 (0.96 - 1.72)	-18%	0.98 (0.72 - 1.34)	1.07 (0.78 - 1.47)	454%
Pakistani/ Bangladeshi	<b>1.58 (1.16 - 2.14)*</b>	<b>1.63 (1.2 - 2.22)*</b>	-9%	<b>2.21 (1.63 - 3)*</b>	<b>2.39 (1.75 - 3.25)*</b>	-15%
Other ethnicity	1.1 (0.89 - 1.36)	1.1 (0.89 - 1.36)	3%	1.19 (0.96 - 1.47)	1.16 (0.93 - 1.44)	13%
<b>Family structure (ref. Two parent):</b>						
Reconstructed		1.15 (0.9 - 1.48)			<b>1.4 (1.1 - 1.77)*</b>	
Single		1.17 (0.98 - 1.41)			<b>1.47 (1.23 - 1.75)*</b>	
Other		0.89 (0.64 - 1.24)			1.13 (0.84 - 1.53)	
<b>Sample size:</b>				n = 4,759	n = 4,745	

\*p≤0.05



### 6.3.7.3. Clustering of health behaviours

Compared to adolescents who lived in *Two-parent* families, those who lived in *Reconstituted* or *Single-parent* families were more likely to be in the *Low substance use: unhealthy diet* and *High substance use: physically inactive* clusters, than the *Low substance use: healthy diet* cluster; furthermore, adjustment for family structure resulted in some moderate changes to ethnic variations in cluster membership (Table 6-24).

Among Black Caribbean adolescents (who, compared to White UK, were more likely to live in *Reconstituted* or *Single-parent*, compared to *Two-parent* families, and were more likely to be in *Low substance use: unhealthy diet*, and *High substance use: physically inactive* clusters, than the *Low substance use: healthy diet* cluster), mediation by family structure explained 25% of ethnic variation in the likelihood of being in the *Low substance use: unhealthy diet*, while suppressing 25% and 70% of ethnic variations in the likelihood of being in the *High substance use: physically inactive* cluster, and *High substance use: physically active* clusters, respectively.

Among Indian adolescents (who, compared to White UK, were less likely to live in *Reconstituted*, or *Single-parent* families, and were less likely to be in the *High substance use: physically inactive* cluster, *High substance use: physically active* clusters, and *Low substance use: unhealthy diet* cluster, than the *Low substance use: healthy diet* cluster), mediation by family structure explained 37% of the ethnic variation in membership of the *Low substance use: unhealthy diet* cluster.

Among Pakistani/ Bangladeshi adolescents who were less likely to live in *Reconstituted*, or *Single-parent* families, and were less likely to be in the *High substance use: physically inactive* cluster, and *High substance use: physically active* clusters, but more likely to be in the *Low substance use: unhealthy diet* cluster, than the *Low substance use: healthy diet* cluster), mediation by family structure suppressed 32% of the ethnic variation in membership of the *Low substance use: unhealthy diet* cluster. There is no evidence that family structure mediated any ethnic variation in cluster membership among Black African or Other ethnicity adolescents.

In summary, there is evidence that family structure mediates some ethnic variations in clustering of adolescent health behaviours among Black Caribbean, Indian, and Pakistani/ Bangladeshi adolescents.



Table 6-24. Multinomial regression predicting clusters of health behaviours by ethnicity, age, and gender; before and after adjusting for family structure:

	High substance use, physically active (ref: Low substance use, healthy diet):			High substance use, physically inactive (ref: Low substance use, healthy diet):			Low substance use, unhealthy diet (ref: Low substance use, healthy diet):		
	Unadjusted OR	Adjusted OR	Mediated (%)	Unadjusted OR	Adjusted OR	Mediated (%)	Unadjusted OR	Adjusted OR	Mediated (%)
<b>Age (years):</b>	1.36 (1.08 - 1.71)*	1.33 (1.05 - 1.69)*		1.65 (1.42 - 1.91)*	1.68 (1.44 - 1.95)*		0.97 (0.87 - 1.09)	0.97 (0.86 - 1.09)	
<b>Gender (ref: Male):</b> Female	0.53 (0.39 - 0.72)*	0.52 (0.38 - 0.72)*		1.77 (1.47 - 2.13)*	1.74 (1.44 - 2.1)*		1.01 (0.88 - 1.16)	1.02 (0.89 - 1.18)	
<b>Ethnicity (ref: White UK):</b>									
Black Caribbean	0.86 (0.54 - 1.35)	0.76 (0.47 - 1.22)	-70%	0.61 (0.47 - 0.8)*	0.51 (0.39 - 0.68)*	-25%	1.53 (1.2 - 1.95)*	1.39 (1.08 - 1.8)*	25%
Black African	0.37 (0.22 - 0.64)*	0.39 (0.22 - 0.67)*	2%	0.23 (0.17 - 0.31)*	0.22 (0.16 - 0.31)*	0%	1.77 (1.41 - 2.23)*	1.76 (1.39 - 2.23)*	1%
Indian	0.3 (0.15 - 0.58)*	0.32 (0.16 - 0.62)*	3%	0.14 (0.09 - 0.21)*	0.16 (0.1 - 0.24)*	2%	0.79 (0.59 - 1.05)	0.87 (0.65 - 1.16)	37%
Pakistani/ Bangladeshi	0.7 (0.41 - 1.19)	0.71 (0.41 - 1.23)	5%	0.13 (0.08 - 0.22)*	0.16 (0.1 - 0.26)*	3%	1.5 (1.14 - 1.95)*	1.65 (1.26 - 2.18)*	-32%
Other ethnicity	0.85 (0.58 - 1.23)	0.81 (0.56 - 1.18)	-24%	0.47 (0.38 - 0.6)*	0.46 (0.37 - 0.58)*	-2%	0.97 (0.87 - 1.09)	0.89 (0.71 - 1.12)	3%
<b>Family structure (ref. Two parent):</b>									
Reconstructed		1.36 (0.84 - 2.2)			1.88 (1.42 - 2.49)*			1.41 (1.1 - 1.8)*	
Single		1.3 (0.92 - 1.84)			1.87 (1.52 - 2.3)*			1.3 (1.1 - 1.54)*	
Other		1.96 (0.8 - 4.8)			1.07 (0.53 - 2.17)			1.43 (0.89 - 2.31)	
<b>Sample size:</b>							n = 4,774	n = 4,774	

\*p≤0.05

### 6.3.8. Mediation of ethnic variations in adolescent health behaviours by household crowding

To support the mediational hypothesis we require evidence that there are ethnic differences in household overcrowding, which are in turn associated with differences in adolescent health behaviours, and that adjustment for household overcrowding affects the strength or the direction of ethnic variations in adolescent health behaviours.

Ethnic variations in structural inequalities are shown in Table 5-6 (Section 5.1.6): Black African, and Pakistani/ Bangladeshi adolescents were more likely to live in overcrowded households.

Next, household overcrowding was added to multinomial logistic regression of health behaviours on ethnicity, adjusted for age and gender. Results of chi<sup>2</sup> tests of the effects of living in an overcrowded household are shown in Table 6-25: household overcrowding was associated with alcohol, and illicit drug use, physical activity, and clusters of health behaviours.

Table 6-25. Chi<sup>2</sup> tests of joint significance of effects of household overcrowding predicting adolescent health behaviours:

Health behaviour:	Joint effects of household overcrowding:
Current tobacco use	$p=0.33$
Current alcohol use	<b><math>p&lt;0.01</math></b>
Lifetime illicit drug use	<b><math>p=0.02</math></b>
Fruit and vegetables	2.5 (df=2) $p=0.28$
Physical activity	<b>5.5 (df=2) <math>p=0.06</math></b>
Body size	0.11 (df=2) $p=0.95$
Clusters of behaviours	<b>6.2 (df=3) <math>p=0.10</math></b>

#### 6.3.8.1. Substance use behaviours

Adolescents who lived in overcrowded households were less likely to report current alcohol, or lifetime illicit drug use; however, adjustment for household overcrowding had little effect on ethnic variations in alcohol and illicit drug use (Table 6-26). Thus, there is no evidence that differences in household overcrowding mediated ethnic variations in alcohol or illicit drug use.

#### 6.3.8.2. Body size and related behaviours

Adolescents who lived in overcrowded households were less likely to engage in less than 14 hours of physical activity per week, and statistically significantly less likely to engage in *<7 hours/week*, compared to *≥14 hours/week*, physical activity; however, adjustment for household overcrowding resulted no change to ethnic variations in physical activity (Table 6-27). Thus, there is no evidence that differences in household overcrowding mediated ethnic variations in physical activity.

#### 6.3.8.3. Clustering of health behaviours

Adolescents who lived in overcrowded households were less likely to be in the *High substance use: physically inactive*, compared to the *Low substance use: healthy diet* cluster; however, adjustment for household overcrowding resulted no change to ethnic variations in cluster membership (Table 6-28). Thus, there is no evidence that differences in household overcrowding mediated ethnic variations in the clustering of health behaviours.

Table 6-26. Multinomial regression predicting tobacco and illicit drug use by ethnicity, age and gender; before and after adjusting for household overcrowding:

	Current alcohol use (ref: no current use):			Lifetime drug use (ref: no lifetime use):		
	Unadjusted OR	Adjusted OR	Mediated (%)	Unadjusted OR	Adjusted OR	Mediated (%)
<b>Age (years):</b>	<b>1.62 (1.44 - 1.82)*</b>	<b>1.64 (1.46 - 1.84)*</b>		<b>1.57 (1.39 - 1.78)*</b>	<b>1.56 (1.38 - 1.76)*</b>	
<b>Gender (ref: Male):</b>						
Female	<b>1.36 (1.16 - 1.6)*</b>	<b>1.37 (1.16 - 1.61)*</b>		<b>1.24 (1.05 - 1.45)*</b>	<b>1.24 (1.05 - 1.46)*</b>	
<b>Ethnicity (ref: White UK):</b>						
Black Caribbean	<b>0.48 (0.39 - 0.6)*</b>	<b>0.47 (0.38 - 0.59)*</b>	-2%	<b>0.68 (0.54 - 0.86)*</b>	<b>0.68 (0.54 - 0.85)*</b>	-2%
Black African	<b>0.16 (0.12 - 0.2)*</b>	<b>0.17 (0.13 - 0.21)*</b>	1%	<b>0.32 (0.25 - 0.41)*</b>	<b>0.32 (0.25 - 0.42)*</b>	1%
Indian	<b>0.14 (0.1 - 0.19)*</b>	<b>0.14 (0.11 - 0.19)*</b>	0%	<b>0.21 (0.15 - 0.3)*</b>	<b>0.21 (0.14 - 0.3)*</b>	0%
Pakistani/ Bangladeshi	<b>0.01 (0 - 0.02)*</b>	<b>0.01 (0 - 0.02)*</b>	0%	<b>0.35 (0.25 - 0.48)*</b>	<b>0.36 (0.26 - 0.5)*</b>	2%
Other ethnicity	<b>0.38 (0.31 - 0.46)*</b>	<b>0.37 (0.31 - 0.46)*</b>	0%	<b>0.63 (0.52 - 0.77)*</b>	<b>0.63 (0.52 - 0.77)*</b>	1%
<b>Household overcrowding (ref: not overcrowded):</b>						
Overcrowded		<b>0.48 (0.32 - 0.71)*</b>			<b>0.62 (0.41 - 0.93)*</b>	
<b>Sample size:</b>	<i>n</i> = 4,717	<i>n</i> = 4,663		<i>n</i> = 4,718	<i>n</i> = 4,667	

\* $p \leq 0.05$

Table 6-27. Multinomial regression predicting physical activity, by ethnicity, age and gender; before and after adjusting for household overcrowding:

	7-14 hours PA/week (ref:≥14 hours/day):			<7 hours PA/week (ref:≥14 hours/day):		
	Unadjusted OR	Adjusted OR	Mediated (%)	Unadjusted OR	Adjusted OR	Mediated (%)
<b>Age (years):</b>	1.14 (0.94 - 1.4)	1.13 (0.93 - 1.39)		1.17 (0.97 - 1.42)	1.16 (0.96 - 1.4)	
<b>Gender (ref. male):</b>						
Female	<b>1.59 (1.19 - 2.13)*</b>	<b>1.58 (1.18 - 2.11)*</b>		<b>4.55 (3.47 - 5.96)*</b>	<b>4.55 (3.47 - 5.97)*</b>	
<b>Ethnicity (ref. White UK):</b>						
Black Caribbean	0.75 (0.5 - 1.13)	0.75 (0.5 - 1.13)	-1%	<b>0.68 (0.46 - 0.99)*</b>	<b>0.67 (0.46 - 0.99)*</b>	0%
Black African	0.88 (0.59 - 1.33)	0.89 (0.59 - 1.35)	11%	0.78 (0.53 - 1.15)	0.81 (0.55 - 1.2)	15%
Indian	0.86 (0.51 - 1.46)	0.87 (0.51 - 1.47)	3%	1.13 (0.69 - 1.84)	1.13 (0.69 - 1.84)	1%
Pakistani/ Bangladeshi	1.07 (0.65 - 1.74)	1.1 (0.68 - 1.81)	-56%	1.05 (0.66 - 1.67)	1.1 (0.69 - 1.76)	-94%
Other ethnicity	0.92 (0.64 - 1.32)	0.92 (0.64 - 1.33)	5%	0.8 (0.57 - 1.12)	0.82 (0.58 - 1.15)	9%
<b>Household overcrowding (ref. not overcrowded):</b>						
Overcrowded		0.72 (0.44 - 1.18)			<b>0.59 (0.37 - 0.93)*</b>	
<b>Sample size:</b>				<i>n</i> = 4,655	<i>n</i> = 4,603	

\**p*≤0.05

Table 6-28. Multinomial regression predicting clusters of health behaviours, by ethnicity, age and gender; before and after adjustment for household overcrowding:

	High substance use, physically active (ref: Low substance use, healthy diet):			High substance use, physically inactive (ref: Low substance use, healthy diet):			Low substance use, unhealthy diet (ref: Low substance use, healthy diet):		
	Unadjusted OR	Adjusted OR	Mediated (%)	Unadjusted OR	Adjusted OR	Mediated (%)	Unadjusted OR	Adjusted OR	Mediated (%)
<b>Age (years):</b>	<b>1.36 (1.08 - 1.71)*</b>	<b>1.37 (1.09 - 1.73)*</b>		<b>1.65 (1.42 - 1.91)*</b>	<b>1.65 (1.43 - 1.91)*</b>		0.97 (0.87 - 1.09)	0.98 (0.87 - 1.1)	
<b>Gender</b> (ref: Male):									
Female	<b>0.53 (0.39 - 0.72)*</b>	<b>0.53 (0.38 - 0.72)*</b>		<b>1.77 (1.47 - 2.13)*</b>	<b>1.77 (1.47 - 2.13)*</b>		1.01 (0.88 - 1.16)	0.99 (0.86 - 1.14)	
<b>Ethnicity</b> (ref. White UK):									
Black Caribbean	0.86 (0.54 - 1.35)	0.87 (0.55 - 1.38)	11%	<b>0.61 (0.47 - 0.8)*</b>	<b>0.61 (0.47 - 0.8)*</b>	0%	<b>1.53 (1.2 - 1.95)*</b>	<b>1.57 (1.23 - 2.01)*</b>	-9%
Black African	<b>0.37 (0.22 - 0.64)*</b>	<b>0.36 (0.21 - 0.63)*</b>	-2%	<b>0.23 (0.17 - 0.31)*</b>	<b>0.24 (0.17 - 0.33)*</b>	2%	<b>1.77 (1.41 - 2.23)*</b>	<b>1.83 (1.45 - 2.31)*</b>	-7%
Indian	<b>0.3 (0.15 - 0.58)*</b>	<b>0.3 (0.15 - 0.58)*</b>	0%	<b>0.14 (0.09 - 0.21)*</b>	<b>0.13 (0.09 - 0.2)*</b>	0%	0.79 (0.59 - 1.05)	0.8 (0.6 - 1.07)	4%
Pakistani/ Bangladeshi	0.7 (0.41 - 1.19)	0.69 (0.4 - 1.18)	-2%	<b>0.13 (0.08 - 0.22)*</b>	<b>0.14 (0.09 - 0.23)*</b>	1%	<b>1.5 (1.14 - 1.95)*</b>	<b>1.51 (1.15 - 1.99)*</b>	-4%
Other ethnicity	0.85 (0.58 - 1.23)	0.85 (0.58 - 1.23)	1%	<b>0.47 (0.38 - 0.6)*</b>	<b>0.47 (0.38 - 0.59)*</b>	0%	0.89 (0.71 - 1.11)	0.9 (0.72 - 1.13)	11%
<b>Household overcrowding</b> (ref: not overcrowded):									
Overcrowded		1.06 (0.56 - 2.04)			<b>0.5 (0.28 - 0.87)*</b>			0.94 (0.69 - 1.26)	
<b>Sample size:</b>							n = 4,774	n = 4,700	

\*p≤0.05

### **6.3.9. Mediation of ethnic variations in adolescent health behaviours by experiences of racism**

To support the mediational hypothesis we require evidence that there are ethnic differences in experiences of racism, which are in turn associated with differences in adolescent health behaviours, and that adjustment for experiences of racism affects the strength or the direction of ethnic variations in adolescent health behaviours.

Ethnic variations in structural inequalities are shown in Table 5-6 (Section 5.1.6): compared to White UK, adolescents of all ethnicities were significantly more likely to have experienced racism.

Next, experiences of racism were added to multinomial logistic regression of health behaviours on ethnicity, adjusted for age and gender. Results of chi<sup>2</sup> tests of the effects of experiences of racism are shown in Table 6-29: experiences of racism were associated with tobacco, alcohol, and illicit drug use, physical activity, and clusters of health behaviours.

Table 6-29. Chi2 tests of joint effects of experiences of racism on adolescent health behaviours predicting adolescent health behaviours:

	Chi2
Current tobacco use	<b><i>p</i>&lt;0.01</b>
Current alcohol use	<b><i>p</i>&lt;0.01</b>
Lifetime illicit drug use	<b><i>p</i>&lt;0.01</b>
Fruit and vegetables	0.0 (df=2) <i>p</i> =1.00
Physical activity	<b>17.1 (df=2) <i>p</i>&lt;0.01</b>
Body size	2.5 (df=2) <i>p</i> =0.29
Clusters of behaviours	<b>19.6 (df=3) <i>p</i>&lt;0.01</b>

#### 6.3.9.1. Substance use behaviours

Adolescents who had experienced racism were at greater risk of using tobacco, alcohol, and illicit drugs; furthermore, adjustment for experiences of racism resulted in some small changes to ethnic variations in tobacco, and illicit drug use (Table 6-30, and Table 6-31, respectively).

Among Other ethnicity adolescents (who, compared to White UK, were more likely to have experienced racism, but were less likely to engage in substance use behaviours), mediation by experiences of racism suppressed ethnic variation in tobacco use by 8% and illicit drug use by 9%. Among Black Caribbean adolescents (who, compared to White UK, were more likely to have experienced racism and were less likely to use tobacco, alcohol, or illicit drugs), mediation by experiences of racism suppressed 7% of ethnic variation in illicit drug use. Adjustment for experiences of racism did not result in any substantial changes to any ethnic variations in current alcohol use.

In summary, there is evidence that mediation by experiences of racism suppressed some ethnic variations in tobacco and illicit drug use among Black Caribbean and Other ethnicity adolescents.



Table 6-30. Multinomial regression predicting current tobacco, and alcohol use, by ethnicity, age and gender; before and after adjusting for experiences of racism:

	Current tobacco use (ref: no current use):			Current alcohol use (ref: no current use):		
	Unadjusted OR	Adjusted OR	Mediated (%)	Unadjusted OR	Adjusted OR	Mediated (%)
<b>Age (years):</b>	<b>1.55 (1.32 - 1.81)*</b>	<b>1.55 (1.32 - 1.81)*</b>		<b>1.62 (1.44 - 1.82)*</b>	<b>1.61 (1.43 - 1.81)*</b>	
<b>Gender (ref: Male):</b>						
Female	<b>1.7 (1.39 - 2.08)*</b>	<b>1.72 (1.41 - 2.1)*</b>		<b>1.36 (1.16 - 1.6)*</b>	<b>1.37 (1.16 - 1.6)*</b>	
<b>Ethnicity (ref: White UK):</b>						
Black Caribbean	<b>0.39 (0.29 - 0.53)*</b>	<b>0.38 (0.28 - 0.51)*</b>	-3%	<b>0.48 (0.39 - 0.6)*</b>	<b>0.47 (0.37 - 0.58)*</b>	-3%
Black African	<b>0.15 (0.1 - 0.22)*</b>	<b>0.14 (0.1 - 0.21)*</b>	-1%	<b>0.16 (0.12 - 0.2)*</b>	<b>0.15 (0.12 - 0.19)*</b>	-1%
Indian	<b>0.19 (0.12 - 0.31)*</b>	<b>0.18 (0.11 - 0.29)*</b>	-1%	<b>0.14 (0.1 - 0.19)*</b>	<b>0.14 (0.1 - 0.19)*</b>	-1%
Pakistani/ Bangladeshi	<b>0.37 (0.26 - 0.55)*</b>	<b>0.36 (0.25 - 0.53)*</b>	-2%	<b>0.01 (0 - 0.02)*</b>	<b>0.01 (0 - 0.02)*</b>	0%
Other ethnicity	<b>0.56 (0.44 - 0.71)*</b>	<b>0.53 (0.42 - 0.67)*</b>	-8%	<b>0.38 (0.31 - 0.46)*</b>	<b>0.36 (0.3 - 0.44)*</b>	-2%
<b>Experiences of racism (ref: not experienced):</b>						
Experienced racism		<b>1.35 (1.11 - 1.66)*</b>			<b>1.36 (1.17 - 1.58)*</b>	
<b>Sample size:</b>	<i>n</i> = 4,723	<i>n</i> = 4,705		<i>n</i> = 4,717	<i>n</i> = 4,701	

\* $p \leq 0.05$

Table 6-31. Multinomial regression predicting lifetime illicit drug use by ethnicity, age and gender; before and after adjusting for experiences of racism:

	Lifetime drug use (ref: no lifetime use):		
	Unadjusted OR	Adjusted OR	Mediated (%)
<b>Age (years):</b>	<b>1.57 (1.39 - 1.78)*</b>	<b>1.55 (1.37 - 1.76)*</b>	
<b>Gender (ref: Male):</b>			
Female	<b>1.24 (1.05 - 1.45)*</b>	<b>1.24 (1.05 - 1.46)*</b>	
<b>Ethnicity (ref: White UK):</b>			
Black Caribbean	<b>0.68 (0.54 - 0.86)*</b>	<b>0.66 (0.52 - 0.83)*</b>	-7%
Black African	<b>0.32 (0.25 - 0.41)*</b>	<b>0.3 (0.23 - 0.38)*</b>	-3%
Indian	<b>0.21 (0.15 - 0.3)*</b>	<b>0.2 (0.14 - 0.29)*</b>	-1%
Pakistani/ Bangladeshi	<b>0.35 (0.25 - 0.48)*</b>	<b>0.34 (0.25 - 0.47)*</b>	-2%
Other ethnicity	<b>0.63 (0.52 - 0.77)*</b>	<b>0.6 (0.49 - 0.73)*</b>	-9%
<b>Experiences of racism (ref: not experienced):</b>			
Experienced racism		<b>1.43 (1.22 - 1.67)*</b>	
<b>Sample size:</b>	<i>n</i> = 4,718	<i>n</i> = 4,703	

\* $p \leq 0.05$

### 6.3.9.2. Body size and related behaviours

Adolescents who had experienced racism were less likely to engage in less than 14 hours' physical activity per week; furthermore, adjustment for experiences of racism resulted in a small change to ethnic variations in physical activity (Table 6-32).

Among Black Caribbean adolescents (who, compared to White UK, were more likely to have experienced racism, and were less likely to engage in less than 14 hours of physical activity per week), mediation by experiences of racism explained ethnic variation in physical activity by 8%. After adjustment for experiences of racism ethnic variation in physical activity among Black Caribbean adolescents were no longer statistically significant to the 95 percent confidence level.

In summary, there is evidence that mediation by experiences of racism explains some ethnic variations in physical activity among Black Caribbean adolescents.

Table 6-32. Multinomial regression predicting physical activity by ethnicity, age and gender; before and after adjusting for experiences of racism:

	7-14 hours PA/week (ref:≥14 hours/day):			<7 hours PA/week (ref:≥14 hours/day):		
	Unadjusted OR	Adjusted OR	Mediated (%)	Unadjusted OR	Adjusted OR	Mediated (%)
<b>Age (years):</b>	1.14 (0.94 - 1.4)	1.16 (0.94 - 1.42)		1.17 (0.97 - 1.42)	1.19 (0.98 - 1.43)	
<b>Gender (ref. male):</b>						
Female	<b>1.59 (1.19 - 2.13)*</b>	<b>1.58 (1.18 - 2.11)*</b>		<b>4.55 (3.47 - 5.96)*</b>	<b>4.57 (3.48 - 6)*</b>	
<b>Ethnicity (ref. White UK):</b>						
Black Caribbean	0.75 (0.5 - 1.13)	0.79 (0.52 - 1.19)	15%	<b>0.68 (0.46 - 0.99)*</b>	0.7 (0.48 - 1.03)	8%
Black African	0.88 (0.59 - 1.33)	0.95 (0.63 - 1.43)	58%	0.78 (0.53 - 1.15)	0.86 (0.58 - 1.26)	33%
Indian	0.86 (0.51 - 1.46)	0.96 (0.56 - 1.64)	72%	1.13 (0.69 - 1.84)	1.26 (0.77 - 2.07)	-97%
Pakistani/ Bangladeshi	1.07 (0.65 - 1.74)	1.11 (0.68 - 1.82)	-68%	1.05 (0.66 - 1.67)	1.09 (0.68 - 1.74)	-76%
Other ethnicity	0.92 (0.64 - 1.32)	0.96 (0.67 - 1.39)	54%	0.8 (0.57 - 1.12)	0.83 (0.59 - 1.18)	18%
<b>Experiences of racism (ref: not experienced):</b>						
Experienced racism		<b>0.61 (0.47 - 0.79)*</b>			<b>0.62 (0.49 - 0.78)*</b>	
<b>Sample size:</b>				<i>n</i> = 4,655	<i>n</i> = 4,616	

\* $p \leq 0.05$ ; PA: physical activity

### 6.3.9.3. Clustering of health behaviours

Adolescents who had experienced racism were more likely to be in the *High substance use: physically inactive* or *High substance use: physically active* clusters than the *Low substance use: healthy diet* cluster; furthermore, adjustment for experiences of racism resulted in small-moderate changes to ethnic variations in physical activity (Table 6-33); predicted probabilities computed using the estimates from this model presented in Figure 6-17 support interpretation of the odds ratios.

Among Black Caribbean adolescents (who, compared to White UK, were more likely to have experienced racism, less likely be in the *High substance use: physically inactive* cluster, and more likely to be in the *Low substance use: unhealthy diet* cluster), adjustment for experiences of racism increased the odds of being in the *Low substance use: unhealthy diet*, compared to the *Low substance use: healthy diet*, cluster by 5%. This finding cannot be surprising as there was no notable effect of experiences of racism on membership in this cluster; to investigate this further the predicted probabilities of cluster membership by experiences of racism and ethnicity were examined. Increased odds of being in the *Low substance use: unhealthy diet* cluster, after adjustment for experiences of racism, appear to be caused by a reduction in the probability of being in the *Low substance use: healthy diet* reference cluster (43% before, and 38% after, adjustment). This reduced probability is balanced by increased probabilities of being in the *High substance use: physically active* (4% before, and 7% after, adjustment) and *High substance use: physically inactive* clusters (18% before, and 21% after, adjustment). The latter difference is reflected by a moderate (25%) reduction in the odds that Black Caribbean, compared to White UK, adolescents were in the *High substance use: physically inactive* cluster. This might be considered as evidence of mediation by experiences of racism that suppresses ethnic variation among Black Caribbean adolescents; however, there was no significant ethnic variation in membership of this cluster among Black Caribbean, compared to White UK, adolescents, either before or after adjustment.

Among Black African adolescents (who, compared to White UK, were more likely to have experienced racism, less likely be in the *High substance use: physically active*, or *High substance use: physically inactive* clusters, and more likely to be in the *Low substance use: unhealthy diet* cluster, than the *Low substance use: healthy diet* cluster), mediation by experiences of racism suppressed 5% ethnic variation in membership of the *High substance use: physically active* cluster. Among Indian, and Pakistani/ Bangladeshi adolescents there were no notable effects of adjustment for, and therefore no evidence of mediation by, experiences of racism on ethnic variations in cluster membership.

In summary there is evidence for mediation of ethnic variation in membership of the *High substance use: physically active* cluster by experiences of racism among Black African, Black Caribbean, Pakistani/ Bangladeshi, and Other ethnicity adolescents; greater exposure to racism among ethnic minority adolescents increases the likelihood of being in the *High substance use: physically active* cluster suppressing ethnic variations.

Table 6-33. Multinomial regression predicting clusters of health behaviours by ethnicity, age and gender; before and after adjusting for experiences of racism:

	High substance use, physically active (ref: Low substance use, healthy diet):			High substance use, physically inactive (ref: Low substance use, healthy diet):			Low substance use, unhealthy diet (ref: Low substance use, healthy diet):		
	Unadjusted OR	Adjusted OR	Mediated (%)	Unadjusted OR	Adjusted OR	Mediated (%)	Unadjusted OR	Adjusted OR	Mediated (%)
<b>Age (years):</b>	<b>1.36 (1.08 - 1.71)*</b>	<b>1.34 (1.06 - 1.7)*</b>		<b>1.65 (1.42 - 1.91)*</b>	<b>1.66 (1.43 - 1.92)*</b>		0.97 (0.87 - 1.09)	0.97 (0.87 - 1.09)	
<b>Gender (ref: Male):</b>									
Female	<b>0.53 (0.39 - 0.72)*</b>	<b>0.52 (0.38 - 0.72)*</b>		<b>1.77 (1.47 - 2.13)*</b>	<b>1.79 (1.48 - 2.15)*</b>		1.01 (0.88 - 1.16)	1.02 (0.89 - 1.18)	
<b>Ethnicity (ref: White UK):</b>									
Black Caribbean	0.86 (0.54 - 1.35)	0.82 (0.52 - 1.3)	-25%	<b>0.61 (0.47 - 0.8)*</b>	<b>0.6 (0.46 - 0.79)*</b>	-2%	<b>1.53 (1.2 - 1.95)*</b>	<b>1.55 (1.21 - 1.98)*</b>	-5%
Black African	<b>0.37 (0.22 - 0.64)*</b>	<b>0.34 (0.2 - 0.59)*</b>	-5%	<b>0.23 (0.17 - 0.31)*</b>	<b>0.22 (0.16 - 0.3)*</b>	-1%	<b>1.77 (1.41 - 2.23)*</b>	<b>1.78 (1.41 - 2.24)*</b>	0%
Indian	<b>0.3 (0.15 - 0.58)*</b>	<b>0.27 (0.14 - 0.53)*</b>	-3%	<b>0.14 (0.09 - 0.21)*</b>	<b>0.13 (0.09 - 0.2)*</b>	-1%	0.79 (0.59 - 1.05)	0.79 (0.6 - 1.06)	1%
Pakistani/ Bangladeshi	0.7 (0.41 - 1.19)	0.66 (0.38 - 1.12)	-13%	<b>0.13 (0.08 - 0.22)*</b>	<b>0.13 (0.08 - 0.21)*</b>	0%	<b>1.5 (1.14 - 1.95)*</b>	<b>1.49 (1.14 - 1.95)*</b>	1%
Other ethnicity	0.85 (0.58 - 1.23)	0.8 (0.55 - 1.16)	-33%	<b>0.47 (0.38 - 0.6)*</b>	<b>0.45 (0.36 - 0.57)*</b>	-4%	0.89 (0.71 - 1.11)	0.89 (0.71 - 1.11)	3%
<b>Racism (ref: not experienced):</b>									
Experienced racism		<b>1.79 (1.34 - 2.39)*</b>			<b>1.3 (1.08 - 1.57)*</b>			1.08 (0.93 - 1.26)	
<b>Sample size:</b>							<i>n</i> = 4,774	<i>n</i> = 4,715	

\**p*≤0.05

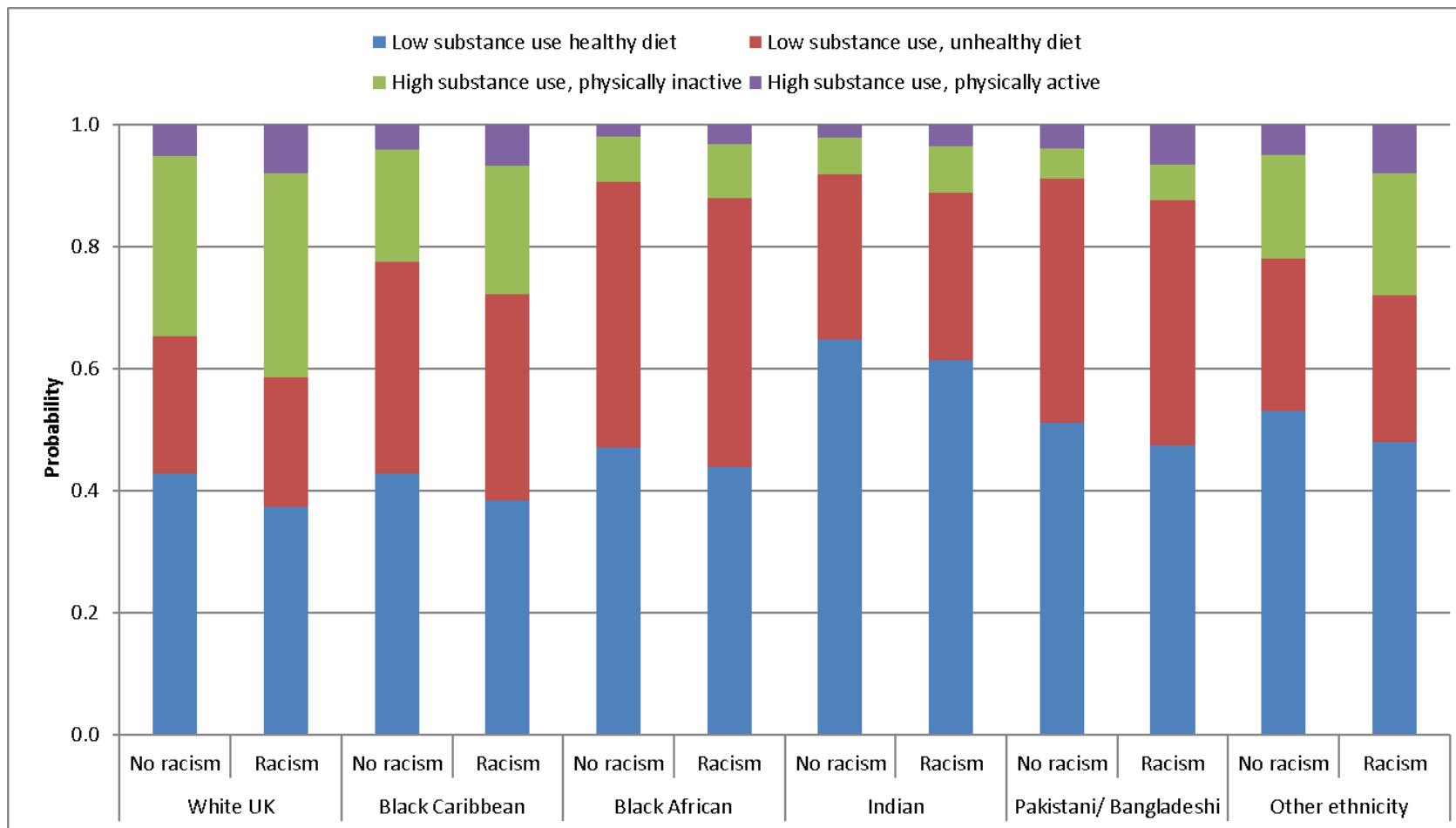


Figure 6-17: Predicted probabilities of clusters of health behaviours by ethnicity and experiences of racism, adjusted for age and gender.

### 6.3.10. Final models

As described in 6.2, final models were constructed in two steps. First, health behaviours, adjusted for age and gender, were regressed on ethnicity and its interactions with variables measuring cultural values previously found to moderate ethnic variations. Second, any structural inequality variables that were found to mediate ethnic variations were added. Percentages of ethnic variations in adolescent health behaviours mediated or suppressed by structural inequalities variables is calculated using Equation 1, described in 5.2.4.

#### 6.3.10.1. Tobacco use:

Previously, I found that in models predicting adolescent tobacco use, ethnicity interacted with gender and religious attendance (6.3.2.1, and 6.3.4.1, respectively).

The final model predicting adolescent tobacco use includes moderators and mediators identified individually in previous analyses. Chi2 tests were used to test the joint significance of moderators and mediators in the final model are shown in Table 6-34; each was found to be significant to the 95 percent confidence level and were included in the final model predicting adolescent tobacco use.

Table 6-34. Chi2 tests of joint significance of effects of moderators and mediators of ethnic variations of adolescent tobacco use:

	<b>Covariates:</b>	<b>Chi2:</b>
Moderators:	Gender	<b>20.4 (df=5) p&lt;0.01</b>
	Religious attendance	<b>13.8 (df=5) p=0.02</b>
Mediators:	Family structure	<b>10.1 (df=3) p=0.02</b>
	Experiences of racism	<b>9.6 (df=1) p&lt;0.01</b>

The final logistic regression predicting adolescent tobacco use by ethnicity, its interactions with gender, and its interactions with religious attendance, including family structure and experiences of racism as mediators of ethnic variations by structural inequalities are shown in Table 6-35. Compared to White UK, Black Caribbean, Black African, Indian and Other ethnicity adolescents were significantly less likely to use tobacco, and Indian and Pakistani/ Bangladeshi females were significantly less likely to use tobacco than males; the same pattern was apparent when interactions between gender and ethnicity were investigated in 6.3.2.1.

Among Black Caribbean, and Black African adolescents, those who attended a place of worship less frequently were more likely to use tobacco than those who attended a



place of worship more frequently; a similar pattern was also apparent among Pakistani/ Bangladeshi adolescents when interactions between religious attendance and ethnicity. This indicates that lower probabilities of using tobacco use were concentrated among Pakistani/ Bangladeshi females rather than males who regularly attended a place of worship. The final model was then completed by adding family structure and experiences of racism. Adolescents who lived in *Reconstituted*, or *Single-parent*, compared to *Two-parent* families, and those who had experienced racism were more likely to use tobacco; adjustment for these structural inequality variables resulted in some small changes to ethnic variations in current tobacco use.

Compared to White UK, Black Caribbean and Black African adolescents were less likely to use tobacco. While there was no significant heterogeneity in this ethnic variation by gender, those Black Caribbean and Black African adolescents who attended a place of worship less frequently were more likely to use tobacco. Adjustment for structural inequalities resulted in no notable changes to variations in tobacco use among Black African adolescents. Whereas, mediation by structural inequalities explained 8% of the greater likelihood of tobacco use among Black Caribbean adolescents who attended a place of worship less, compared to more frequently. Since the likelihoods of living in a *Two-parent* or *Reconstituted* family or having experienced racism, risk factors for tobacco use, were greater among Black Caribbean adolescents, either might mediate this ethnic variation. We might hypothesise that among those adolescents who attended a place of worship less frequently there is a higher likelihood of living in a *Single-parent* or *Reconstituted* family; equally we might hypothesise that those adolescents who attended a place of worship more frequently had greater social support to protect them from using tobacco as a result of experiencing racism.

Compared to White UK, Indian and Pakistani/ Bangladeshi adolescents were less likely to use tobacco. While there was no significant heterogeneity in these ethnic variations by religious attendance, Indian and Pakistani/ Bangladeshi females were significantly less likely to use tobacco than males. Adjustment for structural inequalities resulted in no substantial changes to variations between Pakistani/ Bangladeshi and White UK adolescents or between Indian and Pakistani/ Bangladeshi males and females. However, mediation by structural inequalities did explain 6% of the lower likelihood of using tobacco among Indian compared to White UK adolescents. Since Indian adolescents were more likely to experience of racism, and less likely to live in *Reconstructed* or *Single-parent* families which are both risk factors for tobacco use, it is likely that family structure mediated ethnic variation in tobacco use among Indian adolescents.

There was a significant main effect of Other ethnicity; however no changes resulted from adjustment for structural inequalities.

In summary, there is evidence to suggest that structural inequalities mediated some ethnic variations in tobacco use. Among Indian adolescents less exposure to structural inequalities explained a small amount of the lower likelihood of using tobacco, whereas greater exposure to structural inequalities explained a small amount of the greater likelihood of using tobacco among Black Caribbean adolescents who attended a place of worship less frequently.

#### 6.3.10.2. Current alcohol use:

Previous analyses found no moderators and only family structure to be a mediator to be significant in models predicting current alcohol use. Therefore, the final model for alcohol use (Table 6-40) is identical to the model presented in section 6.8.1 in which the joint effects of family structure are significant predictors of alcohol use ( $\chi^2: 20.2$  ( $df=3$ )  $p<0.01$ ). Compared to White UK, adolescents of each ethnic minority group were less likely to use alcohol. Adjustment for family structure resulted in changes to the ethnic variation only among Black Caribbean adolescents. Black Caribbean adolescents were more likely than White UK adolescents to live in *Reconstituted* or *Single-parent* that are a risk factor for alcohol use, compared to *Two-parent* families; this mediating pathway suppressed 7% of the underlying lower likelihood of alcohol use in this group.

Table 6-35. Final model predicting tobacco use by ethnicity, interactions between ethnicity, gender and religious attendance, age; before and after adjustment for family structure and experiences of racism:

	Tobacco use (ref: no use):		
	Unadjusted OR	Adjusted OR	Mediated (%)
<b>Age (years):</b>	<b>1.56 (1.33 - 1.83)*</b>	<b>1.56 (1.32 - 1.83)*</b>	
<b>Gender (ref. male):</b>			
Female	<b>2.2 (1.58 - 3.07)*</b>	<b>2.22 (1.59 - 3.11)*</b>	
<b>Religious attendance (ref. Regular):</b>			
Seldom-never	1.09 (0.63 - 1.9)	1.12 (0.64 - 1.97)	
<b>Ethnicity (ref. White UK):</b>			
Black Caribbean	<b>0.22 (0.1 - 0.49)*</b>	<b>0.21 (0.09 - 0.46)*</b>	-2%
Black African	<b>0.11 (0.05 - 0.26)*</b>	<b>0.1 (0.04 - 0.24)*</b>	-2%
Indian	<b>0.39 (0.17 - 0.91)*</b>	0.43 (0.19 - 1)	6%
Pakistani/Bangladeshi	0.82 (0.41 - 1.62)	0.9 (0.45 - 1.79)	47%
Other ethnicity	<b>0.39 (0.2 - 0.77)*</b>	<b>0.38 (0.19 - 0.75)*</b>	-1%
<b>Ethnicity x gender</b>			
Black Caribbean; female	1.05 (0.57 - 1.91)	1.02 (0.56 - 1.88)	47%
Black African; female	0.98 (0.45 - 2.15)	1.07 (0.48 - 2.38)	476%
Indian; female	<b>0.27 (0.1 - 0.71)*</b>	<b>0.26 (0.1 - 0.7)*</b>	-1%
Pakistani/Bangladeshi; female	<b>0.06 (0.01 - 0.28)*</b>	<b>0.06 (0.01 - 0.27)*</b>	0%
Other ethnicity; female	0.88 (0.55 - 1.4)	0.88 (0.55 - 1.4)	-3%
<b>Ethnicity x religious attendance</b>			
Black Caribbean; Seldom-never	<b>2.37 (1.11 - 5.05)*</b>	<b>2.27 (1.06 - 4.85)*</b>	8%
Black African; Seldom-never	<b>2.85 (1.19 - 6.83)*</b>	<b>2.89 (1.2 - 7)*</b>	-2%
Indian; Seldom-never	0.81 (0.28 - 2.33)	0.77 (0.27 - 2.24)	-18%
Pakistani/Bangladeshi; Seldom-never	0.6 (0.18 - 1.95)	0.56 (0.17 - 1.83)	-10%
Other ethnicity; Seldom-never	1.76 (0.91 - 3.43)	1.69 (0.86 - 3.31)	9%
<b>Family structure (ref: Two parent):</b>			
Reconstructed		<b>1.53 (1.15 - 2.03)*</b>	
Single parent		<b>1.29 (1.02 - 1.62)*</b>	
Other		1.15 (0.75 - 1.77)	
<b>Racism (ref: None):</b>			
Experienced racism		<b>1.38 (1.13 - 1.7)*</b>	
<b>Sample size:</b>	<i>n</i> = 4,673	<i>n</i> = 4,657	

\* $p \leq 0.05$

Table 6-36. Final model predicting alcohol use by ethnicity, age and gender; before and after adjustment for family structure:

	Alcohol use (ref: no use):		
	Unadjusted OR	Adjusted OR	Mediated (%)
<b>Age (years):</b>	<b>1.62 (1.44 - 1.82)*</b>	<b>1.63 (1.45 - 1.84)*</b>	
<b>Gender: (ref. male)</b>			
Female	<b>1.36 (1.16 - 1.6)*</b>	<b>1.35 (1.15 - 1.59)*</b>	
<b>Ethnicity (ref: White UK)</b>			
Black Caribbean	<b>0.48 (0.39 - 0.6)*</b>	<b>0.45 (0.36 - 0.56)*</b>	-7%
Black African	<b>0.16 (0.12 - 0.2)*</b>	<b>0.16 (0.12 - 0.2)*</b>	0%
Indian	<b>0.14 (0.1 - 0.19)*</b>	<b>0.15 (0.11 - 0.21)*</b>	1%
Pakistani/Bangladeshi	<b>0.01 (0 - 0.02)*</b>	<b>0.01 (0 - 0.02)*</b>	0%
Other ethnicity	<b>0.38 (0.31 - 0.46)*</b>	<b>0.37 (0.31 - 0.45)*</b>	-1%
<b>Family structure: (ref: two parents)</b>			
Reconstructed		<b>1.55 (1.25 - 1.92)*</b>	
Single parent		<b>1.3 (1.1 - 1.53)*</b>	
Other		1.06 (0.79 - 1.41)	
<b>Sample size:</b>	<i>n</i> = 4,717	<i>n</i> = 4,707	

\* $p \leq 0.05$

### 6.3.10.3. Illicit drug use:

The final model predicting lifetime illicit drug use combines moderators and mediators identified individually in previous analyses. Results of chi2 tests carried out for joint significance of moderators and mediators in the final model are shown in Table 6-37. The interactions between religious attendance and ethnicity were borderline significant, the effects of family structure and experiences of racism were statistically significant to the 95 percent confidence level. The final model investigating moderation of ethnic variations in illicit drug use, by cultural values, and mediation of ethnic variations by structural inequalities, is shown in Table 6-38.

Table 6-37. Chi2 tests of joint significance of effects of moderators and mediators of ethnic variations of adolescent tobacco use:

	Covariates:	Chi2:
Moderators:	Religious attendance	<b>9.3 (df=5) p=0.10</b>
Mediators:	Family structure	<b>21.2 (df=3) p&lt;0.01</b>
	Experiences of racism	<b>19.1 (df=1) p&lt;0.01</b>

Lifetime use of illicit drugs was less likely among adolescents of each ethnic minority, compared to White UK, and more likely among Black African adolescents, who attended a place of worship less frequently, compared to more religious counterparts.

Adjustment for structural inequalities resulted in changes to ethnic variation only among Black Caribbean adolescents; mediation by family structure and experiences of racism suppressed 15% of otherwise lower likelihood of illicit drug use. Black Caribbean adolescents' tendency to live in a *Reconstituted* or *Single-parent*, than a *Two-parent* family, and to have experienced racism, both factors that conferred greater risks of illicit drug use could both act as mediators in this situation. There was no evidence for mediation of other ethnic variations which were apparent in the likelihood of illicit drug use.

Table 6-38. Final model predicting illicit drug use by ethnicity, interactions between ethnicity and religious attendance, age, and gender; before and after adjustment for family structure and experiences of racism:

	Lifetime illicit drug use		
	Unadjusted OR	Adjusted OR	Mediated (%)
<b>Age (years):</b>	<b>1.54 (1.36 - 1.75)*</b>	<b>1.53 (1.35 - 1.73)*</b>	
<b>Gender (ref. male):</b>			
Female	<b>1.24 (1.06 - 1.47)*</b>	<b>1.24 (1.05 - 1.47)*</b>	
<b>Religious attendance (ref. Regular-often):</b>			
Seldom-never	1.02 (0.63 - 1.64)	1.03 (0.63 - 1.67)	
<b>Ethnicity (ref. White UK):</b>			
Black Caribbean	0.59 (0.35 - 0.99)	<b>0.53 (0.32 - 0.9)*</b>	-15%
Black African	<b>0.27 (0.16 - 0.45)*</b>	<b>0.25 (0.15 - 0.42)*</b>	-3%
Indian	<b>0.21 (0.11 - 0.4)*</b>	<b>0.23 (0.12 - 0.43)*</b>	2%
Pakistani/ Bangladeshi	<b>0.37 (0.21 - 0.66)*</b>	<b>0.4 (0.23 - 0.71)*</b>	4%
Other ethnicity	<b>0.47 (0.28 - 0.78)*</b>	<b>0.45 (0.27 - 0.75)*</b>	-3%
<b>Ethnicity x religious attendance</b>			
Black Caribbean; Seldom-never	1.32 (0.74 - 2.36)	1.27 (0.7 - 2.28)	17%
Black African; Seldom-never	<b>1.93 (1.02 - 3.68)*</b>	1.92 (1 - 3.67)	2%
Indian; Seldom-never	0.97 (0.43 - 2.18)	0.93 (0.41 - 2.11)	-118%
Pakistani/Bangladeshi; Seldom-never	0.79 (0.37 - 1.71)	0.75 (0.35 - 1.64)	-19%
Other ethnicity; Seldom-never	1.54 (0.89 - 2.68)	1.49 (0.85 - 2.6)	10%
<b>Family structure (ref. two parent):</b>			
Reconstructed		<b>1.45 (1.15 - 1.81)*</b>	
Single parent		<b>1.42 (1.2 - 1.7)*</b>	
Other		0.99 (0.71 - 1.38)	
<b>Racism (ref. not experienced):</b>			
Experienced racism		<b>1.42 (1.21 - 1.66)*</b>	
<b>Sample size:</b>	<i>n</i> = 4,669	<i>n</i> = 4,653	

\* $p \leq 0.05$

#### 6.3.10.4. Fruit and vegetable consumption:

The final model predicting fruit and vegetable consumption combines moderators and mediators, of ethnic variations, identified in previous analyses. Results of chi2 tests carried out for joint significance of moderators and mediators in the final model are shown in Table 6-39. The interactions between English language use with family was a borderline jointly significant ( $p=0.07$ ) in the model predicting fruit and vegetables before adjustment for household material disadvantage and family structure. Household

material disadvantage and family structure were both significant to the 95 percent confidence level in the final model. The final model investigating ethnic variations in fruit and vegetable consumption, their moderation by cultural values, and mediation by structural inequalities, is shown in Table 6-40.

Table 6-39. Chi2 tests of joint significance of effects of moderators and mediators of ethnic variations of adolescent fruit and vegetable consumption:

	<b>Covariates:</b>	<b>Chi2:</b>
Moderators:	English language use	59.6 (df=10) p=0.11
Mediators:	Household material disadvantage	<b>28.8 (df=4) p&lt;0.01</b>
	Family structure	<b>16.8 (df=6) p=0.01</b>

Compared to White UK, Black Caribbean, Black African, Pakistani/ Bangladeshi, and Other ethnicity adolescents were more likely to eat <2 *portions*, than  $\geq 5$  *portions* per day; Black Caribbean, adolescents were also more likely to eat 2-4 *portions*, than  $\geq 5$  *portions* of fruit and vegetables per day. Compared to Pakistani/ Bangladeshi adolescents who spoke *Mostly-all* English with family, those who spoke *Some/Little-no* English with family were more likely to eat 2-4 *portions*, or <2 *portions*, than  $\geq 5$  *portions* per day. Adjustment for structural inequalities resulted in some small-moderate changes to ethnic variations in fruit and vegetable consumption.

Mediation by structural inequalities explained 28% of ethnic variation in the likelihood eating <2 *portions* of fruit and vegetables per day among Black Caribbean adolescents; compared to White UK adolescents, they were more likely to live in *Medium* or *Most*, than *Least*, materially disadvantaged households and *Reconstructed* or *Single-parent*, than *Two-parent* families, each a risk factor for eating <2 *portions* of fruit and vegetables per day. Among Black African adolescents, mediation by structural inequalities explained 9% of the ethnic variation in the likelihood of eating 2-4 *portions*, and 16% of the ethnic variation in the likelihood of eating <2 *portions* of fruit and vegetables per day. Compared to White UK, Black African adolescents were more likely to live in *Medium* or *Most*, than *Least* materially disadvantaged households, conferring greater risk of eating less than five portions of fruit and vegetables per day. Black African adolescents were more likely to live in *Single-parent*, than *Two-parent* families, conferring greater risk of eating <2 *portions* of fruit and vegetables per day; but were more likely to live in *Two-parent* than *Reconstituted* families which is protective against eating <2 *portions* of fruit and vegetables per day. Therefore, among Black African, compared to White UK adolescents, we would hypothesise that: a greater likelihood of eating 2-4 *portions*, than  $\geq 5$  *portions* of fruit and vegetables per day is mediated by

living in households of *Medium* or *Most*, than *Least* material disadvantage; while a greater likelihood of eating <2 *portions* of fruit and vegetables per day may be mediated by both household material disadvantage and by living in *Single-parent* families.

Adjustment for structural inequalities resulted in no substantial change to the greater likelihood of eating <2 *portions* of fruit and vegetables among Pakistani/ Bangladeshi, compared to White UK adolescents. However, mediation by structural inequalities explained 13% and 11% of the greater likelihood of eating 2-4 *portions* or <2 *portions* of fruit and vegetables per day, respectively, among Pakistani/ Bangladeshi adolescents who spoke *Some/Little-no* English with family, compared to those who spoke *Mostly-all* English with family. Pakistani/ Bangladeshi adolescents were more likely than White UK adolescents to live in *Medium* or *Most* materially disadvantaged households which conferred greater risk of eating less than five portions of fruit and vegetables per day compared to living in the *Least* materially disadvantaged households. In contrast, Pakistani/ Bangladeshi adolescents were more likely than White UK adolescents to live in *Two-parent* families, which was associated with a lower risk of eating <2 *portions*, compared to  $\geq 5$  *portions* of fruit and vegetables per day, compared to *Reconstituted* or *Single-parent* families. Therefore, we would hypothesise that greater likelihood of eating less than five portions of fruit and vegetables per day among Pakistani/ Bangladeshi adolescents who spoke less, compared to more, English with family was mediated by greater household material disadvantage among this group.

In summary, evidence suggests that living in households of greater household material disadvantage and not living in *Two-parent* families mediated some of the lower fruit and vegetable consumption found among Black Caribbean and Black African adolescents; whereas living in households of greater material disadvantage mediated some of the lower fruit and vegetable consumption among Pakistani/ Bangladeshi adolescents who spoke less English with family.



Table 6-40. Final model predicting adolescent fruit and vegetable consumption by ethnicity, interactions between ethnicity and English language use, age, gender; before and after adjustment for household material disadvantage, and family structure:

	2-4 portions FV/day (ref:≥5 portions/ day):			<2 portions FV/day (ref:≥5 portions/ day):		
	Unadjusted OR	Adjusted OR	Mediated (%)	Unadjusted OR	Adjusted OR	Mediated (%)
<b>Age (years):</b>	1.03 (0.9 - 1.17)	1.03 (0.91 - 1.18)		1.01 (0.9 - 1.14)	1.01 (0.89 - 1.14)	
<b>Gender (ref. male):</b>						
Female	0.91 (0.77 - 1.07)	0.9 (0.76 - 1.06)		1.02 (0.87 - 1.2)	1 (0.85 - 1.17)	
<b>English language use (ref. Mostly-all):</b>						
Some/little-no	0.46 (0.14 - 1.54)	0.5 (0.15 - 1.72)		0.24 (0.05 - 1.12)	0.26 (0.05 - 1.24)	
<b>Ethnicity (ref. White UK):</b>						
Black Caribbean	1.21 (0.92 - 1.59)	1.16 (0.87 - 1.53)	26%	<b>2.12 (1.64 - 2.73)*</b>	<b>1.8 (1.38 - 2.35)*</b>	28%
Black African	<b>1.4 (1.04 - 1.87)*</b>	<b>1.36 (1.01 - 1.84)*</b>	9%	<b>2.63 (2 - 3.46)*</b>	<b>2.37 (1.79 - 3.14)*</b>	16%
Indian	1.31 (0.91 - 1.88)	1.35 (0.93 - 1.94)	-12%	1.07 (0.73 - 1.56)	1.12 (0.76 - 1.65)	-70%
Pakistani/ Bangladeshi	1.06 (0.69 - 1.62)	1.07 (0.7 - 1.64)	-15%	<b>1.88 (1.28 - 2.77)*</b>	<b>1.9 (1.29 - 2.81)*</b>	-2%
Other ethnicity	1.11 (0.87 - 1.42)	1.06 (0.82 - 1.36)	46%	<b>1.36 (1.07 - 1.73)*</b>	1.23 (0.96 - 1.57)	36%
<b>Ethnicity x English language use</b>						
Black Caribbean; Some/little-no	1.1 (0.27 - 4.51)	1.16 (0.27 - 5.02)	-57%	3.87 (0.74 - 20.09)	4.4 (0.81 - 23.87)	-19%
Black African; Some/little-no	2.23 (0.63 - 7.93)	1.93 (0.52 - 7.08)	25%	3.2 (0.65 - 15.76)	2.93 (0.58 - 14.86)	13%
Indian; Some/little-no	1.87 (0.52 - 6.77)	1.65 (0.44 - 6.16)	25%	3.17 (0.62 - 16.17)	2.94 (0.56 - 15.43)	11%
Pakistani/Bangladeshi; Some/little-no	<b>4.05 (1.1 - 14.99)*</b>	3.65 (0.95 - 13.94)	13%	<b>5.27 (1.04 - 26.71)*</b>	4.8 (0.92 - 25.09)	11%
Other ethnicity; Some/little-no	1.93 (0.56 - 6.61)	1.83 (0.52 - 6.48)	11%	2.72 (0.56 - 13.1)	2.76 (0.55 - 13.72)	2%
<b>Household material disadvantage (ref. Least)</b>						
Medium		1.17 (0.99 - 1.39)			<b>1.46 (1.24 - 1.73)*</b>	
Most		<b>1.42 (1.14 - 1.78)*</b>			<b>1.58 (1.28 - 1.96)*</b>	
<b>Family structure (ref. Two parent):</b>						
Reconstructed		1.13 (0.87 - 1.46)			<b>1.39 (1.09 - 1.78)*</b>	
Single		1.09 (0.89 - 1.33)			<b>1.36 (1.13 - 1.63)*</b>	
Other		0.83 (0.59 - 1.17)			1.09 (0.8 - 1.49)	
<b>Sample size:</b>				<i>n</i> = 4,661	<i>n</i> = 4,470	

\*p<0.05

### 6.3.10.5. Physical activity:

The final model investigating ethnic variations in physical activity combines mediators identified in previous analyses (no moderators were identified). Results of chi2 tests carried out for joint significance of mediators in the final model are shown in Table 6-41. Household material disadvantage and experiences of racism were both significant to the 95 percent confidence level in the final model predicting physical activity.

Table 6-41. Chi2 tests of joint significances of effects of moderators and mediators of ethnic variations of adolescent physical activity:

	<b>Covariates:</b>	<b>Chi2:</b>
Mediators:	Household material disadvantage	<b>14.4 (df=4) <math>p&lt;0.01</math></b>
	Experiences of racism	<b>16.7 (df=2) <math>p&lt;0.01</math></b>

The final model investigating ethnic variations in physical activity is presented in Table 6-42. Physical activity was regressed on ethnicity, adjusted for age and gender. Compared to White UK, Black Caribbean adolescents were less likely to engage in *<7 hours* than  $\geq 14$  hours per day physical activity. Adjustment for structural inequalities resulted in a small change to this ethnic variation.

Mediation by structural inequalities suppressed 8% of the ethnic variation in *<7 hours* physical activity per week among Black Caribbean adolescents. In previous analyses household material disadvantage was found to suppress 16% of ethnic variation in the likelihood of engaging in *<7 hours* physical activity per week among Black Caribbean adolescents; whereas, experiences of racism were found to explain 8% of ethnic variations in engaging in *<7 hours* physical activity per week among Black Caribbean adolescents. Thus, in the final model, the mediating effect of experiences of racism is masked by that of household material disadvantage, which is itself attenuated.

In summary, compared to White UK, Black Caribbean adolescents were less likely to be in among the most physically inactive adolescents; however, some of this ethnic variation was suppressed by greater household material disadvantage; in contrast, experiences of racism explained some of this ethnic advantage in physical activity but this protective effect was masked by the stronger negative effect of household material disadvantage.

Table 6-42. Final model predicting adolescent physical activity by ethnicity, age, gender; before and after adjusting for household material disadvantage, and experiences of racism:

	7-14 hours PA/week (ref:≥14 hours/day):			<7 hours PA/week (ref:≥14 hours/day):		
	Unadjusted OR	Adjusted OR	Mediated (%)	Unadjusted OR	Adjusted OR	Mediated (%)
<b>Age (years):</b>	1.14 (0.94 - 1.4)	1.14 (0.92 - 1.4)		1.17 (0.97 - 1.42)	1.17 (0.96 - 1.42)	
<b>Gender (ref. male):</b>						
Female	<b>1.59 (1.19 - 2.13)*</b>	<b>1.55 (1.15 - 2.07)*</b>		<b>4.55 (3.47 - 5.96)*</b>	<b>4.34 (3.29 - 5.71)*</b>	
<b>Ethnicity (ref. White UK):</b>						
Black Caribbean	0.75 (0.5 - 1.13)	0.73 (0.48 - 1.12)	-8%	<b>0.68 (0.46 - 0.99)*</b>	<b>0.65 (0.44 - 0.96)*</b>	-8%
Black African	0.88 (0.59 - 1.33)	0.91 (0.6 - 1.39)	24%	0.78 (0.53 - 1.15)	0.79 (0.53 - 1.18)	4%
Indian	0.86 (0.51 - 1.46)	0.97 (0.57 - 1.67)	79%	1.13 (0.69 - 1.84)	1.29 (0.78 - 2.13)	-118%
Pakistani/ Bangladeshi	1.07 (0.65 - 1.74)	1.12 (0.67 - 1.85)	-75%	1.05 (0.66 - 1.67)	1.06 (0.65 - 1.71)	-7%
Other ethnicity	0.92 (0.64 - 1.32)	0.94 (0.65 - 1.37)	30%	0.8 (0.57 - 1.12)	0.79 (0.55 - 1.12)	-6%
<b>Household material disadvantage (ref. Least)</b>						
Medium		1.23 (0.94 - 1.62)			<b>1.44 (1.12 - 1.87)*</b>	
Most		1.22 (0.86 - 1.74)			<b>1.59 (1.15 - 2.21)*</b>	
<b>Experiences of racism (ref: Not):</b>						
Experienced racism		<b>0.61 (0.47 - 0.79)*</b>			<b>0.61 (0.48 - 0.78)*</b>	
<b>Sample size:</b>				<i>n</i> = 4,655	<i>n</i> = 4,478	

\* $p \leq 0.05$

#### 6.3.10.6. Body size:

The final model investigating ethnic variations in body size combines moderators identified in previous analyses (no mediators were identified). Results of chi2 tests carried out for joint significance of moderators in the final model are shown in Table 6-43. In the final model predicting body size there was borderline significance of the interactions between gender and ethnicity ( $p=0.09$ ) and between English language use with family and ethnicity ( $p=0.10$ ).

Table 6-43. Chi2 tests of joint significances of effects of moderators and mediators of ethnic variations of adolescent physical activity:

	<b>Covariates:</b>	<b>Chi2:</b>
Moderators:	Gender	<b>16.5 (df=10) <math>p=0.09</math></b>
	English language use	<b>16.0 (df=10) <math>p=0.10</math></b>

The final model investigating ethnic variations in body size is presented in Table 6-44. Compared to White UK, Black Caribbean and Pakistani/ Bangladeshi adolescents were more likely to be obese than neither overweight nor obese. There was no significant heterogeneity in ethnic variations in body size by gender. Within each ethnic group those who spoke *Some-Little/no* English with family were less likely to be obese than those who spoke *Mostly-all* English with family. This heterogeneity was borderline significant ( $p=0.054$ ) among Black Caribbean adolescents and significant to 95 percent confidence levels among Black African, Indian, and Pakistani/ Bangladeshi adolescents.

In summary, ethnic variations in adolescent body size are moderated by gender and English language use with family, variables which represent cultural values in models predicting adolescent health behaviours.

Table 6-44. Final model predicting adolescent body size by ethnicity, age, and interactions between ethnicity, gender and English language use:

	<b>Overweight (ref: not overweight):</b>	<b>Obese (ref: not overweight):</b>
<b>Age (years):</b>	0.83 (0.71 - 0.98)*	1.09 (0.86 - 1.38)
<b>Gender (ref. male):</b>		
Female	0.91 (0.57 - 1.46)	0.99 (0.49 - 2.04)
<b>English language use (ref. Mostly-all):</b>		
Some/little-no	2.3 (0.45 - 11.7)	<b>6.3 (1.2 - 32.98)*</b>
<b>Ethnicity (ref. White UK):</b>		
Black Caribbean	1.36 (0.88 - 2.09)	<b>2.08 (1.12 - 3.85)*</b>
Black African	1.3 (0.83 - 2.03)	1.36 (0.68 - 2.7)
Indian	1.31 (0.75 - 2.27)	1.76 (0.77 - 4.02)
Pakistani/ Bangladeshi	1.34 (0.77 - 2.35)	<b>2.24 (1.03 - 4.89)*</b>
Other ethnicity	1.54 (0.9 - 2.62)	1.04 (0.42 - 2.55)
<b>Ethnicity x gender</b>		
Black Caribbean; female	1.74 (0.94 - 3.23)	1.48 (0.62 - 3.56)
Black African; female	1.75 (0.96 - 3.2)	2.05 (0.82 - 5.13)
Indian; female	1.11 (0.53 - 2.3)	0.48 (0.13 - 1.73)
Pakistani/Bangladeshi; female	1.02 (0.47 - 2.21)	0.34 (0.08 - 1.45)
Other ethnicity; female	1.02 (0.48 - 2.18)	1.11 (0.35 - 3.56)
<b>Ethnicity x English language use</b>		
Black Caribbean; Some/little-no	0.26 (0.04 - 1.57)	0.16 (0.03 - 1.03)
Black African; Some/little-no	0.4 (0.08 - 2.16)	<b>0.09 (0.02 - 0.54)*</b>
Indian; Some/little-no	0.48 (0.09 - 2.69)	<b>0.1 (0.01 - 0.66)*</b>
Pakistani/ Bangladeshi; Some/little-no	0.42 (0.07 - 2.32)	<b>0.07 (0.01 - 0.48)*</b>
Other ethnicity; Some/little-no	0.38 (0.07 - 2.24)	0.36 (0.05 - 2.37)
<b>Sample size:</b>		<i>n</i> = 3,338

\* $p \leq 0.05$

### 6.3.10.7. Clustering of health behaviours:

The final model investigating ethnic variations in clustering of health behaviours combines moderators and mediators identified in previous analyses.

Results of chi2 tests carried out for joint significance of mediators in the final model are shown in Table 6-45. Interactions between English language use with family and ethnicity, and the effects of household material disadvantage, family structure, and experiences of racism were each significant to the 95 percent confidence level in the final model predicting cluster membership. The final model investigating ethnic variations in clustering of health behaviours is presented in Table 6-46.

Table 6-45. Chi2 tests of joint significances of effects of moderators and mediators of ethnic variations of clustering of adolescent health behaviours:

	<b>Covariates:</b>	<b>Chi2:</b>
Moderators:	English language use	<b>60.2 (df=15) <math>p&lt;0.01</math></b>
Mediators:	Household material disadvantage	<b>30.7 (df=6) <math>p&lt;0.01</math></b>
	Family structure	<b>32.0 (df=9) <math>p&lt;0.01</math></b>
	Experiences of racism	<b>16.4 (df=3) <math>p&lt;0.01</math></b>

Compared to White UK, Black Caribbean adolescents were less likely to be in the *High substance use: physically inactive*, and more likely to be in the *Low substance use: unhealthy diet* clusters, than the *Low substance use: healthy diet* cluster; and they were more likely to live in *Reconstituted*, or *Single-parent* families, and to have experienced racism, which were positively associated with membership of that cluster. Mediation by structural inequalities suppressed 20% of the lower likelihood of being in the *High substance use: physically inactive*, than the *Low substance use: healthy diet* cluster, among Black Caribbean compared to White UK adolescents. Black Caribbean, compared to White UK, adolescents were more likely to be in the *Low substance use: unhealthy diet*, than the *Low substance use: healthy diet* cluster. They were also more likely to be exposed to structural inequalities that were risk factors for membership of the *Low substance use: unhealthy diet*, than the *Low substance use: healthy diet* cluster (compared to White UK adolescents Black Caribbean adolescents were more likely to live in households of *Medium* or *Most*, rather than *Least*, household disadvantage, to live in *Single-parent* rather than *Two-parent* families); mediation by structural inequalities explained 35% of this ethnic variation.

Black African adolescents who spoke *Some-Little/no*, compared to *Mostly-All*, English with family were less likely than White UK adolescents to be in the *High substance use: physically inactive*, compared to the *Low substance use: healthy diet* cluster. Mediation by structural inequalities suppressed 23% of this ethnic variation, upon adjustment for structural inequalities this ethnic variation gained statistical significance to the 95 percent confidence level. Black African adolescents were more likely than White UK to be in the *Low substance use: unhealthy diet*, than the *Low substance use: healthy diet* cluster. Mediation by structural inequalities explained 19% of this ethnic variation. Black African adolescents were less likely to be in the *High substance use: physically active*, compared to the *Low substance use: healthy diet* cluster, than White UK adolescents; adjustment for structural inequalities resulted in no change to this ethnic variation.

Black African adolescents were more likely than White UK counterparts to live in *Medium*, or *Most*, than *Least* disadvantaged households, which were associated with greater risks of being in the *Low substance use: unhealthy diet*, compared to the *Low substance use: healthy diet* cluster. They were more likely than White UK to live in *Single-parent* families, but less likely to live in *Reconstituted* families, which were both associated with greater risks of being in the *Low substance use: unhealthy diet* or *High substance use: physically inactive*, compared to the *Low substance use: healthy diet* cluster than were *Two-parent* families. Black African adolescents were also more likely than White UK adolescents to have experienced racism and this was associated with greater risk of being in the *High substance use: physically inactive* or *High substance use: physically active*, compared to the *Low substance use: healthy diet* cluster.

There were no significant ethnic variations in cluster membership among Indian, compared to White UK adolescents.

As described in previous analyses, compared to White UK adolescents Pakistani/Bangladeshi adolescents were more likely to live in *Medium*, or *Most* materially disadvantaged households, that were associated with greater risk of being in the *Low substance use: unhealthy diet*, and lower risk of being in the *High substance use: physically inactive*, rather than the *Low substance use: healthy diet* cluster, than those who lived in *Least* materially disadvantaged households; they were less likely than White UK to live in *Reconstituted*, or *Single-parent* families, that were associated with greater risks of being in both the *Low substance use: unhealthy diet*, and the *High substance use: physically inactive*, rather than the *Low substance use: healthy diet* cluster, than those who lived in *Two-parent* families; they were also more likely than White UK adolescents to have experienced racism, that was associated with greater risk

of being in the *High substance use: physically inactive* or *High substance use: physically active*, rather than the *Low substance use: healthy diet* cluster.

Pakistani/ Bangladeshi adolescents were more likely than White UK adolescents to be in the *Low substance use: unhealthy diet*, rather than the *Low substance use: healthy diet* cluster; however, adjustment for structural inequalities resulted in insubstantial changes to this ethnic variation. Previous, individual, analyses found that household material disadvantage explained some ethnic variation in membership, whereas family structure suppressed some ethnic variation in this cluster among Pakistani/ Bangladeshi adolescents; thus, evidence suggests that these two factors cancel each other out in the final model. Membership of the *High substance use: physically inactive* rather than the *Low substance use: healthy diet* cluster was less likely among Pakistani/ Bangladeshi, compared to White UK adolescents, and less likely among Pakistani/ Bangladeshi adolescents who spoke *Some-little/no*, compared to *Mostly-all* English with family. Mediation by structural inequalities explained 16% of the ethnic variation among Pakistani/ Bangladeshi adolescents who spoke less English with family. Previous analyses found no evidence for mediation of ethnic variations in the unmoderated ethnic variations in membership of this cluster. Thus, we might speculate that the chances of being exposed to risk factors (living in *Reconstituted* or *Single-parent* families, and experiences of racism) were lower among less acculturated adolescents who spoke less English with their families. Ethnic variation in membership of the *High substance use: physically active* cluster was concentrated among Pakistani/ Bangladeshi adolescents who spoke *Some-little/no*, rather than *Mostly-all* English with family. These less acculturated adolescents were significantly less likely to be in this cluster of health behaviours and mediation by structural inequalities explained 6% of this ethnic variation; we might speculate that less acculturated adolescents were more likely to live in more materially disadvantaged households, or were less likely to have experienced racism.

While there was no ethnic variation among Other ethnicity compared to White UK adolescents in the likelihood of membership of the *Low substance use: unhealthy diet*, rather than the *Low substance use: healthy diet* cluster, Other ethnicity adolescents who spoke *Some-little/no*, rather than *Mostly-all* English with family were less likely to be in the *Low substance use: unhealthy diet* cluster. Mediation by structural inequalities explained 20% of this ethnic variation among the less acculturated adolescents and upon adjustment from structural inequalities that ethnic variation was no longer statistically significant. This finding is counterintuitive; greater household material disadvantage, and not living in a *Two-parent* family which were more likely among Other ethnicity, compared to White UK adolescents, and were risk factors for membership of the *Low*



*substance use: unhealthy diet*, rather than the *Low substance use: healthy diet* cluster. We might speculate that the chance of living in a household of *Least* material disadvantage or in *Reconstituted* or *Single-parent* family was less likely among the less acculturated Other ethnicity adolescents.

Membership of the *High substance use: physically inactive*, rather than the *Low substance use: healthy diet* cluster was less likely among Other ethnicity than White UK adolescents and among Other ethnicity adolescents was less likely among those who spoke *Some-little/no*, rather than *Mostly-all*, English with family. Mediation by structural inequalities suppressed the ethnic variation between Other ethnicity and White UK adolescents by 21%, this finding is not surprising since Other ethnicity adolescents were more likely than White UK adolescents to live in *Single-parent families* or to have experienced racism, which are both risk factors for membership of the *High substance use: physically inactive*, rather than the *Low substance use: healthy diet* cluster. Mediation by structural inequalities explained 7% of the variation between Other ethnicity adolescents who spoke less, and those who spoke more, English with family. Based on this finding we would hypothesise that less acculturated Other ethnicity adolescents were less likely to live in *Single-parent* families, or to have experienced racism than their more acculturated counterparts.

Ethnic variation in membership of the *High substance use: physically active*, rather than the *Low substance use: healthy diet* cluster was concentrated among Other ethnicity adolescents who spoke *Some-little/no*, rather than *Mostly-all* English with family with the less acculturated adolescents less likely to be in the *High substance use: physically active* cluster than their more acculturated counterparts. Mediation by structural inequalities explained 8% of this ethnic variation; we can hypothesise that less acculturated adolescents were more likely to live in more materially disadvantaged households, or were less likely to have experienced racism than their more acculturated counterparts.

In summary, there is evidence that structural inequalities mediate some ethnic variations in the membership of the *Low substance use: unhealthy diet*, *High substance use: physically inactive*, and the *High substance use: physically active* clusters, rather than the *Low substance use: healthy diet* cluster. Mediation by structural inequalities: explains some of the higher likelihood of membership of the *Low substance use: unhealthy diet* cluster among Black Caribbean, Black African, and less acculturated Other ethnicity adolescents; suppresses some of the lower likelihood of membership in the *High substance use: physically inactive* cluster among Black Caribbean and Other ethnicity, as well as less acculturated Black African adolescents, while in contrast,

explaining some of the lower likelihood of membership in the *High substance use: physically inactive* cluster among less acculturated Pakistani/ Bangladeshi and Other ethnicity adolescents; and explains some of the lower likelihood of being in the *High substance use: physically active* cluster among less acculturated Pakistani/ Bangladeshi and Other ethnicity adolescents.

Table 6-46. Final model predicting clustering of adolescent health behaviours by ethnicity, age, and interactions between ethnicity, gender, and English language use; before and after adjusting for household material disadvantage, family structure, and experiences of racism:

	High substance use, physically active **			High substance use, physically inactive**			Low substance use, unhealthy diet**		
	Unadjusted OR	Adjusted OR	Mediated (%)	Unadjusted OR	Adjusted OR	Mediated (%)	Unadjusted OR	Adjusted OR	Mediated (%)
<b>Age (years):</b>	<b>1.39 (1.1 - 1.75)*</b>	1.4 (1.1 - 1.77)*		<b>1.68 (1.45 - 1.95)*</b>	1.67 (1.44 - 1.94)*		0.96 (0.86 - 1.08)	0.95 (0.84 - 1.07)	
<b>Gender (ref: Male):</b>									
Female	<b>0.55 (0.4 - 0.75)*</b>	0.55 (0.4 - 0.75)*		<b>1.84 (1.54 - 2.2)*</b>	1.88 (1.56 - 2.26)*		1.02 (0.88 - 1.18)	1.02 (0.88 - 1.18)	
<b>Ethnicity (ref: White UK):</b>									
Black Caribbean	0.76 (0.47 - 1.21)	0.69 (0.42 - 1.13)	-28%	<b>0.57 (0.43 - 0.74)*</b>	<b>0.48 (0.36 - 0.64)*</b>	-20%	<b>1.58 (1.23 - 2.04)*</b>	<b>1.38 (1.06 - 1.8)*</b>	35%
Black African	<b>0.35 (0.18 - 0.65)*</b>	<b>0.33 (0.17 - 0.64)*</b>	-2%	<b>0.24 (0.17 - 0.34)*</b>	<b>0.24 (0.17 - 0.34)*</b>	0%	<b>2.01 (1.56 - 2.6)*</b>	<b>1.82 (1.4 - 2.38)*</b>	19%
Indian	<b>0.19 (0.07 - 0.54)*</b>	<b>0.18 (0.06 - 0.51)*</b>	-1%	<b>0.16 (0.1 - 0.27)*</b>	<b>0.17 (0.1 - 0.29)*</b>	2%	0.86 (0.6 - 1.23)	0.88 (0.61 - 1.26)	11%
Pakistani/ Bangladeshi	1.05 (0.56 - 1.97)	1.04 (0.55 - 1.96)	28%	<b>0.14 (0.07 - 0.28)*</b>	<b>0.16 (0.08 - 0.31)*</b>	2%	<b>1.8 (1.26 - 2.57)*</b>	<b>1.77 (1.23 - 2.54)*</b>	4%
Other ethnicity	1.11 (0.74 - 1.65)	1.06 (0.7 - 1.59)	48%	<b>0.68 (0.53 - 0.86)*</b>	<b>0.61 (0.47 - 0.79)*</b>	-21%	1.09 (0.84 - 1.4)	1 (0.77 - 1.29)	104%
<b>Ethnicity x English lang. use</b>									
Black Caribbean; Some/little-no	1.35 (0.44 - 4.12)	1.33 (0.37 - 4.78)	4%	1.05 (0.53 - 2.06)	1.34 (0.66 - 2.71)	-652%	1.29 (0.73 - 2.27)	1.48 (0.81 - 2.71)	-68%
Black African; Some/little-no	0.86 (0.32 - 2.32)	0.94 (0.34 - 2.57)	54%	0.59 (0.33 - 1.06)	<b>0.5 (0.26 - 0.93)*</b>	-23%	0.82 (0.6 - 1.13)	0.83 (0.6 - 1.14)	4%
Indian; Some/little-no	2.31 (0.68 - 7.89)	2.36 (0.69 - 8.07)	-3%	0.67 (0.3 - 1.51)	0.72 (0.32 - 1.63)	16%	0.94 (0.6 - 1.47)	0.95 (0.6 - 1.51)	28%
Pakistani/ Bangladeshi; Some/little-no	<b>0.37 (0.15 - 0.92)*</b>	0.41 (0.16 - 1.01)	6%	0.73 (0.29 - 1.83)	0.77 (0.31 - 1.95)	16%	0.81 (0.54 - 1.22)	0.81 (0.54 - 1.23)	1%
Other ethnicity; Some/little-no	<b>0.4 (0.24 - 0.66)*</b>	<b>0.45 (0.27 - 0.75)*</b>	8%	<b>0.25 (0.17 - 0.36)*</b>	<b>0.3 (0.21 - 0.43)*</b>	7%	<b>0.71 (0.55 - 0.93)*</b>	0.77 (0.59 - 1.02)	20%
<b>Household material disadvantage (ref. Least)</b>									
Medium		<b>0.68 (0.5 - 0.94)*</b>			0.97 (0.79 - 1.18)			<b>1.37 (1.16 - 1.61)*</b>	
Most		0.69 (0.46 - 1.04)			0.82 (0.64 - 1.06)			<b>1.3 (1.06 - 1.59)*</b>	
<b>Family structure (ref. Two parent):</b>									
Reconstructed		0.99 (0.61 - 1.61)			<b>1.81 (1.38 - 2.36)*</b>			1.28 (1 - 1.63)*	
Single		1.24 (0.87 - 1.77)			<b>1.6 (1.29 - 1.99)*</b>			<b>1.24 (1.04 - 1.48)*</b>	
Other		0.95 (0.49 - 1.83)			1 (0.67 - 1.5)			1.13 (0.84 - 1.51)	
<b>Racism (ref: None):</b>									
Experienced racism		<b>1.68 (1.25 - 2.27)*</b>			<b>1.31 (1.08 - 1.59)*</b>			1.06 (0.91 - 1.24)	
<b>Sample size:</b>							n = 4,612	n = 4,461	

\*p≤0.05 | \*\*Reference category: Low substance use, healthy diet

#### 6.4. Key findings

Here I describe my key findings from Chapter 6 where I have investigated ethnic variations in adolescent health behaviours among DASH study adolescents.

I identified four clusters of adolescent health behaviours among DASH study adolescents. These clusters, defined by substance use, fruit and vegetable consumption and physical activity were characterised as:

- *High substance use: physically active*
- *High substance use: physically inactive*
- *Low substance use: healthy diet*
- *Low substance use: unhealthy diet*

As expected there were significant ethnic variations in adolescent health behaviours and in the clustering of adolescent health behaviours. Ethnic minority adolescents were less likely to engage in substance use behaviours, Black Caribbean, Black African, and Pakistani/ Bangladeshi adolescents tended to eat fewer fruit and vegetables per day, Black Caribbean adolescents tended to be more physically active, and Black Caribbean and Black African adolescents were more likely to be overweight or obese than White UK adolescents. Compared to White UK adolescents Ethnic minority adolescents were less likely to be in the *High substance use: physically inactive* cluster, Black Caribbean, Black African, and Pakistani/ Bangladeshi adolescents were more likely to be in the *Low substance use: unhealthy diet* cluster, and Black African and Indian adolescents were less likely to be in the *High substance use: physically active* cluster, rather than the *Low substance use: healthy diet cluster*.

Some of those ethnic variations in health behaviours were moderated by cultural values (gender, religious attendance and English language use with family). Lower likelihoods of tobacco use among Indian, and Pakistani/ Bangladeshi adolescents were concentrated amongst females. Lower likelihoods of tobacco use among Black Caribbean adolescents and Black African adolescents and the lower likelihood of illicit drug use among Black African adolescents were concentrated among those who attended a place of worship less frequently. Lower fruit and vegetable consumption among Pakistani/ Bangladeshi adolescents was concentrated among those who spoke less English with their families and the higher likelihoods of obesity among Black African adolescents was concentrated among those who spoke more English with their families. Some ethnic variations in the clustering of adolescent health behaviour were also moderated by cultural values (English language use with family). Lower likelihoods of being in the *High substance use: physically active* among Pakistani/ Bangladeshi and Other ethnicity adolescents and the

lower likelihoods of being in the *High substance use: physically inactive* cluster among Other ethnicity adolescents were concentrated among those who spoke less English with their families.

In some cases structural inequalities mediated, but in others they suppressed, ethnic variations in adolescent health behaviours. Some ethnic variations in adolescent health behaviours were slightly reduced but none were explained by adjustment for structural inequalities. Among Black Caribbean, compared to White UK adolescents, structural inequalities (family structure and experiences of racism) suppressed an otherwise even lower likelihood of using illicit drugs by 15%.

Structural inequalities mediated some ethnic variations in fruit and vegetable consumption. Household material disadvantage and family structure explained higher likelihoods of eating <2 *portions*, rather than  $\geq 5$  *portions* of fruit and vegetables, among Black Caribbean adolescents by 28%, Black African adolescents by 16%, Pakistani/ Bangladeshi adolescents who spoke less English with their families by 11%, and Other ethnicity adolescents by 36%. Those structural inequalities also mediated the higher likelihoods of eating 2-4 *portions*, rather than  $\geq 5$  *portions* of fruit and vegetables, among Pakistani/ Bangladeshi adolescents who spoke less English with their families by 13%.

Structural inequalities mediated some ethnic variations in the clustering of adolescent health behaviours. Household material disadvantage and family structure explained greater likelihoods of being in the *Low substance use: unhealthy diet* cluster, among Black Caribbean adolescents by 35%, Black African adolescents by 19%, and among Other ethnicity adolescents who spoke less English language with family by 20%. Those structural inequalities suppressed otherwise even lower likelihoods of being in the *High substance use: physically inactive* cluster, among Black Caribbean adolescents by 20%, among Other ethnicity adolescents by 21%, and among Black African adolescents who spoke less English with family by 23%.

In this chapter I have found that there were ethnic variations in adolescent health behaviours and clusters of adolescent health behaviours among DASH study adolescents. Some of ethnic variations were moderated by cultural values and some were mediated by structural inequalities however on the whole they remain unexplained. In subsequent analyses (Chapters 7-9) I investigate whether any of these ethnic variations can be explained by perceived parenting styles. In 10.1, I discuss these findings with reference to existing literature, the aims and objectives of my Thesis, and possible interventions.

## 7. Ethnic variations in parenting styles

### 7.1. Introduction

The analysis presented in this chapter addresses objective B of my thesis (Figure 7-1), to investigate ethnic variations in perceived parenting styles, and whether these variations are moderated by cultural values, or mediated by structural inequalities.

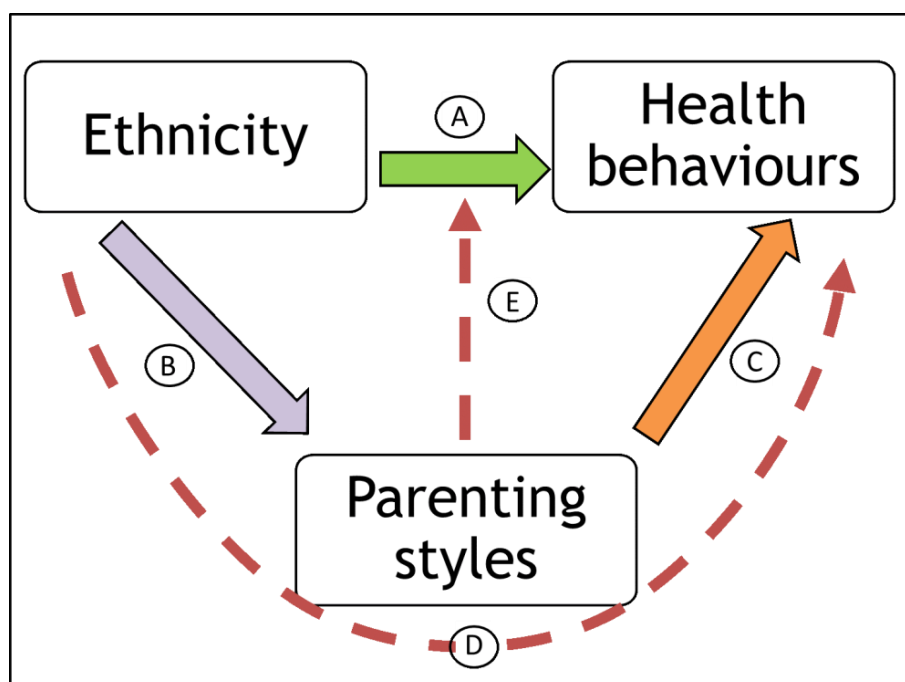


Figure 7-1: Thesis objective B, investigation of ethnic variations in perceived parenting styles.

I reviewed literature that investigated, and sought to explain, ethnic variations in parenting styles (4.2.2). Previous research suggests that ethnic variations in parenting styles may be at least partly explained by differences in cultural values, and exposure to structural inequalities.

Previous findings from the DASH study showed that ethnic minority adolescents perceived greater parental control, compared to White UK adolescents. Ethnic variations in perceived parental care were inconsistent with some ethnic minority groups perceiving more, and some less, parental care, compared to White UK. The current analysis builds on these findings by investigating ethnic variations in perceived parental care and control, as well as the parenting styles derived from them and investigating whether ethnic variations are moderated by cultural values, or mediated by structural inequalities.

Box 7-1. Objective B - Research questions:

1. Were there ethnic variations in perceived parenting styles?
2. Were ethnic variations in perceived parenting styles moderated by generational status, English language use with family, or religious attendance?
3. Were ethnic variations in perceived parenting styles mediated by household material disadvantage, family structure, household overcrowding, or experiences of racism?

## 7.2. Methods

Logistic regression was used to investigate ethnic variations in perceived parental care, control and parenting styles. Adolescent parenting styles variables are perceived parental care, control, and parenting styles. Covariates include age, gender, cultural values (generational status, English language use with family, and religious attendance), and structural inequalities (household material disadvantage, family structure, household overcrowding, and experiences of racism). More information on these variables can be found in section 5.2. Wald chi<sup>2</sup> tests were used to test the joint significance ( $p < 0.05$ ) of ethnic variations, and of multinomial covariate effects.

Parenting variables were regressed on age, gender and ethnicity; predicted probabilities were plotted for the interpretation of ethnic variations. I investigated moderation of ethnic variations by including interactions between ethnicity and cultural values. Interactions were added individually, predicted probabilities plotted for interpretation, before combining those with significant effects. I used these models of moderated ethnic variations to investigate mediation of ethnic variations by structural inequalities. Structural inequality variables were added individually, before combining those with significant effects in final models. I used Equation 1 to calculate the percentage of ethnic variations mediated by structural inequalities, individually, and combined in the final model.

## 7.3. Results

### 7.3.1. Ethnic variations in perceived parenting styles

#### *Ethnic variations in perceived parental care and control:*

Multinomial logistic regression models to investigate ethnic variations in perceived parental care and control are shown in Table 7-1. Age was positively associated with low perceived parental care, but unrelated to perceived parental control. Females were more likely than males to perceive *Low care* and *High control*, rather than *High care*, and *Low control*, respectively. Compared to White UK adolescents, Black Caribbean and Black African adolescents were more likely to perceive *Low care*, than *High care*; adolescents of each ethnic minority group were more likely to perceive *Medium control* or *High control*, than *Low control*. Predicted probabilities of perceived parental care and control shown in Figure 7-2 and Figure 7-3, respectively, illustrate these ethnic variations.

Table 7-1. Multinomial regression predicting perceived parental care and control, by ethnicity, age, and gender:

	Perceived parental care (ref. High)		Perceived parental control (ref. Low)	
	Medium care	Low care	Medium control	High control
<b>Age (years):</b>	1.1 (0.95 - 1.26)	<b>1.26 (1.11 - 1.43)*</b>	0.89 (0.79 - 1.01)	0.89 (0.79 - 1.01)
<b>Gender (ref. male):</b>				
Female	1.05 (0.88 - 1.26)	<b>1.42 (1.2 - 1.66)*</b>	1.01 (0.87 - 1.18)	<b>1.58 (1.35 - 1.84)*</b>
<b>Ethnicity (ref. White UK):</b>				
Black Caribbean	1.15 (0.87 - 1.54)	<b>1.58 (1.22 - 2.06)*</b>	<b>1.56 (1.22 - 1.98)*</b>	<b>2.58 (2 - 3.34)*</b>
Black African	1.03 (0.78 - 1.37)	<b>1.43 (1.1 - 1.84)*</b>	<b>1.76 (1.38 - 2.25)*</b>	<b>3.7 (2.87 - 4.78)*</b>
Indian	0.86 (0.62 - 1.19)	0.86 (0.63 - 1.17)	<b>1.88 (1.38 - 2.55)*</b>	<b>3.65 (2.66 - 5)*</b>
Pakistani/ Bangladeshi	0.85 (0.61 - 1.18)	1.04 (0.77 - 1.4)	<b>2.07 (1.52 - 2.8)*</b>	<b>4.31 (3.15 - 5.91)*</b>
Other ethnicity	0.94 (0.74 - 1.2)	1.18 (0.95 - 1.48)	<b>1.57 (1.28 - 1.94)*</b>	<b>3 (2.39 - 3.77)*</b>
Chi2 test p value		<b>&lt;0.01</b>		<b>&lt;0.01</b>
<b>Sample size:</b>		<i>n</i> = 4,715		<i>n</i> = 4,713

\* $p \leq 0.05$



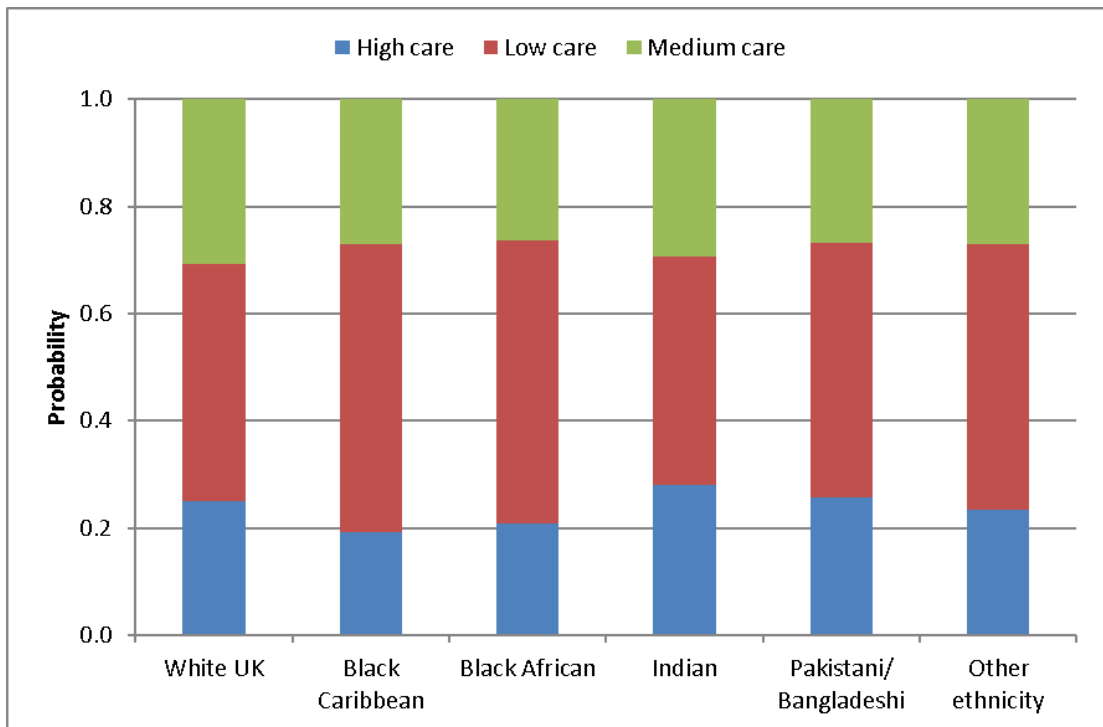


Figure 7-2: Predicted probabilities of *High*, *Medium*, and *Low* perceived parental care by ethnicity, adjusted for age and gender.

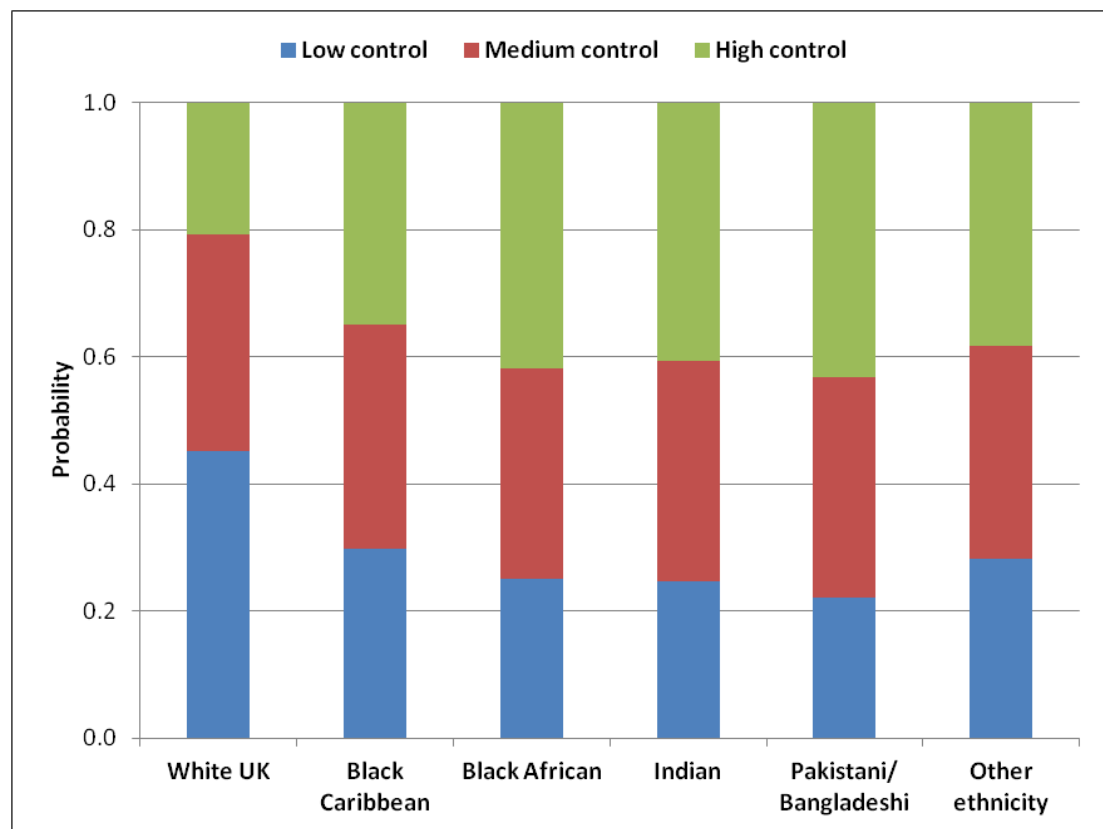


Figure 7-3: Predicted probabilities of *Low*, *Medium*, and *High* perceived parental control by ethnicity, adjusted for age and gender.

*Ethnic variations in perceived parenting styles:*

Multinomial logistic regression models to investigate ethnic variations in perceived parenting styles are shown in Table 7-2. Age was positively associated with *Neglectful*, rather than *Permissive*, and negatively associated with *Authoritative*, rather than *Permissive* parenting. Females were more likely than males to perceive *Authoritarian*, rather than *Permissive* parenting.

Compared to White UK adolescents, Indian, and Pakistani/ Bangladeshi adolescents were less likely to perceive *Neglectful*, rather than *Permissive* parenting; adolescents of each ethnic minority group were more likely to perceive *Authoritative*, or *Authoritarian*, rather than *Permissive* parenting. Black Caribbean adolescents were also more likely to perceive *Neglectful* parenting than White UK adolescents, but this ethnic variation had borderline statistical significance ( $p=0.06$ ). Predicted probabilities of perceived parenting styles shown in Figure 7-4 illustrate these ethnic variations.

Table 7-2. Multinomial regression predicting perceived parenting styles, by ethnicity, age, and gender:

	Perceived parenting styles (ref. Permissive parenting):		
	Neglectful	Authoritative	Authoritarian
<b>Age (years):</b>	<b>1.16 (1.02 - 1.31)*</b>	<b>0.77 (0.65 - 0.92)*</b>	1.12 (0.99 - 1.27)
<b>Gender (ref. male):</b>			
Female	1.14 (0.98 - 1.34)	1.22 (1 - 1.51)	<b>1.81 (1.55 - 2.11)*</b>
<b>Ethnicity (ref. White UK):</b>			
Black Caribbean	1.26 (0.99 - 1.6)	<b>2.15 (1.45 - 3.18)*</b>	<b>2.4 (1.82 - 3.16)*</b>
Black African	1.1 (0.86 - 1.4)	<b>2.83 (1.95 - 4.11)*</b>	<b>2.95 (2.26 - 3.85)*</b>
Indian	<b>0.66 (0.48 - 0.92)*</b>	<b>2.86 (1.88 - 4.36)*</b>	<b>2.12 (1.54 - 2.93)*</b>
Pakistani/ Bangladeshi	<b>0.66 (0.48 - 0.92)*</b>	<b>2.74 (1.8 - 4.2)*</b>	<b>2.71 (1.98 - 3.71)*</b>
Other ethnicity	0.96 (0.78 - 1.19)	<b>2.5 (1.77 - 3.52)*</b>	<b>2.37 (1.85 - 3.03)*</b>
Chi2 test p value			<b>&lt;0.01</b>
<b>Sample size:</b>			<i>n</i> = 4,695

\**p* ≤ 0.05

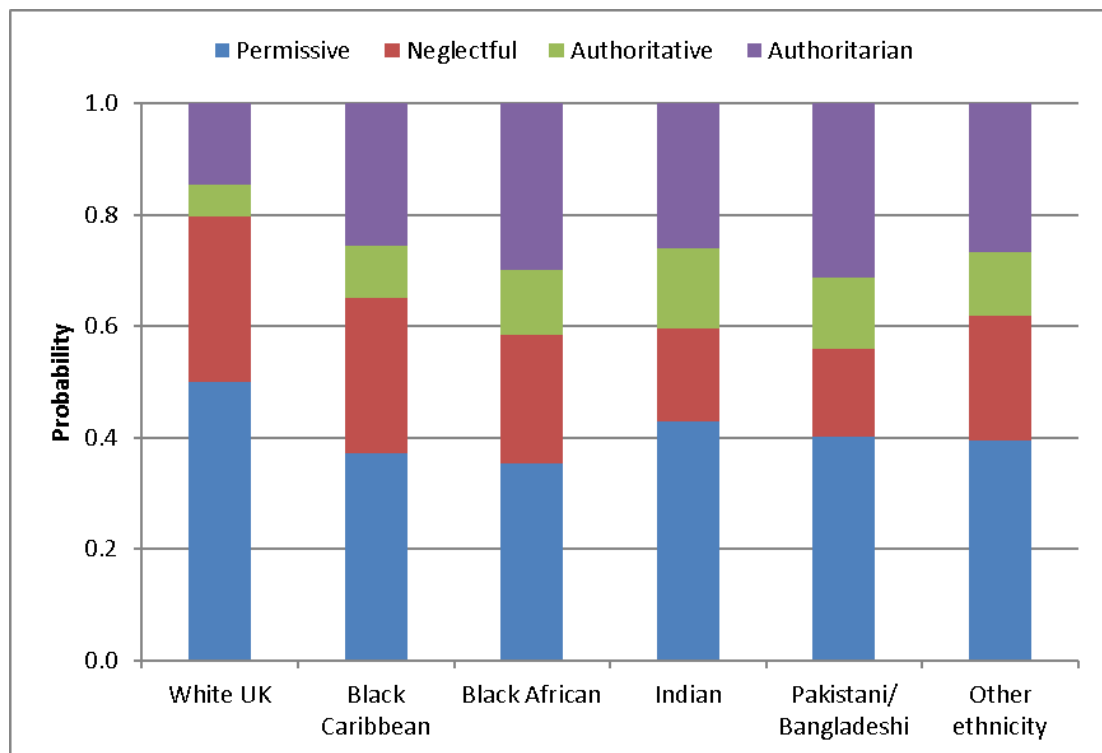


Figure 7-4: Predicted probabilities of *Permissive*, *Neglectful*, *Authoritative*, and *Authoritarian* parenting by ethnicity, adjusted for age and gender.

### 7.3.2. Moderation of ethnic variations in perceived parenting styles by cultural values

#### 7.3.2.1. Moderation of ethnic variations in perceived parenting by gender

Interactions between ethnicity and gender were included in logistic regression models predicting perceived parental care, control and parenting style, adjusted for age. Results of chi2 tests for joint significance of interactions terms are shown in Table 7-3; they were not significant in any of the models.

Table 7-3. Chi2 tests of joint significance of interactions between ethnicity and gender:

	Chi2:
Perceived parental care	12.8 (df=10) $p=0.24$
Perceived parental control	4.6 (df=10) $p=0.92$
Perceived parenting style	10.0 (df=15) $p=0.82$

#### 7.3.2.2. Moderation of ethnic variations in perceived parenting by generational status

Interactions between ethnicity and generational status were included in logistic regression models predicting perceived parental care, control and parenting style, adjusted for age, and gender. Results of chi2 tests for joint significance of interactions terms are shown in Table 7-4; these were significant only in the model predicting perceived parental care

Table 7-4. Chi2 tests of joint significance of interactions between ethnicity and generational status:

	Chi2:
Perceived parental care	<b>38.9 (df=10) <math>p&lt;0.01</math></b>
Perceived parental control	11.0 (df=10) $p=0.36$
Perceived parenting style	20.5 (df=15) $p=0.15$

#### *Perceived parental care and control:*

The results of the model predicting perceived parental care by interactions between generational status and ethnicity are presented in Table 7-5. Small numbers of White UK adolescents who were *Born Abroad* resulted in extremely unbalanced estimates in an initial model (not shown); to solve this issue the main effects of generational status on perceived parental care were constrained to equal 1. This step was carried out on the

premise that the effects of interest are those of generational status among ethnic minority, not White UK adolescents. Inclusion of the interaction between ethnicity and generational status did not result in any substantive changes to the main effects of ethnicity on perceived parental care described in 7.3.1; however, there are statistically significant interaction effects among Black Caribbean, Indian, and Pakistani/ Bangladeshi adolescents. Black Caribbean adolescents who were *Born Abroad* were more likely than those *Born UK* to perceived *Low care*, than *High care*; whereas, Indian adolescents who were *Born Abroad* were less likely than those *Born UK* to perceive *Low care* than *High care*; similarly, Pakistani/ Bangladeshi adolescents who were *Born Abroad* were less likely than those *Born UK* to perceive *Medium care*, or *Low care*, than *High care*. Predicted probabilities computed from this model are shown in Table 7-5. The probability of perceiving *Low care* was higher among Black Caribbean adolescents *Born UK* (52%) than among White UK adolescents (44%), and higher still among Black Caribbean adolescents *Born Abroad* (61%). While there were no substantial differences in probabilities of perceiving *High care*, *Medium care*, or *Low care* between White UK adolescents and *Born UK* Indian or Pakistani/ Bangladeshi adolescents, among those *Born Abroad* the probabilities of *High care* were higher (33%, and 40%, respectively) than those *Born UK* (27%, and 23%, respectively). Among Pakistani/ Bangladeshi adolescents, there was also a lower probability of perceiving *Medium care* among those *Born Abroad* (29%), than among those *Born UK* (16%).

Table 7-5. Multinomial logistic regression predicting perceived parental care by ethnicity, interactions between ethnicity and generational status, age and gender:

	Perceived parental care (ref. High care)	
	Medium care	Low care
<b>Age (years):</b>	1.1(0.96 - 1.26)	<b>1.27(1.12 - 1.44)*</b>
<b>Gender (ref. male):</b>		
Female	1.05(0.87 - 1.25)	<b>1.4(1.19 - 1.65)*</b>
<b>Ethnicity (ref. White UK):</b>		
Black Caribbean	1.09(0.81 - 1.48)	<b>1.42(1.07 - 1.87)*</b>
Black African	1.02(0.73 - 1.42)	<b>1.62(1.2 - 2.19)*</b>
Indian	0.83(0.58 - 1.18)	0.98(0.71 - 1.36)
Pakistani/ Bangladeshi	1.03(0.72 - 1.46)	1.18(0.85 - 1.64)
Other ethnicity	0.95(0.73 - 1.24)	1.26(0.99 - 1.6)
Chi2 test <i>p</i> value		<b>0.01</b>
<b>Generational status (ref. Born UK):</b>		
Born abroad**	1	1
<b>Ethnicity x Generational status</b>		
Black Caribbean; Born abroad	1.27(0.73 - 2.21)	<b>1.69(1.03 - 2.75)*</b>
Black African; Born abroad	1.04(0.7 - 1.57)	0.73(0.51 - 1.05)
Indian; Born abroad	1.15(0.64 - 2.06)	<b>0.47(0.26 - 0.87)*</b>
Pakistani/Bangladeshi; Born abroad	<b>0.31(0.15 - 0.65)*</b>	<b>0.51(0.29 - 0.89)*</b>
Other ethnicity; Born abroad	0.99(0.72 - 1.36)	0.84(0.63 - 1.12)
Chi2 test <i>p</i> value		<b>&lt;0.01</b>
<b>Sample size:</b>		<i>n</i> = 4,713

\**p*≤0.05

\*\*Main effects of Generational status constrained to 1

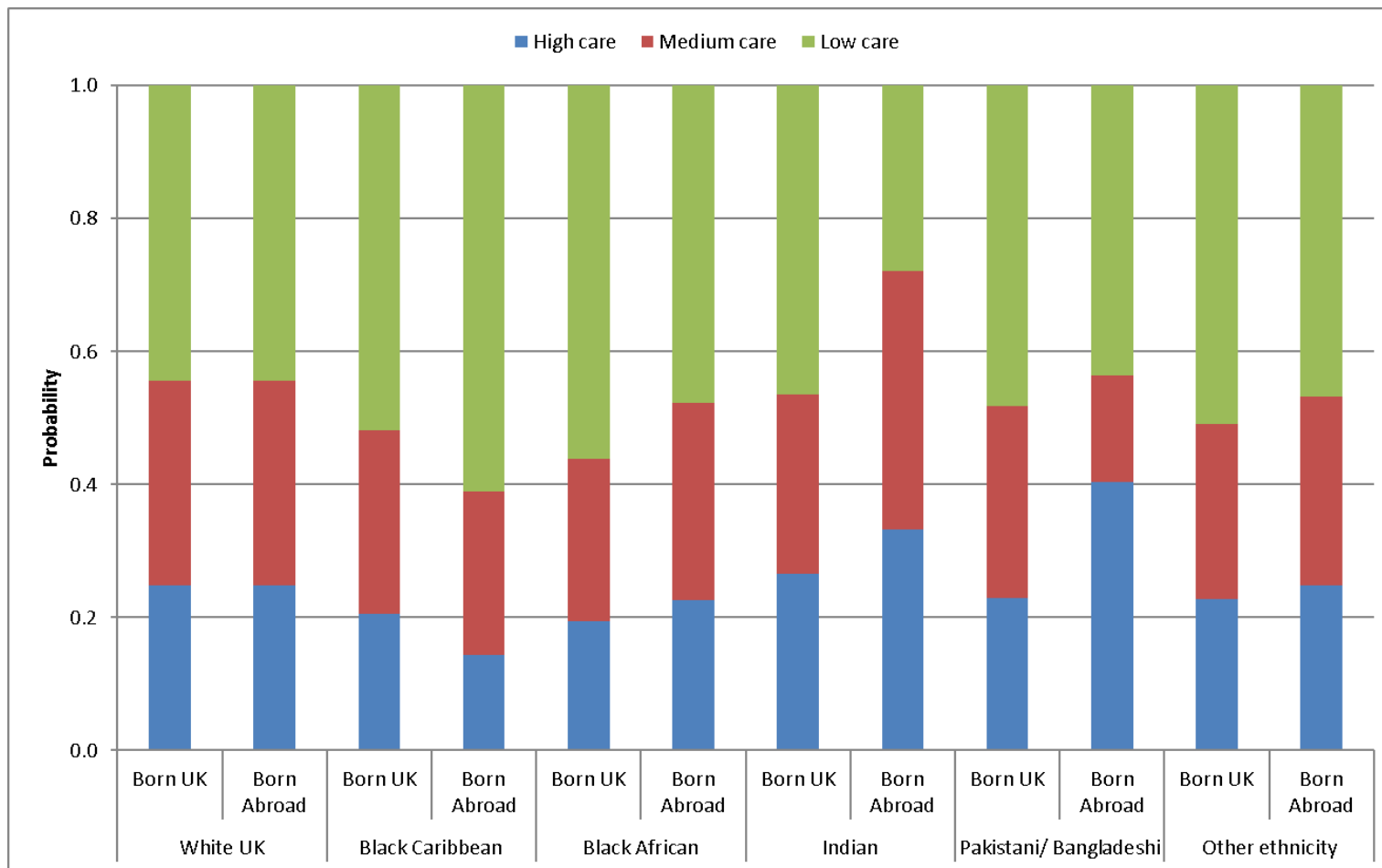


Figure 7-5: Predicted probabilities of *High*, *Medium*, and *Low* perceived parental care by ethnicity and generational status, adjusted for age and gender.

*Perceived parenting styles:*

Interactions between generational status and ethnicity were not significant in models predicting perceived parenting styles.

7.3.2.3. Moderation of ethnic variations in perceived parenting by religious attendance

Interactions between ethnicity and religious attendance were included in logistic regression models predicting perceived parental care, control and parenting style, adjusted for age, and gender. Results of chi2 tests for joint significance of interactions terms are shown in Table 7-6; these were not significant in any of the models.

Table 7-6. Chi2 tests of joint significance of interactions between ethnicity and religious attendance:

	<b>Chi2:</b>
Perceived parental care	9.6 (df=10) p=0.47
Perceived parental control	8.6 (df=10) p=0.62
Perceived parenting style	17.9 (df=15) p=0.27

7.3.2.4. Moderation of ethnic variations in perceived parenting by English language use with family

Interactions between ethnicity and English language use with family were included in logistic regression models predicting perceived parental care, control and parenting style, adjusted for age, and gender. Results of chi2 tests for joint significance of interactions terms are shown in Table 7-7.

Table 7-7. Chi2 tests of joint significance of interactions between ethnicity and English language use:

	<b>Chi2:</b>
Perceived parental care	<b>21.7 (df=10) p=0.02</b>
Perceived parental control	14.1 (df=10) p=0.17
Perceived parenting style	<b>30.1 (df=15) p=0.01</b>



*Perceived parental care and control:*

The results of the model predicting perceived parental care by interactions between English language use with family and ethnicity are presented in Table 7-8.

Although the interaction between ethnicity and English use with family was jointly significant, it did not result in any notable changes to ethnic variations in perceived parental care described in 7.3.1, and there were no individually significant interaction effects, therefore, this interaction was not included in subsequent analyses.

Table 7-8. Multinomial logistic regression predicting perceived parental care by ethnicity, interactions between ethnicity and English language use, age and gender:

	Perceived parental care (ref. High care)	
	Medium care	Low care
<b>Age (years):</b>	1.11 (0.96 - 1.27)	<b>1.25 (1.1 - 1.42)*</b>
<b>Gender (ref. male):</b>		
Female	1.05 (0.88 - 1.26)	<b>1.39 (1.18 - 1.63)*</b>
<b>Ethnicity (ref. White UK):</b>		
Black Caribbean	1.18 (0.88 - 1.59)	<b>1.49 (1.14 - 1.96)*</b>
Black African	1.18 (0.85 - 1.63)	<b>1.65 (1.23 - 2.22)*</b>
Indian	0.72 (0.48 - 1.1)	0.95 (0.66 - 1.38)
Pakistani/ Bangladeshi	0.95 (0.63 - 1.45)	0.87 (0.58 - 1.29)
Other ethnicity	0.99 (0.75 - 1.31)	<b>1.33 (1.03 - 1.71)*</b>
Chi2 test <i>p</i> value		<b>&lt;0.01</b>
<b>English language use with family (ref. Mostly-all):</b>		
Some/little-no	1.62 (0.46 - 5.69)	0.65 (0.16 - 2.66)
<b>Ethnicity x English language use</b>		
Black Caribbean; Some/little-no	0.52 (0.12 - 2.27)	1.85 (0.39 - 8.78)
Black African; Some/little-no	0.44 (0.12 - 1.65)	0.93 (0.22 - 4)
Indian; Some/little-no	0.85 (0.22 - 3.29)	1.04 (0.23 - 4.6)
Pakistani/ Bangladeshi; Some/little-no	0.5 (0.13 - 1.93)	2.02 (0.46 - 8.89)
Other ethnicity; Some/little-no	0.55 (0.15 - 2.01)	1.09 (0.26 - 4.6)
Chi2 test <i>p</i> value		<b>0.02</b>
<b>Sample size:</b>		<i>n</i> = 4,580

\**p*≤0.05

*Perceived parenting styles:*

The results of the model predicting perceived parenting styles by interactions between English language use with family and ethnicity are presented in Table 7-9. Inclusion of the interaction between ethnicity and English language use with family did not result in any substantive changes to the main effects of ethnicity on perceived parental care described in 7.3.1. However, there was statistically significant interaction between Pakistani/ Bangladeshi ethnicity and English language use with family; those who spoke *Some-little/no* English with family were more likely than those who spoke *Mostly-all* English with family to perceive *Neglectful* rather than *Permissive* parenting.

Predicted probabilities computed from this model are shown in Figure 7-6. Among Pakistani/ Bangladeshi adolescents the probability of perceiving *Neglectful* parenting was higher among those who spoke *Some-little/no* English with family (20%) than among those who spoke *Mostly-all* English with family (12%); whereas, the probability of perceiving *Permissive* parenting was lower among those who spoke *Some-little/no* English with family (36%) than among those who spoke *Mostly-all* English with family (45%).

Table 7-9. Multinomial logistic regression predicting perceived parenting styles by ethnicity, interactions between ethnicity and English language use, age and gender:

	Perceived parenting styles (ref. Permissive parenting):		
	Neglectful parenting	Authoritative parenting	Authoritarian parenting
<b>Age (years):</b>	<b>1.15 (1.01 - 1.3)*</b>	<b>0.76 (0.64 - 0.91)*</b>	1.09 (0.96 - 1.24)
<b>Gender (ref. male):</b>			
Female	1.1 (0.94 - 1.29)	1.22 (0.99 - 1.5)	<b>1.79 (1.53 - 2.1)*</b>
<b>Ethnicity (ref. White UK):</b>			
Black Caribbean	1.22 (0.95 - 1.56)	<b>2.18 (1.44 - 3.29)*</b>	<b>2.14 (1.6 - 2.85)*</b>
Black African	1.22 (0.93 - 1.6)	<b>2.6 (1.7 - 3.99)*</b>	<b>2.94 (2.19 - 3.95)*</b>
Indian	0.77 (0.52 - 1.15)	<b>2.08 (1.19 - 3.63)*</b>	<b>2.29 (1.56 - 3.37)*</b>
Pakistani/ Bangladeshi	<b>0.43 (0.26 - 0.7)*</b>	<b>2.5 (1.45 - 4.29)*</b>	<b>2.28 (1.53 - 3.4)*</b>
Other ethnicity	1.08 (0.85 - 1.37)	<b>1.67 (1.11 - 2.52)*</b>	<b>2.19 (1.67 - 2.87)*</b>
Chi2 test <i>p</i> value			<0.01
<b>English language use with family (ref. Mostly-all):</b>			
Some/little-no	0.37 (0.08 - 1.73)	2.05 (0.43 - 9.83)	0.84 (0.18 - 3.98)
<b>Ethnicity x English language use</b>			
Black Caribbean; Some/little-no	2.91 (0.54 - 15.57)	0.57 (0.09 - 3.56)	2.01 (0.38 - 10.71)
Black African; Some/little-no	1.68 (0.34 - 8.32)	0.68 (0.13 - 3.5)	1.12 (0.23 - 5.55)
Indian; Some/little-no	1.57 (0.3 - 8.2)	0.96 (0.18 - 5.14)	0.89 (0.17 - 4.58)
P'stani/ B'deshi; Some/little-no	<b>5.57 (1.07 - 28.98)*</b>	0.61 (0.11 - 3.27)	1.54 (0.3 - 7.82)
Other ethnicity; Some/little-no	1.82 (0.38 - 8.77)	1.21 (0.24 - 6.04)	1.36 (0.28 - 6.63)
Chi2 test <i>p</i> value			0.01
<b>Sample size:</b>			<i>n</i> = 4,564

\**p* ≤ 0.05

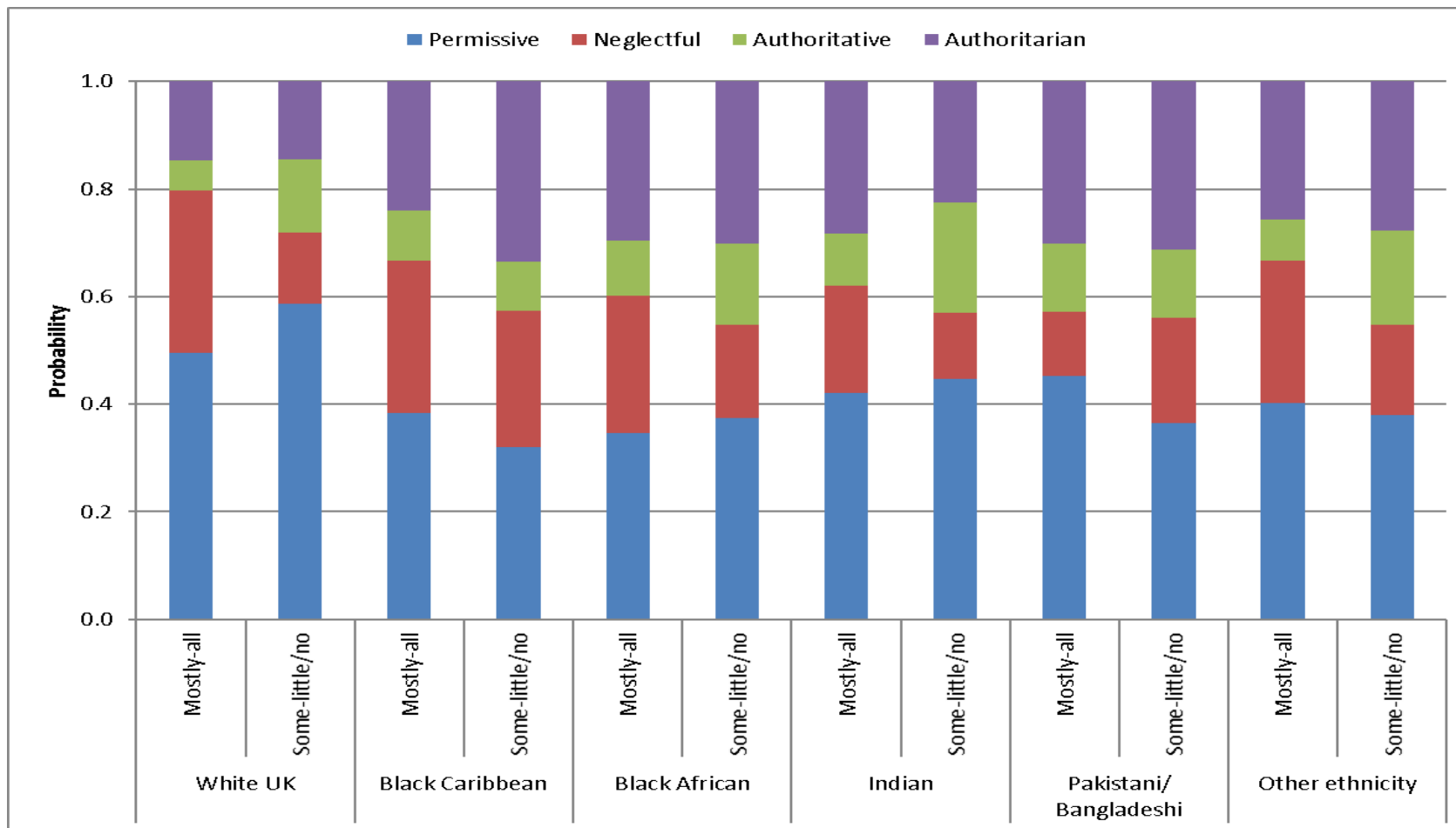


Figure 7-6: Predicted probabilities of *Permissive*, *Neglectful*, *Authoritative*, and *Authoritarian* parenting styles by ethnicity and English language use, adjusted for age and gender.

### 7.3.3. Mediation of ethnic variations in perceived parenting styles by structural inequalities

#### 7.3.3.1. Mediation of ethnic variations in perceived parenting styles by household material resources

To support the mediational hypothesis we require evidence that there are ethnic differences in household material disadvantage, which are in turn associated with differences in perceived parenting, and that adjustment for household material disadvantage affects the strength or the direction of ethnic variations in perceived parenting.

Ethnic variations in structural inequalities are shown in Table 5-6 (Section 5.1.6): Black Caribbean, Black African, Pakistani/ Bangladeshi, and Other ethnicity adolescents were more likely to live in households of either *Medium* or *Most*, compared to *Least* material disadvantage. Among Indian adolescents there was no significant ethnic variation in household material disadvantage.

Next, household material disadvantage was added to multinomial logistic regression of perceived parenting on ethnicity, adjusted for age and gender. Results of chi<sup>2</sup> tests for joint significance of the effects of *Medium* and *Most*, compared to *Least* household material disadvantage are shown in Table 7-10: household material disadvantage was significantly related to perceived parental care, control and parenting styles. In the following sections the findings of these models are discussed, including the percentage of ethnic variations in perceived parenting explained.

Table 7-10. Chi2 test of joint effects of household material disadvantage on perceived parenting:

	Chi2:
Parental care	chi2: 18.2 (df=4) $p<0.01$
Parental control	chi2: 11.0 (df=4) $p=0.03$
Parenting style	chi2: 25.1 (df=6) $p<0.01$

*Perceived parental care and control:*

In models predicting perceived parental care and control by household material disadvantage, adjusted for age, and gender (not shown), adolescents who lived in the *Most*, compared to *Least* materially disadvantaged households were more likely to perceive *Low care*, rather than *High care* (*Medium* significant:  $p<0.01$ ; *Most* significant:  $p=0.03$ ), and *Low control*, rather than *High control* (*Medium* borderline significant:  $p=0.07$ ; *Most* significant:  $p<0.01$ ). In the models investigating mediation of ethnic variations in parental care and control (Table 7-11, and Table 7-12, respectively) these associations were either weaker or absent: the association between *Medium*, compared to *Least* household material disadvantage and *Low care* remained significant ( $p=0.01$ ), the association between *Most*, compared to *Least* household material disadvantage and *Low care* was borderline significant ( $p=0.10$ ), associations between *Medium* or *Most*, compared to *Least* household material disadvantage, and *Medium control* and *High control* were no longer significant to the 95 percent level. This finding suggests substantial collinearity among ethnicity, household material disadvantage, and parenting.

Inclusion of household material disadvantage resulted in moderate changes to the ethnic variations in parental care (Table 7-11), but only one small change to the ethnic variations in parental control (Table 7-12). Among Black Caribbean and Black African adolescents (who, compared to White UK were more likely to live in *Medium* or *Most*, compared to *Least*, materially disadvantaged households, and more likely than White UK adolescents to perceive *Low care* rather than *High care*) mediation by household material disadvantage explained ethnic variation in parental care by 15% among Black Caribbean and 22% among Black African adolescents. Adjustment for household material disadvantage resulted in one small change to the ethnic variations in parental control: among Black African, compared to White UK adolescents, household material disadvantage suppressed greater likelihood of *Medium control*, rather than *Low control* by 6%. This is an unexpected finding as there was no relationship between household material disadvantage and the likelihood of perceiving *Medium*, rather than *Low*

*control*; this might be caused by a reduction in the distribution of responses from the *Low control*, reference category, to *High control*. Adjustment for household material disadvantage resulted in no changes to the greater likelihood of perceived parental control across the other ethnic minority groups, compared to the White UK adolescents.

In summary, these results suggest that a small to moderate proportion of the greater likelihood of perceiving *Low care* than *High care*, among Black Caribbean and Black African compared to White UK adolescents can be explained by greater family material disadvantage among these adolescents. There is little to no evidence to suggest that ethnic difference in household material disadvantage are related to ethnic variations in perceived parental control.

Table 7-11. Multinomial regression predicting perceived parental care by ethnicity, age and gender; before and after adjustment for household material disadvantage:

	Perceived parental care (ref. High care)					
	Medium care			Low care		
	Unadjusted OR	Adjusted OR	Mediated (%)	Unadjusted OR	Adjusted OR	Mediated (%)
<b>Age (years):</b>	1.1(0.95 - 1.26)	1.12(0.97 - 1.29)		<b>1.26(1.11 - 1.43)*</b>	<b>1.26(1.11 - 1.43)*</b>	
<b>Gender (ref. male):</b>						
Female	1.05(0.88 - 1.26)	1.07(0.89 - 1.28)		<b>1.42(1.2 - 1.66)*</b>	<b>1.43(1.21 - 1.69)*</b>	
<b>Ethnicity (ref. White UK):</b>						
Black Caribbean	1.15(0.87 - 1.54)	1.14(0.85 - 1.53)	8%	<b>1.58(1.22 - 2.06)*</b>	<b>1.49(1.14 - 1.95)*</b>	15%
Black African	1.03(0.78 - 1.37)	1.03(0.77 - 1.37)	7%	<b>1.43(1.1 - 1.84)*</b>	<b>1.33(1.03 - 1.74)*</b>	22%
Indian	0.86(0.62 - 1.19)	0.87(0.62 - 1.21)	7%	0.86(0.63 - 1.17)	0.84(0.62 - 1.15)	-12%
Pakistani/ Bangladeshi	0.85(0.61 - 1.18)	0.89(0.64 - 1.24)	28%	1.04(0.77 - 1.4)	1.03(0.76 - 1.41)	7%
Other ethnicity	0.94(0.74 - 1.2)	0.95(0.74 - 1.21)	14%	1.18(0.95 - 1.48)	1.15(0.92 - 1.44)	18%
<b>Household material disadvantage (ref: Least):</b>						
Medium		1.01(0.84 - 1.22)			<b>1.24(1.04 - 1.47)*</b>	
Most		0.91(0.72 - 1.15)			1.19(0.97 - 1.47)	
<b>Sample size:</b>				<i>n</i> = 4,715	<i>n</i> = 4,573	

\* $p \leq 0.05$



Table 7-12. Multinomial regression predicting perceived parental control by ethnicity, age and gender; before and after adjustment for household material disadvantage:

	Perceived parental control (ref. Low control)					
	Medium control			High control		
	Unadjusted OR	Adjusted OR	Mediated %	Unadjusted OR	Adjusted OR	Mediated %
<b>Age (years):</b>	0.89(0.79 - 1.01)	0.89(0.78 - 1.01)		0.89(0.79 - 1.01)	0.88(0.78 - 1)	
<b>Gender (ref. male):</b>						
Female	1.01(0.87 - 1.18)	1.01(0.86 - 1.18)		1.58(1.35 - 1.84)*	1.55(1.32 - 1.82)*	
<b>Ethnicity (ref. White UK):</b>						
Black Caribbean	<b>1.56(1.22 - 1.98)*</b>	<b>1.55(1.22 - 1.98)*</b>	1%	<b>2.58(2 - 3.34)*</b>	<b>2.52(1.93 - 3.27)*</b>	4%
Black African	<b>1.76(1.38 - 2.25)*</b>	<b>1.81(1.41 - 2.33)*</b>	-6%	<b>3.7(2.87 - 4.78)*</b>	<b>3.76(2.89 - 4.89)*</b>	-2%
Indian	<b>1.88(1.38 - 2.55)*</b>	<b>1.86(1.37 - 2.53)*</b>	2%	<b>3.65(2.66 - 5)*</b>	<b>3.59(2.62 - 4.93)*</b>	2%
Pakistani/ Bangladeshi	<b>2.07(1.52 - 2.8)*</b>	<b>2.1(1.54 - 2.86)*</b>	-4%	<b>4.31(3.15 - 5.91)*</b>	<b>4.32(3.14 - 5.94)*</b>	0%
Other ethnicity	<b>1.57(1.28 - 1.94)*</b>	<b>1.6(1.29 - 1.97)*</b>	-4%	<b>3(2.39 - 3.77)*</b>	<b>2.95(2.34 - 3.72)*</b>	2%
<b>Household material disadvantage (ref: Least):</b>						
Medium		1.05(0.89 - 1.24)			1.05(0.89 - 1.25)	
Most		0.97(0.79 - 1.19)			1.18(0.96 - 1.45)	
<b>Sample size:</b>				<i>n</i> = 4,713	<i>n</i> = 4,571	

\* $p \leq 0.05$

*Perceived parenting styles:*

In the model investigating mediation of ethnic variations in perceived parenting styles by household material disadvantage, adjusted for age, and gender (Table 7-13), adolescents who lived in *Medium* or *Most*, compared to *Least*, materially disadvantaged households were more likely to perceive *Authoritarian*, rather than *Permissive* parenting, and those living in *Medium*, compared to *Least* materially disadvantaged households were more likely to perceive *Neglectful* than *Permissive* parenting (borderline significant,  $p=0.10$ ).

Adjustment for household material disadvantage resulted in small changes to the ethnic variations in perceived parenting style. Among Black Caribbean, Black African, Pakistani/ Bangladeshi, and Other ethnicity adolescents (who, compared to White UK, were more likely to live in *Medium* or *Most*, than *Least* materially disadvantaged households and to perceive *Authoritarian*, than *Permissive* parenting), adjustment for household material disadvantage explained ethnic variations, compared to White UK adolescents, in the likelihood of *Authoritarian*, rather than *Permissive* parenting, by 6% among Pakistani/ Bangladeshi, 8% among Black African, and Other ethnicity, and 10% among Black Caribbean.

In summary, findings indicate that among Black Caribbean, Black African, Pakistani/ Bangladeshi, and Other ethnicity adolescents are more likely than White UK adolescents to live in households with *Medium* or *Most* material disadvantage than to live in households with *Least* material disadvantage; those who lived in *Medium* or *Most* disadvantaged households were more likely to perceive *Authoritarian* parenting. This indirect pathway appears to explain a small amount of ethnic variations in perceived parenting among these adolescents.

Table 7-13. Multinomial regression predicting perceived parenting styles by ethnicity, age and gender; before and after adjustment for household material disadvantage:

	Perceived parenting styles (ref. Permissive parenting)								
	Neglectful parenting			Authoritative parenting			Authoritarian parenting		
	Unadjusted OR	Adjusted OR	Mediated %	Unadjusted OR	Adjusted OR	Mediated %	Unadjusted OR	Adjusted OR	Mediated %
<b>Age (years):</b>	<b>1.16 (1.02 - 1.31)*</b>	1.16 (1.02 - 1.32)*		<b>0.77 (0.65 - 0.92)*</b>	<b>0.78 (0.66 - 0.93)*</b>		1.12 (0.99 - 1.27)	1.11 (0.97 - 1.26)	
<b>Gender (ref. male):</b>									
Female	1.14 (0.98 - 1.34)	1.15 (0.98 - 1.35)		1.22 (1 - 1.51)	1.2 (0.97 - 1.48)		<b>1.81 (1.55 - 2.11)*</b>	<b>1.79 (1.53 - 2.1)*</b>	
<b>Ethnicity (ref. White UK):</b>									
Black Caribbean	1.26 (0.99 - 1.6)	1.2 (0.93 - 1.53)	25%	<b>2.15 (1.45 - 3.18)*</b>	<b>2.1 (1.4 - 3.15)*</b>	4%	<b>2.4 (1.82 - 3.16)*</b>	<b>2.26 (1.7 - 2.99)*</b>	10%
Black African	1.1 (0.86 - 1.4)	1.04 (0.81 - 1.34)	61%	<b>2.83 (1.95 - 4.11)*</b>	<b>2.96 (2.02 - 4.35)*</b>	-7%	<b>2.95 (2.26 - 3.85)*</b>	<b>2.79 (2.13 - 3.67)*</b>	8%
Indian	<b>0.66 (0.48 - 0.92)*</b>	<b>0.64 (0.46 - 0.89)*</b>	-7%	<b>2.86 (1.88 - 4.36)*</b>	<b>2.85 (1.87 - 4.36)*</b>	1%	<b>2.12 (1.54 - 2.93)*</b>	<b>2.05 (1.48 - 2.84)*</b>	7%
Pakistani/ Bangladeshi	<b>0.66 (0.48 - 0.92)*</b>	<b>0.63 (0.45 - 0.88)*</b>	-9%	<b>2.74 (1.8 - 4.2)*</b>	<b>2.72 (1.76 - 4.19)*</b>	2%	<b>2.71 (1.98 - 3.71)*</b>	<b>2.61 (1.9 - 3.58)*</b>	6%
Other ethnicity	0.96 (0.78 - 1.19)	0.94 (0.76 - 1.16)	-57%	<b>2.5 (1.77 - 3.52)*</b>	<b>2.48 (1.75 - 3.51)*</b>	1%	<b>2.37 (1.85 - 3.03)*</b>	<b>2.25 (1.76 - 2.89)*</b>	8%
<b>Household material disadvantage (ref: Least):</b>									
Medium		1.16 (0.97 - 1.37)			0.85 (0.68 - 1.08)			<b>1.21 (1.02 - 1.44)*</b>	
Most		1.08 (0.87 - 1.34)			0.99 (0.75 - 1.31)			<b>1.39 (1.13 - 1.72)*</b>	
<b>Sample size:</b>							<i>n</i> = 4,695	<i>n</i> = 4,554	

\*p ≤ 0.05

### 7.3.3.2. Mediation of ethnic variations in perceived parenting styles by family structure

To support the mediational hypothesis we require evidence that there are ethnic differences in family structure, which are in turn associated with differences in perceived parenting, and that adjustment for family structure affects the strength or the direction of ethnic variations in perceived parenting.

Ethnic variations in structural inequalities are shown in Table 5-6 (Section 5.1.6): Black Caribbean adolescents were more likely to live in *Reconstituted*, *Single-parent*, and *Other*, than *Two-parent* families; Black African adolescents were less likely to live in *Reconstituted*, but more likely to live in *Single-parent*, or *Other*, than *Two-parent* families; Indian, and Pakistani/ Bangladeshi adolescents were less likely to live in *Reconstituted*, or *Single-parent*, than *Two-parent* families; and Other ethnicity adolescents were more likely to live in *Single-parent*, or *Other*, than *Two-parent* families.

Next, family structure was added to multinomial logistic regression of perceived parenting on ethnicity, adjusted for age and gender. Results of chi<sup>2</sup> tests for joint significance of the effects of *Reconstituted*, *Single-parent*, and *Other*, compared to *Two-parent* family structures are shown in Table 7-14: family structure was significantly related to perceived parental care, control and parenting styles. In the following sections the findings of these models are discussed, including the percentage of ethnic variations in perceived parenting explained.

Table 7-14. Chi2 test of joint effects of family structure on perceived parenting:

	Chi2:
Parental care	<b>16.8 (df=6) <math>p=0.01</math></b>
Parental control	<b>20.3 (df=6) <math>p&lt;0.01</math></b>
Parenting style	<b>21.0 (df=9) <math>p=0.01</math></b>

*Perceived parental care and control:*

In the model predicting perceived parental care and control by family structure and ethnicity, adjusted for age, and gender (Table 7-15 and Table 7-16, respectively), adolescents who lived in the *Reconstituted*, compared to *Two-parent* families were more likely to perceive *Low care*, than *High care*, and *High control* than *Low control*; and adolescents who lived in *Single-parent* families were less likely to perceive *Medium care* than *High care*.

Adjustment for family structure resulted in small changes to ethnic variations in perceived parental care and small-moderate changes to the ethnic variations in perceived parental control. Among Black Caribbean adolescents (who, compared to White UK, were more likely to live in *Reconstituted* or *Single-parent*, than *Two-parent* families, and to perceive *Low care*, than *High care*), mediation by family structure explained 9% of their ethnic variation in parental care. In contrast, among Black African adolescents (who, compared to White UK, were less likely to live in *Reconstituted*, but more likely to live in *Single-parent*, than *Two-parent* families, and more likely to perceive *Low care*, than *High care*), mediation by family structure suppressed 7% of their ethnic variation in parental care.

Among Black African, Indian, and Pakistani/ Bangladeshi adolescents (who, compared to White UK, were less likely to live in *Reconstituted* than *Two-parent* families, and more likely to perceive *High control* than *Low control*), mediation by family structure suppressed greater ethnic variations by 6%, 5%, and 5%, respectively. Similarly, among Black Caribbean, Black African, and Other ethnicity adolescents (who, compared to White UK, were more likely to live in *Single-parent* than *Two-parent* families and more likely to perceive *Medium control* than *Low control*), mediation by family structure suppressed greater ethnic variations by 21%, 10%, and 8%, respectively. In contrast, among Indian adolescents (who, compared to White UK, were less likely to live in *Single-parent* than *Two-parent* families, but more likely to perceive *Medium control* than *Low control*), mediation by family structure explained 7% of their ethnic variation.

In summary, there is evidence that family structure mediated some ethnic variations in perceived parental care and control. Black Caribbean adolescents were more likely to live in *Reconstituted*, rather than *Two-parent* families; this increased their risk of perceiving *Low care*, rather than *High care*, a mediational pathway that explained some of their greater likelihood of perceiving *Low care*, compared to White UK adolescents; in contrast, Black African adolescents were less likely to live in *Reconstituted* rather than *Two-parent* families; reducing their risk of perceiving *Low care* rather than *High care*, a mediational pathway that suppressing even an greater likelihood of perceiving *Low care*, compared to White UK adolescents. Black African, Indian, and Pakistani/ Bangladeshi adolescents were less likely to live in *Reconstituted*, rather than *Two-parent* families; this reduced their risk of perceived *High control*, rather than *Low control*, a mediational pathway that suppressed even greater likelihoods of perceived *High control*, compared to White UK adolescents. Simultaneously, Black Caribbean, Black African, and Other ethnicity adolescents were more likely to live in *Single-parent*, than *Two-parent* families; this reduced their risk of perceived *Medium control*, rather than *Low control*, a mediational pathway that suppressed even greater likelihoods of perceived *Medium control*, compared to White UK adolescents. In contrast, Indian adolescents were less likely to live in *Single-parent* than *Two-parent* families; this increased their risk of perceiving *Medium control*, rather than *Low control*, a mediational pathway that explained some of their greater likelihood of perceiving *Medium care*, compared to White UK adolescents.

Table 7-15. Multinomial regression predicting perceived parental care by ethnicity, age and gender; before and after adjustment for family structure:

	Perceived parental care (ref. High care)					
	Medium care			Low care		
	Unadjusted OR	Adjusted OR	Mediated %	Unadjusted OR	Adjusted OR	Mediated %
<b>Age (years):</b>	1.1 (0.95 - 1.26)	1.1 (0.96 - 1.27)		1.26 (1.11 - 1.43)*	1.27 (1.12 - 1.44)*	
<b>Gender (ref. male):</b>						
Female	1.05 (0.88 - 1.26)	1.05 (0.88 - 1.26)		1.42 (1.2 - 1.66)*	1.42 (1.21 - 1.67)*	
<b>Ethnicity (ref. White UK):</b>						
Black Caribbean	1.15 (0.87 - 1.54)	1.14 (0.85 - 1.52)	11%	<b>1.58 (1.22 - 2.06)*</b>	<b>1.53 (1.17 - 2)*</b>	9%
Black African	1.03 (0.78 - 1.37)	1.04 (0.78 - 1.38)	-25%	<b>1.43 (1.1 - 1.84)*</b>	<b>1.46 (1.13 - 1.89)*</b>	-7%
Indian	0.86 (0.62 - 1.19)	0.89 (0.64 - 1.23)	21%	0.86 (0.63 - 1.17)	0.92 (0.68 - 1.26)	46%
Pakistani/ Bangladeshi	0.85 (0.61 - 1.18)	0.87 (0.63 - 1.22)	18%	1.04 (0.77 - 1.4)	1.12 (0.82 - 1.51)	-208%
Other ethnicity	0.94 (0.74 - 1.2)	0.94 (0.74 - 1.2)	1%	1.18 (0.95 - 1.48)	1.19 (0.96 - 1.49)	-6%
<b>Family structure (ref: Two-parent):</b>						
Reconstituted		1.25 (0.93 - 1.67)			<b>1.64 (1.26 - 2.13)*</b>	
Single-parent		1.08 (0.88 - 1.32)			1.07 (0.9 - 1.29)	
Other		0.91 (0.64 - 1.31)			1.05 (0.76 - 1.44)	
<b>Sample size:</b>				<i>n</i> = 4,715	<i>n</i> = 4,711	

\* $p \leq 0.05$

Table 7-16. Multinomial regression analyses predicting perceived parental control, by ethnicity, age, and gender; before and after adjustment for family structure:

	Perceived parental control (ref. Low control)					
	Medium control			High control		
	Unadjusted OR	Adjusted OR	Mediated %	Unadjusted OR	Adjusted OR	Mediated %
<b>Age (years):</b>	0.89 (0.79 - 1.01)	0.89 (0.78 - 1)		0.89 (0.79 - 1.01)	0.89 (0.78 - 1.01)	
<b>Gender (ref. male):</b>						
Female	1.01 (0.87 - 1.18)	1.02 (0.88 - 1.2)		1.58 (1.35 - 1.84)*	1.59 (1.36 - 1.86)*	
<b>Ethnicity (ref. White UK):</b>						
Black Caribbean	<b>1.56 (1.22 - 1.98)*</b>	<b>1.67 (1.31 - 2.14)*</b>	-21%	<b>2.58 (2 - 3.34)*</b>	<b>2.62 (2.01 - 3.4)*</b>	-2%
Black African	<b>1.76 (1.38 - 2.25)*</b>	<b>1.84 (1.44 - 2.35)*</b>	-10%	<b>3.7 (2.87 - 4.78)*</b>	<b>3.88 (3 - 5.02)*</b>	-6%
Indian	<b>1.88 (1.38 - 2.55)*</b>	<b>1.82 (1.33 - 2.47)*</b>	7%	<b>3.65 (2.66 - 5)*</b>	<b>3.78 (2.75 - 5.19)*</b>	-5%
Pakistani/ Bangladeshi	<b>2.07 (1.52 - 2.8)*</b>	<b>2.02 (1.49 - 2.76)*</b>	4%	<b>4.31 (3.15 - 5.91)*</b>	<b>4.48 (3.26 - 6.16)*</b>	-5%
Other ethnicity	<b>1.57 (1.28 - 1.94)*</b>	<b>1.62 (1.31 - 1.99)*</b>	-8%	<b>3 (2.39 - 3.77)*</b>	<b>3.07 (2.44 - 3.87)*</b>	-4%
<b>Family structure (ref: Two-parent):</b>						
Reconstituted		1 (0.78 - 1.27)			<b>1.37 (1.07 - 1.75)*</b>	
Single-parent		<b>0.75 (0.63 - 0.9)*</b>			0.89 (0.75 - 1.07)	
Other		0.9 (0.66 - 1.24)			0.95 (0.69 - 1.31)	
<b>Sample size:</b>				<i>n</i> = 4,713	<i>n</i> = 4,710	

\* $p \leq 0.05$



*Perceived parenting styles:*

In models predicting perceived parenting style by family structure and ethnicity, adjusted for age, and gender (Table 7-17), adolescents who lived in the *Reconstituted*, compared to *Two-parent* families were more likely to perceive *Neglectful*, or *Authoritarian* than *Permissive* parenting styles.

Adjustment for family structure resulted in small-moderate changes to the ethnic variations in perceived *Neglectful* and *Authoritarian* parenting styles and small-moderate changes to the ethnic variations in perceived parental control. Among Indian and Pakistani/ Bangladeshi adolescents (who, compared to White UK, were less likely to live in *Reconstituted*, than *Two-parent* families, and less likely to perceive *Neglectful*, than *Permissive*, parenting), mediation by family structure explained 6% of their respective ethnic variations in parenting style; whereas, among Black African, Indian, and Pakistani/ Bangladeshi adolescents (who, compared to White UK, were less likely to live in *Reconstituted*, than *Two-parent* families, and more likely to perceive *Authoritarian*, than *Permissive* parenting), mediation by family structure suppressed, respectively, 6%, 18%, and 15% of even greater likelihoods of *Authoritarian* parenting. In contrast, among Black Caribbean adolescents (who, compared to White UK, were more likely to live in *Reconstituted*, than *Two-parent* families, and more likely to perceive *Authoritarian* rather than *Permissive* parenting), mediation by family structure explained 6% of their ethnic variation in Authoritarian parenting.

In summary, there is evidence to suggest that family structure mediated some ethnic variations in perceived parenting styles. Indian and Pakistani/ Bangladeshi adolescents were less likely to live in *Reconstituted* than *Two-parent* families; this decreased their risk of perceiving *Neglectful* rather than *Permissive* parenting, a mediational pathway that explained some of their lower likelihood of perceived *Neglectful* parenting, compared to White UK adolescents. Simultaneously, Black African, Indian, and Pakistani/ Bangladeshi adolescents were less likely to live in *Reconstituted* than *Two-parent* families; this decreased their risk of *Authoritarian*, rather than *Permissive* parenting, a mediational pathway that suppressed even greater likelihoods of perceived *Authoritarian* parenting, compared to White UK adolescents. In contrast, Black Caribbean adolescents were more likely to live in *Reconstituted*, rather than *Two-parent* families; this increased their risk of perceiving *Authoritarian* parenting, compared to White UK adolescents.

Table 7-17. Multinomial regression analyses predicting perceived parenting styles, by ethnicity, age, and gender; before and after adjustment for family structure:

	Perceived parenting styles (ref. Permissive parenting)								
	Neglectful			Authoritative			Authoritarian		
	Unadjusted OR	Adjusted OR	Mediated %	Unadjusted OR	Adjusted OR	Mediated %	Unadjusted OR	Adjusted OR	Mediated %
<b>Age (years):</b>	<b>1.16 (1.02 - 1.31)*</b>	<b>1.16 (1.02 - 1.31)*</b>		<b>0.77 (0.65 - 0.92)*</b>	<b>0.77 (0.65 - 0.91)*</b>		1.12 (0.99 - 1.27)	1.12 (0.99 - 1.27)	
<b>Gender (ref. male):</b>									
Female	1.14 (0.98 - 1.34)	1.15 (0.98 - 1.34)		1.22 (1 - 1.51)	1.22 (1 - 1.51)		<b>1.81 (1.55 - 2.11)*</b>	<b>1.82 (1.56 - 2.13)*</b>	
<b>Ethnicity (ref. White UK):</b>									
Black Caribbean	1.26 (0.99 - 1.6)	1.26 (0.98 - 1.61)	1%	<b>2.15 (1.45 - 3.18)*</b>	<b>2.14 (1.43 - 3.2)*</b>	0%	<b>2.4 (1.82 - 3.16)*</b>	<b>2.31 (1.75 - 3.07)*</b>	6%
Black African	1.1 (0.86 - 1.4)	1.13 (0.88 - 1.44)	-28%	<b>2.83 (1.95 - 4.11)*</b>	<b>2.9 (1.99 - 4.22)*</b>	-4%	<b>2.95 (2.26 - 3.85)*</b>	<b>3.07 (2.35 - 4.02)*</b>	-6%
Indian	<b>0.66 (0.48 - 0.92)*</b>	<b>0.68 (0.49 - 0.95)*</b>	6%	<b>2.86 (1.88 - 4.36)*</b>	<b>2.88 (1.88 - 4.4)*</b>	-1%	<b>2.12 (1.54 - 2.93)*</b>	<b>2.32 (1.67 - 3.22)*</b>	-18%
Pakistani/ Bangladeshi	<b>0.66 (0.48 - 0.92)*</b>	<b>0.68 (0.49 - 0.95)*</b>	6%	<b>2.74 (1.8 - 4.2)*</b>	<b>2.77 (1.8 - 4.25)*</b>	-1%	<b>2.71 (1.98 - 3.71)*</b>	<b>2.96 (2.16 - 4.07)*</b>	-15%
Other ethnicity	0.96 (0.78 - 1.19)	0.97 (0.78 - 1.2)	27%	<b>2.5 (1.77 - 3.52)*</b>	<b>2.52 (1.79 - 3.55)*</b>	-1%	<b>2.37 (1.85 - 3.03)*</b>	<b>2.41 (1.89 - 3.09)*</b>	-3%
<b>Family structure (ref: Two-parent):</b>									
Reconstituted		<b>1.28 (1 - 1.64)*</b>			1.1 (0.77 - 1.57)			<b>1.73 (1.35 - 2.21)*</b>	
Single-parent		0.96 (0.8 - 1.16)			0.95 (0.74 - 1.22)			1.05 (0.88 - 1.26)	
Other		1.05 (0.76 - 1.45)			0.95 (0.61 - 1.47)			1.07 (0.77 - 1.48)	
<b>Sample size:</b>							<b>n = 4,695</b>	<b>n = 4,692</b>	

\*p ≤0.05

### 7.3.3.3. Mediation of ethnic variations in perceived parenting by household overcrowding

To support the mediational hypothesis we require evidence that there are ethnic differences in household overcrowding, which are in turn associated with differences in perceived parenting, and that adjustment for household overcrowding affects the strength or the direction of ethnic variations in perceived parenting.

Ethnic variations in structural inequalities are shown in Table 5-6 (Section 5.1.6): Black African and Pakistani/ Bangladeshi adolescents were more likely than White UK adolescents to live in overcrowded households.

Next, household overcrowding was included in multinomial logistic regression analyses of perceived parenting on ethnicity, adjusted for age and gender. Results of chi<sup>2</sup> tests for joint significance of the effects of household overcrowding are shown in Table 7-18: household overcrowding was borderline significantly related to perceived parental care, and parenting styles, but not perceived parental control. In the following sections the findings of these models, including percentages of ethnic variations explained, are discussed.

Table 7-18. Chi2 test of joint effects of household overcrowding on perceived parenting:

	Chi2:
Parental care	<b>4.6 (df=2) p=0.10</b>
Parental control	0.3 (df=2) p=0.86
Parenting style	<b>6.0 (df=3) p=0.11</b>

*Perceived parental care:*

In the model predicting perceived parental care by household overcrowding and ethnicity, adjusted for age, and gender (Table 7-19), adolescents who lived in the overcrowded households were less likely to perceive *Low care* than *High care*. Adjustment for household overcrowding resulted in a small-moderate change to the ethnic variations in perceived *Low care*, compared to *High care*. Among Black African adolescents (who, compared to White UK adolescents, were more likely to live in overcrowded households, and more likely to perceive *Low care*, rather than *High care*), mediation by household overcrowding suppressed 14% of an even greater likelihood of perceiving *Low care*.

*Perceived parenting styles:*

In the model predicting perceived parenting styles by household overcrowding and ethnicity, adjusted for age, and gender (Table 7-20), adolescents who lived in overcrowded households were less likely to perceive *Neglectful*, rather than *Permissive* parenting. Adjustment for household overcrowding resulted in one small change to ethnic variations in perceived parenting styles: among Pakistani/ Bangladeshi adolescents (who, compared to White UK adolescents, were more likely to live in overcrowded households, and less likely to perceive *Neglectful* rather than *Permissive* parenting), mediation by household overcrowding explained 7% of their ethnic variation in *Neglectful* parenting.

Table 7-19. Multinomial regression analyses predicting perceived parental care, by ethnicity, age, and gender; before and after adjustment for household overcrowding:

	Perceived parental care (ref. High care)					
	Medium care			Low care		
	Unadjusted OR	Adjusted OR	Mediated %	Unadjusted OR	Adjusted OR	Mediated %
<b>Age (years):</b>	1.1 (0.95 - 1.26)	1.11 (0.96 - 1.27)		<b>1.26 (1.11 - 1.43)*</b>	<b>1.28 (1.13 - 1.45)*</b>	
<b>Gender (ref. male):</b>						
Female	1.05 (0.88 - 1.26)	1.07 (0.89 - 1.27)		<b>1.42 (1.2 - 1.66)*</b>	<b>1.44 (1.22 - 1.69)*</b>	
<b>Ethnicity (ref. White UK):</b>						
Black Caribbean	1.15 (0.87 - 1.54)	1.13 (0.85 - 1.51)	13%	<b>1.58 (1.22 - 2.06)*</b>	<b>1.57 (1.2 - 2.04)*</b>	3%
Black African	1.03 (0.78 - 1.37)	1.06 (0.8 - 1.4)	-81%	<b>1.43 (1.1 - 1.84)*</b>	<b>1.48 (1.15 - 1.92)*</b>	-14%
Indian	0.86 (0.62 - 1.19)	0.85 (0.61 - 1.18)	-6%	0.86 (0.63 - 1.17)	0.88 (0.64 - 1.19)	11%
Pakistani/ Bangladeshi	0.85 (0.61 - 1.18)	0.84 (0.6 - 1.17)	-4%	1.04 (0.77 - 1.4)	1.05 (0.77 - 1.42)	-29%
Other ethnicity	0.94 (0.74 - 1.2)	0.94 (0.74 - 1.2)	4%	1.18 (0.95 - 1.48)	1.19 (0.95 - 1.49)	-6%
<b>Household overcrowding (ref. not overcrowded)</b>						
Overcrowded		0.84 (0.58 - 1.21)			<b>0.69 (0.5 - 0.97)*</b>	
<b>Sample size:</b>				<i>n</i> = 4,715	<i>n</i> = 4,664	

\**p*≤0.05

Table 7-20. Multinomial regression analyses predicting perceived parenting styles by ethnicity, age, and gender; before and after adjustment for household overcrowding:

	Perceived parenting styles (ref. Permissive parenting)								
	Neglectful			Authoritative			Authoritarian		
	Unadjusted OR	Adjusted OR	Mediated %	Unadjusted OR	Adjusted OR	Mediated %	Unadjusted OR	Adjusted OR	Mediated %
<b>Age (years):</b>	<b>1.16 (1.02 - 1.31)*</b>	<b>1.18 (1.04 - 1.33)*</b>		<b>0.77 (0.65 - 0.92)*</b>	<b>0.77 (0.65 - 0.92)*</b>		1.12 (0.99 - 1.27)	1.12 (0.99 - 1.27)	
<b>Gender (ref. male):</b>									
Female	1.14 (0.98 - 1.34)	1.14 (0.98 - 1.34)		1.22 (1 - 1.51)	<b>1.24 (1.01 - 1.52)*</b>		<b>1.81 (1.55 - 2.11)*</b>	<b>1.85 (1.58 - 2.16)*</b>	
<b>Ethnicity (ref. White UK):</b>									
Black Caribbean	1.26 (0.99 - 1.6)	1.25 (0.98 - 1.6)	2%	<b>2.15 (1.45 - 3.18)*</b>	<b>2.15 (1.44 - 3.19)*</b>	0%	<b>2.4 (1.82 - 3.16)*</b>	<b>2.39 (1.81 - 3.15)*</b>	1%
Black African	1.1 (0.86 - 1.4)	1.16 (0.91 - 1.48)	-58%	<b>2.83 (1.95 - 4.11)*</b>	<b>2.92 (2 - 4.25)*</b>	-5%	<b>2.95 (2.26 - 3.85)*</b>	<b>3.02 (2.31 - 3.95)*</b>	-3%
Indian	<b>0.66 (0.48 - 0.92)*</b>	<b>0.68 (0.49 - 0.94)*</b>	5%	<b>2.86 (1.88 - 4.36)*</b>	<b>2.96 (1.94 - 4.51)*</b>	-5%	<b>2.12 (1.54 - 2.93)*</b>	<b>2.17 (1.57 - 3)*</b>	-4%
Pakistani/ Bangladeshi	<b>0.66 (0.48 - 0.92)*</b>	<b>0.68 (0.49 - 0.95)*</b>	7%	<b>2.74 (1.8 - 4.2)*</b>	<b>2.76 (1.8 - 4.23)*</b>	-1%	<b>2.71 (1.98 - 3.71)*</b>	<b>2.73 (1.99 - 3.73)*</b>	-1%
Other ethnicity	0.96 (0.78 - 1.19)	0.97 (0.78 - 1.2)	29%	<b>2.5 (1.77 - 3.52)*</b>	<b>2.54 (1.8 - 3.58)*</b>	-3%	<b>2.37 (1.85 - 3.03)*</b>	<b>2.39 (1.87 - 3.05)*</b>	-1%
<b>Household overcrowding (ref. not overcrowded)</b>									
Overcrowded		<b>0.64 (0.43 - 0.95)*</b>			1.08 (0.7 - 1.66)			0.86 (0.61 - 1.21)	
<b>Sample size:</b>							<b>n = 4,695</b>	<b>n = 4,646</b>	

\*p ≤ 0.05

#### 7.3.3.3.1. Mediation of ethnic variations in perceived parenting styles by experiences of racism

To support the mediational hypothesis we require evidence that there are ethnic differences in experiences of racism, which are in turn associated with differences in perceived parenting, and that adjustment for experiences of racism affects the strength or the direction of ethnic variations in perceived parenting.

Ethnic variations in structural inequalities are shown in Table 5-6 (Section 5.1.6): ethnic minority adolescents were more likely to have experiences racism than White UK adolescents.

Next, experiences of racism were included in multinomial logistic regression analyses of perceived parenting on ethnicity, adjusted for age and gender. Results of chi<sup>2</sup> tests for joint significance of the effects of experiences of racism are shown in Table 7-21: experiences of racism were significantly related to perceived parental care, control, and parenting styles. In the following sections the findings of these models, including percentages of ethnic variations explained, are discussed.

Table 7-21. Chi2 test of joint effects of experiences of racism on perceived parenting:

	Chi2:
Parental care	<b>34.7 (df=2) <math>p&lt;0.01</math></b>
Parental control	<b>45.0 (df=2) <math>p&lt;0.01</math></b>
Parenting style	<b>54.1 (df=2) <math>p&lt;0.01</math></b>

*Perceived parental care and control:*

In the model predicting perceived parental care, and control by experiences of racism and ethnicity, adjusted for age, and gender (Table 7-22, and Table 7-23, respectively), adolescents who had experienced racism were more likely to perceive *Low care* than *High care*, and were more likely to perceive *Medium control* or *High control*, than *Low control*.

Adjustment for experiences of racism resulted in a small-moderate change to the ethnic variations in perceived *Low care*. Among Black Caribbean and Black African adolescents (who, compared to White UK adolescents, were more likely to have experienced racism, and more likely to perceive *Low care*, rather than *High care*), mediation by experienced racism explained 9%, and 16%, of their, respective, greater likelihoods of perceiving *Low care*.

Adjustment for experiences of racism resulted in several small changes to ethnic variations in perceived *Medium control*, and *High control*, compared to *Low control*. Among all ethnic minority groups (who, were more likely to have had experiences of racism, and more likely to perceive *Medium control*, or *High control*, rather than *Low control*, compared to White UK adolescents), mediation by experiences of racism explained between 6-9% of greater likelihoods of perceiving *High control* across ethnic minority adolescents, and explained 6% of the greater likelihood of *Medium control* among Black Caribbean adolescents.



Table 7-22. Multinomial regression analyses predicting perceived parental care by ethnicity, age, and gender; before and after adjustment for experiences of racism:

	Perceived parental care (ref. High care)					
	Medium care			Low care		
	Unadjusted OR	Adjusted OR	Mediated %	Unadjusted OR	Adjusted OR	Mediated %
<b>Age (years):</b>	1.1 (0.95 - 1.26)	1.09 (0.95 - 1.25)		<b>1.26 (1.11 - 1.43)*</b>	<b>1.24 (1.09 - 1.4)*</b>	
<b>Gender (ref. male):</b>						
Female	1.05 (0.88 - 1.26)	1.05 (0.88 - 1.25)		<b>1.42 (1.2 - 1.66)*</b>	<b>1.4 (1.19 - 1.65)*</b>	
<b>Ethnicity (ref. White UK):</b>						
Black Caribbean	1.15 (0.87 - 1.54)	1.15 (0.86 - 1.54)	0%	<b>1.58 (1.22 - 2.06)*</b>	<b>1.53 (1.17 - 1.99)*</b>	9%
Black African	1.03 (0.78 - 1.37)	1.04 (0.78 - 1.37)	-16%	<b>1.43 (1.1 - 1.84)*</b>	<b>1.36 (1.05 - 1.76)*</b>	16%
Indian	0.86 (0.62 - 1.19)	0.84 (0.61 - 1.17)	-8%	0.86 (0.63 - 1.17)	0.8 (0.59 - 1.09)	-39%
Pakistani/ Bangladeshi	0.85 (0.61 - 1.18)	0.84 (0.6 - 1.16)	-7%	1.04 (0.77 - 1.4)	0.98 (0.72 - 1.32)	160%
Other ethnicity	0.94 (0.74 - 1.2)	0.92 (0.73 - 1.18)	-29%	1.18 (0.95 - 1.48)	1.12 (0.9 - 1.41)	33%
<b>Experiences of racism (ref. no racism)</b>						
Racism		1.14 (0.94 - 1.38)			<b>1.58 (1.33 - 1.87)*</b>	
<b>Sample size:</b>				<i>n</i> = 4,715	<i>n</i> = 4,682	

\* $p \leq 0.05$

Table 7-23. Multinomial regression analyses predicting perceived parental control, by ethnicity, age, and gender; before and after adjustment for experiences of racism:

	Perceived parental control (ref. Low control)					
	Medium control			High control		
	Unadjusted OR	Adjusted OR	Mediated %	Unadjusted OR	Adjusted OR	Mediated %
<b>Age (years):</b>	0.89 (0.79 - 1.01)	0.89 (0.79 - 1.01)		0.89 (0.79 - 1.01)	<b>0.88 (0.77 - 0.99)*</b>	
<b>Gender (ref. male):</b>						
Female	1.01 (0.87 - 1.18)	1 (0.86 - 1.17)		<b>1.58 (1.35 - 1.84)*</b>	<b>1.55 (1.33 - 1.81)*</b>	
<b>Ethnicity (ref. White UK):</b>						
Black Caribbean	<b>1.56 (1.22 - 1.98)*</b>	<b>1.52 (1.2 - 1.94)*</b>	6%	<b>2.58 (2 - 3.34)*</b>	<b>2.46 (1.9 - 3.19)*</b>	8%
Black African	<b>1.76 (1.38 - 2.25)*</b>	<b>1.74 (1.36 - 2.22)*</b>	3%	<b>3.7 (2.87 - 4.78)*</b>	<b>3.47 (2.68 - 4.49)*</b>	9%
Indian	<b>1.88 (1.38 - 2.55)*</b>	<b>1.84 (1.36 - 2.5)*</b>	4%	<b>3.65 (2.66 - 5)*</b>	<b>3.41 (2.49 - 4.68)*</b>	9%
Pakistani/ Bangladeshi	<b>2.07 (1.52 - 2.8)*</b>	<b>2.03 (1.5 - 2.76)*</b>	3%	<b>4.31 (3.15 - 5.91)*</b>	<b>4.11 (3 - 5.64)*</b>	6%
Other ethnicity	<b>1.57 (1.28 - 1.94)*</b>	<b>1.55 (1.25 - 1.91)*</b>	4%	<b>3 (2.39 - 3.77)*</b>	<b>2.85 (2.26 - 3.58)*</b>	8%
<b>Experiences of racism (ref. no racism)</b>						
Racism		<b>1.26 (1.06 - 1.49)*</b>			<b>1.74 (1.47 - 2.05)*</b>	
<b>Sample size:</b>				<i>n</i> = 4,713	<i>n</i> = 4,681	

\* $p \leq 0.05$

*Perceived parenting styles:*

In the model predicting perceived parenting styles experiences of racism and ethnicity, adjusted for age, and gender (Table 7-24) adolescents who had had experiences of racism were more likely to perceive *Neglectful*, *Authoritative*, or *Authoritarian*, rather than *Permissive* parenting. Adjustment for experiences of racism resulted in small-moderate changes to ethnic variations in perceived parenting styles: across ethnic minority groups, (who, compared to White UK adolescents, were more likely to have experienced racism, and were more likely to perceive *Authoritative*, or *Authoritarian* rather than *Permissive* parenting), mediation by experiences of racism explained 4-7% of ethnic variations in *Authoritative*, and 9-16% of ethnic variations in *Authoritarian* parenting; whereas, among Indian, and Pakistani/ Bangladeshi adolescents (who, compared to White UK adolescents, were more likely to have had experiences of racism, and were less likely to perceive *Neglectful* parenting), mediation by experiences of racism suppressed 7%, and 8%, respectively, of even smaller likelihoods of perceiving *Neglectful* parenting, compared to White UK adolescents.

Table 7-24. Multinomial regression analyses predicting perceived parenting styles by ethnicity, age, and gender; before and after adjustment for experiences of racism:

	Perceived parenting styles (ref. Permissive parenting)								
	Neglectful			Authoritative			Authoritarian		
	Unadjusted OR	Adjusted OR	Mediated %	Unadjusted OR	Adjusted OR	Mediated %	Unadjusted OR	Adjusted OR	Mediated %
<b>Age (years):</b>	<b>1.16 (1.02 - 1.31)*</b>	1.15 (1.02 - 1.31)*		<b>0.77 (0.65 - 0.92)*</b>	<b>0.77 (0.65 - 0.92)*</b>		1.12 (0.99 - 1.27)	1.1 (0.97 - 1.24)	
<b>Gender (ref. male):</b>									
Female	1.14 (0.98 - 1.34)	1.13 (0.97 - 1.32)		1.22 (1 - 1.51)	1.2 (0.98 - 1.48)		<b>1.81 (1.55 - 2.11)*</b>	<b>1.79 (1.53 - 2.09)*</b>	
<b>Ethnicity (ref. White UK):</b>									
Black Caribbean	1.26 (0.99 - 1.6)	1.22 (0.96 - 1.56)	14%	<b>2.15 (1.45 - 3.18)*</b>	<b>2.07 (1.4 - 3.07)*</b>	7%	<b>2.4 (1.82 - 3.16)*</b>	<b>2.27 (1.72 - 2.99)*</b>	9%
Black African	1.1 (0.86 - 1.4)	1.06 (0.83 - 1.36)	38%	<b>2.83 (1.95 - 4.11)*</b>	<b>2.69 (1.85 - 3.92)*</b>	8%	<b>2.95 (2.26 - 3.85)*</b>	<b>2.72 (2.08 - 3.55)*</b>	12%
Indian	<b>0.66 (0.48 - 0.92)*</b>	<b>0.64 (0.46 - 0.89)*</b>	-7%	<b>2.86 (1.88 - 4.36)*</b>	<b>2.75 (1.8 - 4.19)*</b>	6%	<b>2.12 (1.54 - 2.93)*</b>	<b>1.94 (1.4 - 2.68)*</b>	16%
Pakistani/ Bangladeshi	<b>0.66 (0.48 - 0.92)*</b>	<b>0.63 (0.46 - 0.88)*</b>	-8%	<b>2.74 (1.8 - 4.2)*</b>	<b>2.66 (1.74 - 4.07)*</b>	5%	<b>2.71 (1.98 - 3.71)*</b>	<b>2.53 (1.85 - 3.47)*</b>	11%
Other ethnicity	0.96 (0.78 - 1.19)	0.93 (0.75 - 1.16)	-62%	<b>2.5 (1.77 - 3.52)*</b>	<b>2.43 (1.72 - 3.43)*</b>	4%	<b>2.37 (1.85 - 3.03)*</b>	<b>2.21 (1.73 - 2.83)*</b>	11%
<b>Experiences of racism (ref. no racism)</b>									
Racism		<b>1.32 (1.11 - 1.57)*</b>			<b>1.37 (1.09 - 1.71)*</b>			<b>1.84 (1.57 - 2.17)*</b>	
<b>Sample size:</b>							<i>n</i> = 4,695	<i>n</i> = 4,663	

\**p* ≤ 0.05

#### 7.3.4. Final models

In previous sections I investigated moderation of ethnic variations in perceived parenting by measures of cultural values and mediation of ethnic variations in perceived parenting by measures of structural inequalities.

Final models were constructed in two steps. First, perceived parenting variables, adjusted for age and gender, were regressed on ethnicity and interactions with any cultural values variables previously found to moderate ethnic variations. Second, any structural inequality variables that were found to mediate ethnic variations were added. As well as odds ratios, the percentage differences in between ethnic variations in perceived parenting, before and after adjustment for structural inequalities, representing mediational effects, are presented.

##### *Perceived parental care:*

Ethnic variations in perceived parental care were examined in 7.3.1: compared to White UK adolescents: Black Caribbean and Black African adolescents were more likely to perceive *Low care*, rather than *High care*, than White UK adolescents. Univariate analyses showed that ethnic variations in perceived parental care were moderated by generation status: Pakistan/ Bangladeshi adolescents who were *Born abroad* were less likely to perceive *Medium care* or *Low care*, than *High care*, and Indian adolescents who were *Born Abroad* were more likely to perceive *Low care* than *High care*, compared to those *Born UK*. Univariate analyses also showed that ethnic variations in perceived parental care were mediated by structural inequalities measured as household material disadvantage, family structure, household overcrowding, and experiences of racism. In the final model (Table 7-25), living in households of *Medium* or *Most*, rather than *Least* material disadvantage, living in *Reconstituted*, rather than *Two-parent* families, and having had experiences of racism were each associated with greater likelihoods of *Low care*, rather than *High care*; whereas, living in an overcrowded household was associated with a lower likelihood of *Low care*, rather than *High care*. In a separate model predicting parental care by family structure, adjusted for age and gender (not ethnicity), there was also a borderline significant association between living in a *Single-parent*, rather than a *Two-parent* family and *Medium care* rather than *High care* ( $p=0.06$ ). Adjustment for structural inequalities resulted in small-moderate changes to ethnic variations in *Medium care* and *Low care*, rather than *High care*.

Black Caribbean, compared to White UK adolescents were more likely to live in more materially disadvantaged households, and in *Reconstituted* than *Two-parent* families, and to have had experiences of racism; these structural inequalities increased

adolescents' risk of *Low care*, rather than *High care*. Combined, mediational pathways explained 37% of the greater likelihood of *Low care*, rather than *High care*, among Black Caribbean compared to White UK adolescents; furthermore, after adjustment for structural inequalities, there was no longer a statistically significant ethnic variation in *Low care*, rather than *High care*, among Black Caribbean compared to White UK adolescents ( $p=0.12$ ).

Compared to White UK adolescents, Black African adolescents were more likely to live in more materially disadvantaged households, and to have had experiences of racism, increasing their risk of *Low care*, rather than *High care*; on the other hand, they were less likely to live in *Reconstituted* rather than *Two-parent* families but more likely to live in overcrowded households, decreasing their risk of *Low care*, rather than *High care*. Combined mediational effects explained 17% of the greater likelihood of *Low care*, rather than *High care*, among Black African, compared to White UK adolescents. It is interesting to draw a comparison between Black Caribbean and Black African adolescents, in the mediating effects of structural inequalities on their respective ethnic variations in perceived parental care. The profiles of structural inequalities, relative to White UK adolescents, differ between the two groups: Black Caribbean adolescents were more, and Black African adolescents were less, likely to live in *Reconstituted*, rather than *Two-parent* families; while there was no ethnic variation in household overcrowding among Black Caribbean adolescents, Black African adolescents were more likely to live in overcrowded households. Thus, compared to Black African adolescents, Black Caribbean adolescents were exposed to more risk factors and less protective factors. We would therefore hypothesise that living in *Reconstituted* families, and less crowded household were instrumental in explaining the greater likelihood of *Low care* among Black Caribbean.

Compared to White UK, Indian adolescents were more likely to have had experiences of racism, increasing their risk of *Low care*, rather than *High care*; on the other hand, they were less likely to live in *Reconstituted* than *Two-parent* families, decreasing their risk of *Low care*, rather than *High care*. The combined effect of mediational pathways suppressed an even greater ethnic variation in *Low care*, rather than *High care*, among Indian adolescents who were *Born Abroad* compared to those who were *Born UK*. Therefore, these findings suggest that structural inequalities that were risk factors for *Low care* rather than *High care* were less likely, and/or those that were protective against *Low care* rather than *High care* were more likely, among Indian adolescents who were *Born Abroad*, compared to those who were *Born UK*.

Pakistani/ Bangladeshi, compared to White UK adolescents, were more likely to live in more materially disadvantaged households and to have had experiences of racism; increasing their risk of *Low care* rather than *High care*; on the other hand, Pakistani/ Bangladeshi, compared to White UK adolescents, were less likely to live in *Reconstituted* or *Single-parent*, rather than *Two-parent* families, and more likely to live in overcrowded households, decreasing their risk of *Low care*, rather than *High care*. The effect of these mediational pathways, combined, explained 17% of the lower likelihood of *Low care*, rather than *High care* among Pakistani/ Bangladeshi adolescents who were *Born Abroad*, compared to those who were *Born UK*. Therefore, these findings suggest that structural inequalities that were risk factors for *Low care*, rather than *High care* were more likely, and those that were protective against *Low care*, rather than *High care* were less likely, among Pakistani/ Bangladeshi adolescents who were *Born Abroad*, compared to those *Born UK*.

It is interesting to draw a comparison between Indian and Pakistani/ Bangladeshi adolescents, in the mediating effects of structural inequalities on variations in perceived parental care among those who were *Born Abroad*, compared to those who were *Born UK*. The profiles of structural inequalities differ between the two ethnic groups. Adolescents of both ethnic groups were less likely than White UK adolescents to live in non-*Two parent* families, and more likely to have had experiences of racism. However, unlike Indian adolescents, Pakistani/ Bangladeshi adolescents were more likely to live in more materially disadvantaged and overcrowded households, than were White UK adolescents; the former increased, and the latter decreased risks of perceiving *Low care*, rather than *High care*. We would, therefore, hypothesise mediation via the protective effects of living in *Two-parent* families, and in overcrowded households were instrumental in explaining the lower likelihood of *Low care*, rather than *High care* among Pakistani/ Bangladeshi adolescents who were *Born Abroad*, compared to those *Born UK*.

In summary, there is evidence that mediation by structural inequalities is responsible for a small-moderate proportion of the lower perceived parental care among Black Caribbean and Black African, compared to White UK adolescents. Similarly there is evidence that, among Pakistan/ Bangladeshi adolescents, even greater parental care among those *Born Abroad*, compared to those *Born UK*, was suppressed via mediation by structural inequalities. In contrast, among Indian adolescents, more caring parenting among those *Born Abroad*, compared to those *Born UK*, was explained via mediation by structural inequalities.

Table 7-25. Final model predicting perceived parental care by ethnicity, age, and gender; before and after adjustment for structural inequalities:

	Perceived parental care (ref. High care)					
	Medium care			Low care		
	Unadjusted OR	Adjusted OR	Mediated %	Unadjusted OR	Adjusted OR	Mediated %
<b>Age (years):</b>	1.1 (0.96 - 1.26)	1.13 (0.98 - 1.31)		<b>1.27 (1.12 - 1.44)*</b>	<b>1.28 (1.12 - 1.45)*</b>	
<b>Gender (ref. male):</b>						
Female	1.05 (0.87 - 1.25)	1.07 (0.89 - 1.29)		<b>1.4 (1.19 - 1.65)*</b>	<b>1.43 (1.21 - 1.69)*</b>	
<b>Ethnicity (ref. White UK):</b>						
Black Caribbean	1.09 (0.81 - 1.48)	1.03 (0.75 - 1.41)	71%	<b>1.42 (1.07 - 1.87)*</b>	1.26 (0.94 - 1.69)	37%
Black African	1.02 (0.73 - 1.42)	1.05 (0.74 - 1.48)	-205%	<b>1.62 (1.2 - 2.19)*</b>	<b>1.52 (1.11 - 2.08)*</b>	17%
Indian	0.83 (0.58 - 1.18)	0.84 (0.58 - 1.21)	8%	0.98 (0.71 - 1.36)	1 (0.71 - 1.4)	82%
Pakistani/ Bangladeshi	1.03 (0.72 - 1.46)	1.09 (0.76 - 1.57)	-218%	1.18 (0.85 - 1.64)	1.17 (0.83 - 1.65)	6%
Other ethnicity	0.95 (0.73 - 1.24)	0.94 (0.71 - 1.23)	-21%	1.26 (0.99 - 1.6)	1.18 (0.92 - 1.51)	31%
<b>Ethnicity x Generational status**</b>						
Black Caribbean; Born abroad	1.27 (0.73 - 2.21)	1.41 (0.78 - 2.56)	-53%	<b>1.69 (1.03 - 2.75)*</b>	<b>1.7 (1 - 2.88)*</b>	-1%
Black African; Born abroad	1.04 (0.7 - 1.57)	1.06 (0.69 - 1.62)	-28%	0.73 (0.51 - 1.05)	0.75 (0.51 - 1.1)	8%
Indian; Born abroad	1.15 (0.64 - 2.06)	1.25 (0.68 - 2.27)	-70%	<b>0.47 (0.26 - 0.87)*</b>	<b>0.41 (0.22 - 0.79)*</b>	-11%
Pakistani/Bangladeshi; Born abroad	<b>0.31 (0.15 - 0.65)*</b>	<b>0.35 (0.17 - 0.73)*</b>	5%	<b>0.51 (0.29 - 0.89)*</b>	0.6 (0.33 - 1.06)	17%
Other ethnicity; Born abroad	0.99 (0.72 - 1.36)	1 (0.72 - 1.39)	94%	0.84 (0.63 - 1.12)	0.85 (0.63 - 1.15)	8%
<b>Household material disadvantage (ref. Least):</b>						
Medium		0.99 (0.82 - 1.19)			<b>1.23 (1.03 - 1.46)*</b>	
Most		0.87 (0.68 - 1.11)			1.21 (0.97 - 1.51)	
<b>Family structure (ref. two parent):</b>						
Reconstituted		1.24 (0.92 - 1.69)			<b>1.58 (1.2 - 2.07)*</b>	
Single-parent		1.13 (0.92 - 1.4)			1.02 (0.84 - 1.24)	
Other		0.98 (0.68 - 1.42)			1.01 (0.73 - 1.41)	
<b>Household overcrowding (ref. not overcrowded):</b>						
Overcrowded		0.87 (0.59 - 1.26)			<b>0.71 (0.5 - 1)*</b>	
<b>Experiences of racism (ref. no racism):</b>						
Racism		1.12 (0.92 - 1.36)			<b>1.55 (1.3 - 1.84)*</b>	
<b>Sample size:</b>				<i>n</i> = 4,713	<i>n</i> = 4,501	

\**p*≤0.05    \*\*main effects of Generational status constrained to 1



*Perceived parental control:*

Ethnic variations in perceived parental control were examined in section 7.4.1: compared to White UK adolescents: adolescents of each ethnic minority group were more likely to perceive *Medium control*, or *High control*, rather than *Low control*, than White UK adolescents. Univariate analyses provided evidence that ethnic variations in perceived parental control were mediated by structural inequalities, represented by measures of household material disadvantage, family structure, and experiences of racism. In the final model (Table 7-26), compared to those who live in *Two-parent* families, those who lived in *Reconstituted* families were more likely to perceive *High control*, than *Low control*, and those who lived in *Single-parent* families were less likely to perceive *Medium control*, than *Low control*; adolescents who had had experiences of racism were more likely to perceive *Medium control*, or *High control*, than *Low control*. While there were no significant associations between household material disadvantage and perceived parental control in the final model, in a separate model that regressed control on household material disadvantage, adjusted for age and gender, there were positive associations between *High control*, rather than *Low control*, and both *Medium* (borderline significant,  $p=0.07$ ) and *Most* household material disadvantage ( $p<0.01$ ). This indicates collinearity between ethnicity, household material disadvantage, and perceived parental control.

Black Caribbean adolescents, compared to White UK adolescents, were more likely to live in *Medium and Most*, rather than *Least* materially disadvantaged households, and to have had experiences of racism; increasing their risks of *Medium control* and *High control*, rather than *Low control*. They were also more likely to live in *Reconstituted*, rather than *Two-parent* families, increasing their risk of perceiving *High control*, rather than *Low control*, and more likely to live in *Single-parent*, rather than *Two-parent* families, decreasing their risk of *Medium control*, rather than *Low control*. Mediation by structural inequalities suppressed an even greater likelihood of *Medium control*, rather than *Low control*, compared to White UK adolescents. We would hypothesise living in *Single-parent*, rather than *Two-parent*, families was responsible for this effect and masked the opposing effects of greater household material disadvantage and experiences of racism.

Similarly, Black African adolescents were more likely than White UK adolescents to live in *Medium and Most*, rather than *Least* materially disadvantaged households, and to have had experiences of racism, increasing their risks of *Medium control* and *High control*, rather than *Low control*. They were also more likely to live in *Single-parent*, rather than *Two-parent* families, decreasing their risk of *Medium control*, rather than

*Low control*. However, in contrast with Black Caribbean adolescents, Black African adolescents were less likely to live in *Reconstituted*, rather than *Two-parent* families; increasing their risk of *High control*, rather than *Low control*. Mediation by structural inequalities explained 8% of the greater likelihood of *High control*, rather than *Low control*, compared to White UK adolescents. This finding indicates that among Black African adolescents, being more likely to live in *Most*, rather than *Least* materially disadvantaged households, and being more likely to have had experiences of racism were stronger than the countervailing protective effect of living in *Two-parent*, rather than *Reconstituted* families.

Indian and Pakistani/ Bangladeshi adolescents were more likely than White UK adolescents to have had experiences of racism, increasing their risks of *Medium control*, and *High control*, rather than *Low control*. Indian, and Pakistani/ Bangladeshi adolescents also had similar patterns of family structure: both were less likely to live in *Reconstituted* families that increased their risks of *High control*, rather than *Low control*, and were less likely to live in *Reconstituted* families that decreased their risks of *Medium control*, rather than *Low control*, compared to living in *Two-parent* families. However, the two ethnic groups differed in terms of household material disadvantage. Among Indian adolescents household material disadvantage was similar to that of White UK adolescents; however, Pakistani/ Bangladeshi adolescents were more likely to live in *Medium* or *Most* rather than *Least* materially disadvantaged households; this increased their risk of *Medium control* and *High control*, rather than *Low control*. Adjustment for structural inequalities resulted in no changes to ethnic variations in perceived parental control among Indian adolescents; whereas mediation by these structural inequalities suppressed even greater likelihoods of perceived *Medium control* by 14%, and *High control* by 26%. This finding is surprising since Pakistani/ Bangladeshi adolescents were more likely to be exposed to structural inequalities that increased their risks of *Medium control* and *High control*, rather than *Low control* in the form of greater household material disadvantage, and experiences of racism. We can therefore, hypothesise that the negative effects of those risk factors were masked by the protective effects of living in *Two-parent* families; however, the magnitude of the mediated effects are greater than in the model investigating mediation of ethnic variations in parental control by family structure alone. Compared to White UK adolescents, Other ethnicity adolescents were: more likely to live in *Medium* or *Most*, rather than *Least* materially disadvantaged households, increasing their risks of *Medium control* and *High control*, rather than *Low control*; were more likely to live in *Single-parent*, rather than *Two-parent* families, decreasing their risk of *Medium control* rather than *Low control*; and were more likely

to have had experiences of racism, increasing their risks of *Medium control* and *High control*, rather than *Low control*.

In summary, there is evidence that mediation by structural inequalities suppresses small-moderate proportions of the greater likelihoods of *Medium* perceived parental control among Black Caribbean, Pakistani/ Bangladeshi, and Other ethnicity adolescents, compared to White UK adolescents. Findings also suggest that mediation by structural inequalities also suppress a small-moderate proportion of the greater likelihood of *High control* among Pakistani adolescents, compared to White UK adolescents. In contrast, it appears that structural inequalities explain small proportions of greater likelihoods of *High control* among Black African and Other ethnicity adolescents, compared to White UK adolescents.

Table 7-26. Final model predicting perceived parental control by ethnicity, age, and gender; before and after adjustment for structural inequalities:

	Perceived parental control (ref. Low control)					
	Medium control			High control		
	Unadjusted OR	Adjusted OR	Mediated %	Unadjusted OR	Adjusted OR	Mediated %
<b>Age (years):</b>	0.89 (0.79 - 1.01)	0.9 (0.79 - 1.02)		0.89 (0.79 - 1.01)	0.89 (0.77 - 1.01)	
<b>Gender (ref. male):</b>						
Female	1.01 (0.87 - 1.18)	1 (0.85 - 1.18)		<b>1.58 (1.35 - 1.84)*</b>	<b>1.49 (1.26 - 1.76)*</b>	
<b>Ethnicity (ref. White UK):</b>						
Black Caribbean	<b>1.56 (1.22 - 1.98)*</b>	<b>1.67 (1.29 - 2.18)*</b>	-21%	<b>2.58 (2 - 3.34)*</b>	<b>2.54 (1.91 - 3.38)*</b>	3%
Black African	<b>1.76 (1.38 - 2.25)*</b>	<b>1.75 (1.34 - 2.28)*</b>	2%	<b>3.7 (2.87 - 4.78)*</b>	<b>3.49 (2.64 - 4.61)*</b>	8%
Indian	<b>1.88 (1.38 - 2.55)*</b>	<b>1.85 (1.33 - 2.57)*</b>	3%	<b>3.65 (2.66 - 5)*</b>	<b>3.56 (2.52 - 5.01)*</b>	4%
Pakistani/ Bangladeshi	<b>2.07 (1.52 - 2.8)*</b>	<b>2.34 (1.67 - 3.28)*</b>	-26%	<b>4.31 (3.15 - 5.91)*</b>	<b>4.76 (3.36 - 6.76)*</b>	-14%
Other ethnicity	<b>1.57 (1.28 - 1.94)*</b>	<b>1.6 (1.28 - 2)*</b>	-5%	<b>3 (2.39 - 3.77)*</b>	<b>2.84 (2.22 - 3.62)*</b>	8%
<b>Household mat disadvantage (ref. Least):</b>						
Medium		1.1 (0.91 - 1.32)			1.05 (0.86 - 1.27)	
Most		0.96 (0.78 - 1.19)			1.21 (0.98 - 1.49)	
<b>Family structure (ref. two parent)</b>						
Reconstituted		1.05 (0.8 - 1.37)			<b>1.33 (1.02 - 1.74)*</b>	
Single-parent		<b>0.8 (0.66 - 0.97)*</b>			0.92 (0.75 - 1.11)	
Other		0.96 (0.68 - 1.35)			0.96 (0.68 - 1.36)	
<b>Experiences of racism (ref. No racism)</b>						
Racism		<b>1.22 (1.01 - 1.46)*</b>			<b>1.68 (1.4 - 2.01)*</b>	
<b>Sample size:</b>				<i>n</i> = 4,713	<i>n</i> = 4,538	

\*p≤0.05

*Perceived parenting styles:*

Compared to White UK adolescents, Indian and Pakistani/ Bangladeshi adolescents were less likely to perceive *Neglectful*, rather than *Permissive* parenting; adolescents of each ethnic minority group were more likely to perceive *Authoritative*, or *Authoritarian* parenting, rather than *Permissive* parenting.

Subsequent analyses produced evidence that ethnic variations in perceived parenting styles were moderated by English language use with family, representative of cultural values: While compared to White UK adolescents, Pakistani/ Bangladeshi adolescents who spoke *Mostly-All* English with family were less likely to perceive *Neglectful*, rather than *Permissive* parenting, those Pakistani/ Bangladeshi adolescents who spoke *Some-little/no* English with family, compared to those who spoke *Mostly-all* English with family, were more likely to perceive *Neglectful* rather than *Permissive* parenting, than their less acculturated counterparts.

Univariate analyses also provided evidence that ethnic variations in perceived parental control were mediated by structural inequalities, represented by measures of household material disadvantage, family structure, and experiences of racism. In the final model (Table 7-27), those who lived in *Medium*, rather than *Least* household material disadvantage were more likely to perceive *Neglectful*, or *Authoritative* (borderline,  $p=0.09$ ) parenting, but were less likely to perceive *Authoritative* parenting, than *Permissive* parenting; those who lived in *Most*, rather than *Least*, materially disadvantaged households were more likely to perceive *Authoritarian* parenting, than *Permissive* parenting. Those who lived in *Reconstituted*, rather than *Two-parent* families were more likely to perceive *Neglectful* parenting (borderline,  $p=0.06$ ), or *Authoritarian* parenting, than *Permissive* parenting. Those who had had experiences of racism were more likely to perceive *Neglectful*, *Authoritative*, or *Authoritarian* parenting, than *Permissive* parenting.

Compared to White UK, Black Caribbean adolescents were: more likely to live in *Medium* or *Most*, rather than *Least* materially disadvantaged households, risk factors for *Neglectful* and *Authoritarian*, rather than *Permissive* parenting, but protective against *Authoritative* parenting (borderline significant,  $p=0.09$ ); more likely to live in *Reconstituted*, rather than *Two-parent* families, a risk factor for *Neglectful* and *Authoritarian*, rather than *Permissive* parenting; and, more likely to have had experiences of racism, a risk factor for *Neglectful*, *Authoritative*, and *Authoritarian*, rather than *Permissive* parenting. Mediation by structural inequalities explained greater *Authoritative* parenting by 12%, and *Authoritarian* parenting by 20%, rather than *Permissive* parenting, compared to White UK adolescents.

Black African, compared to White UK adolescents, were more likely to live in *Medium* or *Most*, rather than *Least* materially disadvantaged households, increasing their risks of perceived *Neglectful* and *Authoritarian* parenting, but reducing their risk of perceived *Authoritative*, compared to *Permissive* parenting. They were more likely to have had experiences of racism that increased risks of perceived *Neglectful*, *Authoritative*, and *Authoritarian*, rather than *Permissive* parenting. They were less likely than White UK adolescents to live in *Reconstituted*, rather than *Two-parent* families, reducing their risk of perceived *Neglectful*, and *Authoritarian*, rather than *Permissive* parenting. Mediation by these combined structural inequalities explained 13% of the greater likelihood of *Authoritarian*, rather than *Permissive* parenting.

Indian adolescents were not significantly different from White UK adolescents in terms of household material disadvantage, but they were less likely to live in *Reconstituted*, rather than *Two-parent* families, decreasing their risk of perceived *Neglectful* or *Authoritarian*, rather than *Permissive* parenting, and they were more likely to have had experiences of racism, increasing their risk of perceived *Neglectful*, *Authoritative*, and *Authoritarian*, rather than *Permissive* parenting. Mediation by these combined structural inequalities explained greater likelihoods of *Authoritative*, and *Authoritarian*, rather than *Permissive* parenting, both by 5%.

Compared to White UK adolescents, Pakistani/ Bangladeshi adolescents were more likely to live in *Medium* or *Most*, rather than *Least* materially disadvantaged households, increasing their risk of perceived *Neglectful*, or *Authoritarian* parenting, and decreasing their risk of perceived *Authoritative*, rather than *Permissive* parenting. They were less likely to live in *Reconstituted*, than *Two-parent* families, decreasing their risk of perceived *Neglectful*, and *Authoritarian*, rather than *Permissive* parenting. They were more likely to have had experiences of racism that increased their risks of perceived *Neglectful*, *Authoritative*, and *Authoritarian*, rather than *Permissive* parenting. Mediation by combined structural inequalities explained 7% of the greater likelihood of *Authoritarian*, rather than *Permissive* parenting, compared to White UK, and explained 19% of the greater risk of *Neglectful*, rather than *Permissive* parenting, among those who spoke *Some/little-no*, rather than *Mostly-all* English with family. This latter finding indicates that greater household material disadvantage and experiences of racism that were risk factors for *Neglectful*, rather than *Permissive* parenting were more prevalent among the less acculturated Pakistani/ Bangladeshi adolescents.

Compared to White UK adolescents, Other ethnicity adolescent were more likely to live in *Medium* or *Most*, rather than *Least* materially disadvantaged households, increasing their risk of perceived *Neglectful* or *Authoritarian* parenting, and reducing their risk of

perceived *Authoritative*, rather than *Permissive* parenting. They were less likely to live in *Reconstituted*, rather than *Two-parent* families, reducing their risk of perceiving *Neglectful* or *Authoritarian*, rather than *Permissive* parenting. They were more likely to have had experiences of racism that increased their risks of *Neglectful*, *Authoritative*, and *Authoritarian*, rather than *Permissive* parenting. Mediation by structural inequalities explained their greater likelihoods of perceived *Authoritative* and *Authoritarian*, rather than *Permissive* parenting by 7%, and 13%, respectively.

In summary, there is evidence that mediation by structural inequalities explains small-moderate proportions of the greater likelihoods of *Authoritative* parenting among Black Caribbean, Indian, and Other ethnicity adolescents, and explains small-moderate proportions of *Authoritarian* parenting adolescents of each ethnic minority group, compared to White UK adolescents. Furthermore, a small-moderate proportion of the greater likelihood of perceived *Neglectful* parenting among less linguistically acculturated adolescents was explained by structural inequalities.

Table 7-27. Final model predicting perceived parenting styles by ethnicity, age, and gender; before and after adjustment for structural inequalities:

	Perceived parenting styles (ref. Permissive parenting)								
	Neglectful			Authoritative			Authoritarian		
	Unadjusted OR	Adjusted OR	Mediated %	Unadjusted OR	Adjusted OR	Mediated %	Unadjusted OR	Adjusted OR	Mediated %
<b>Age (years):</b>	<b>1.15 (1.01 - 1.31)*</b>	<b>1.16 (1.01 - 1.32)*</b>		<b>0.76 (0.64 - 0.91)*</b>	<b>0.76 (0.63 - 0.91)*</b>		1.1 (0.97 - 1.25)	1.08 (0.95 - 1.23)	
<b>Gender (ref. male):</b>									
Female	1.04 (0.87 - 1.23)	1.04 (0.87 - 1.24)		<b>1.28 (1.03 - 1.58)*</b>	<b>1.27 (1.01 - 1.58)*</b>		<b>1.77 (1.52 - 2.07)*</b>	<b>1.77 (1.51 - 2.08)*</b>	
<b>Ethnicity (ref. White UK):</b>									
Black Caribbean	1.26 (0.97 - 1.62)	1.16 (0.89 - 1.51)	37%	<b>2.12 (1.4 - 3.19)*</b>	<b>1.98 (1.29 - 3.05)*</b>	12%	<b>2.15 (1.62 - 2.86)*</b>	<b>1.92 (1.43 - 2.59)*</b>	20%
Black African	1.26 (0.95 - 1.66)	1.15 (0.86 - 1.53)	42%	<b>2.62 (1.71 - 4)*</b>	<b>2.6 (1.68 - 4.04)*</b>	1%	<b>2.99 (2.24 - 4)*</b>	<b>2.74 (2.03 - 3.7)*</b>	13%
Indian	0.79 (0.53 - 1.18)	0.76 (0.51 - 1.15)	-11%	<b>1.95 (1.12 - 3.4)*</b>	<b>1.91 (1.08 - 3.35)*</b>	5%	<b>2.24 (1.53 - 3.29)*</b>	<b>2.19 (1.48 - 3.23)*</b>	5%
Pakistani/ Bangladeshi	<b>0.45 (0.28 - 0.74)*</b>	<b>0.44 (0.27 - 0.73)*</b>	-2%	<b>2.28 (1.33 - 3.92)*</b>	<b>2.29 (1.32 - 3.97)*</b>	0%	<b>2.27 (1.53 - 3.36)*</b>	<b>2.17 (1.45 - 3.26)*</b>	7%
Other ethnicity	1.12 (0.88 - 1.42)	1.08 (0.85 - 1.39)	26%	<b>1.65 (1.09 - 2.48)*</b>	<b>1.6 (1.05 - 2.44)*</b>	7%	<b>2.21 (1.69 - 2.9)*</b>	<b>2.05 (1.55 - 2.7)*</b>	13%
<b>English language use (ref. Mostly-all):</b>									
Some/little-no	0.4 (0.08 - 1.87)	0.45 (0.09 - 2.18)		1.97 (0.41 - 9.45)	2.32 (0.47 - 11.36)		0.86 (0.18 - 4.08)	1.02 (0.21 - 4.96)	
<b>Ethnicity x English language use</b>									
Black Caribbean; Some/little-no	2.94 (0.55 - 15.8)	2.75 (0.5 - 15.25)	10%	0.56 (0.09 - 3.48)	0.47 (0.07 - 3.09)	-21%	1.99 (0.37 - 10.56)	1.72 (0.31 - 9.47)	28%
Black African; Some/little-no	1.64 (0.33 - 8.17)	1.58 (0.31 - 8.07)	9%	0.67 (0.13 - 3.47)	0.6 (0.11 - 3.19)	-21%	1.1 (0.22 - 5.42)	0.94 (0.18 - 4.77)	165%
Indian; Some/little-no	1.47 (0.28 - 7.72)	1.3 (0.24 - 6.99)	36%	1 (0.19 - 5.39)	0.84 (0.15 - 4.59)	4723%	0.87 (0.17 - 4.45)	0.72 (0.14 - 3.78)	-117%
Pakistani/ Bangladeshi; Some/little-no	<b>5.29 (1.01 - 27.72)*</b>	4.49 (0.84 - 24.07)	19%	0.63 (0.12 - 3.41)	0.49 (0.09 - 2.71)	-39%	1.51 (0.3 - 7.67)	1.32 (0.25 - 6.91)	37%
Other ethnicity; Some/little-no	1.8 (0.37 - 8.73)	1.56 (0.31 - 7.73)	30%	1.2 (0.24 - 6.01)	1.01 (0.2 - 5.16)	96%	1.35 (0.28 - 6.54)	1.13 (0.23 - 5.64)	64%
<b>Household material disadvantage (ref. Least):</b>									
Medium		<b>1.22 (1.02 - 1.46)*</b>			0.81 (0.64 - 1.03)			<b>1.2 (1.01 - 1.44)*</b>	
Most		1.18 (0.94 - 1.49)			0.89 (0.66 - 1.2)			<b>1.39 (1.12 - 1.73)*</b>	
<b>Family structure (ref. two parent)</b>									
Reconstituted		1.28 (0.99 - 1.65)			1.09 (0.74 - 1.61)			<b>1.63 (1.26 - 2.11)*</b>	
Single-parent		0.92 (0.75 - 1.12)			1.01 (0.77 - 1.32)			0.97 (0.8 - 1.18)	
Other		1.02 (0.73 - 1.43)			0.86 (0.53 - 1.38)			0.97 (0.69 - 1.36)	
<b>Experiences of racism (ref. No racism):</b>									
Racism		<b>1.29 (1.08 - 1.54)*</b>			<b>1.34 (1.06 - 1.69)*</b>			<b>1.82 (1.54 - 2.16)*</b>	
<b>Sample size:</b>							N= 4,564	N= 4,422	

\*p < 0.05



#### 7.4. Key findings

Here I describe my key findings from Chapter 7 where I investigated ethnic variations in perceived parenting styles among DASH study adolescents.

As expected there were significant ethnic variations in perceived parental care, control, and parenting styles. Black Caribbean, and Black African adolescents were more likely than White UK adolescents to perceive *Low*, rather than *High* parental care. All ethnic minority adolescents were more likely to perceive either *Medium* or *High*, rather than *Low* parental control and were also more likely to perceive *Authoritative*, or *Authoritarian*, rather than *Permissive* parenting. Indian and Pakistani/ Bangladeshi adolescents were less likely than White UK adolescents to perceive *Neglectful*, rather than *Permissive* parenting.

There was evidence that some ethnic variations in perceived parenting styles were moderated by cultural values. Generational status moderated ethnic variations in perceived parental care. Black Caribbean adolescents who were born abroad were more likely to perceive *Low care*, rather than *High care* than those born in the UK. In contrast, Indian adolescents who were born abroad were more likely than those born in the UK to perceive *Low* rather than *High care*, and Pakistani/ Bangladeshi adolescents who were born abroad were more likely to perceive *Medium* or *Low* rather than *High* care than those born in the UK. English language use with family moderated ethnic variations in perceived parenting styles with Pakistani/ Bangladeshi adolescent who spoke less English with their family were more likely to perceive *Neglectful*, rather than *Permissive* parenting.

Structural inequalities mediated small-to-moderate proportions of some ethnic variations in perceived parenting. Household material disadvantage, family structure, household overcrowding, and experiences of racism explained greater likelihoods of perceived *Low* rather than *High* care, among Black Caribbean (37%), and Black African adolescents (17%). In contrast, household material disadvantage, family structure, and experiences of racism suppressed an otherwise higher likelihood of *Medium* rather than *Low* control among Black Caribbean adolescents (21%), and suppressed otherwise higher likelihoods of *Medium* and *High* rather than *Low* control (26% and 14%, respectively). Household material disadvantage, family structure, and experiences of racism also explained some ethnic variations in perceived parenting styles. Those structural inequalities explained some of the higher likelihoods of *Authoritarian* rather than *Permissive* parenting among Black Caribbean (20%), Black African (13%), and Other ethnicity adolescents (13%), some of the higher likelihood of *Authoritative* rather than *Permissive* parenting among Black Caribbean adolescents (12%), and some of the higher

likelihood of *Neglectful* rather than *Permissive* parenting among Pakistani/ Bangladeshi adolescents who spoke less English with their family (19%).

## 8. Parenting styles and adolescent health behaviours

### 8.1. Introduction

The analysis presented in this chapter addresses objective C of my thesis (Figure 8-1), to investigate associations between perceived parenting styles and adolescent health behaviours.

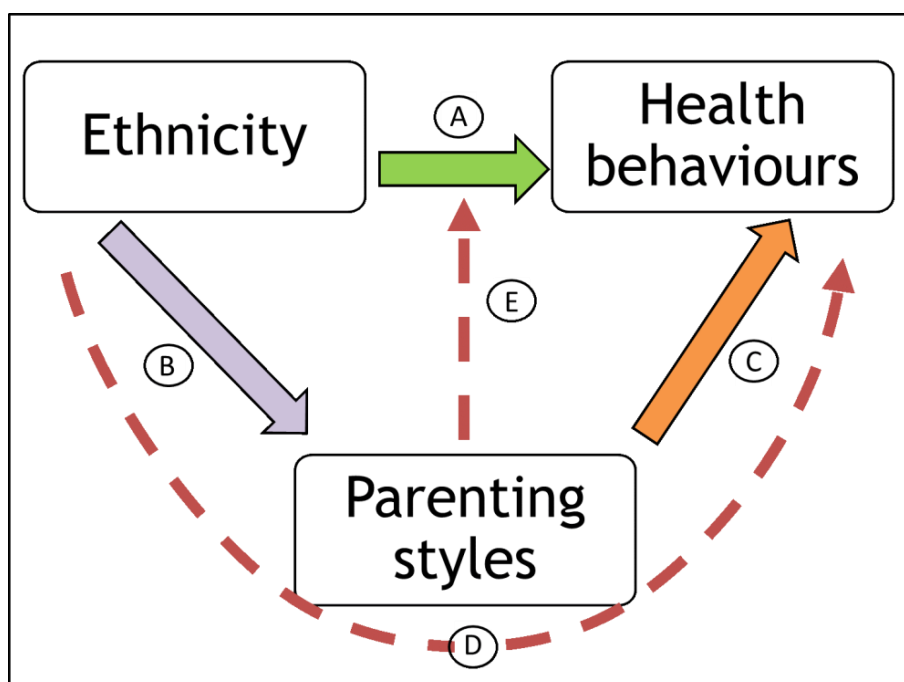


Figure 8-1: Thesis objective C, investigation of associations between perceived parenting styles and adolescent health behaviours.

I reviewed literature that investigated associations between parenting styles and adolescent health behaviours (4.2.3). Previous research suggests that more (high care, high control) authoritative styles of parenting are associated with healthier adolescent behaviours, whereas more (low care, high control) authoritarian styles of parenting are associated with more unhealthy adolescent behaviours. Based on those literature review findings a single research question was formulated (Box 8-1).

Box 8-1: Objective C - Research questions:

- Were perceived parenting styles associated with adolescent health behaviours?

## 8.2. Methods

Logistic regression was used to investigate associations between perceived parental care, control, and parenting styles. Models were adjusted for age, gender, and structural inequalities (household material disadvantage, family structure, household overcrowding, and experiences of racism). More information on these variables can be found in section 5.2. Wald chi<sup>2</sup> tests were used to test the joint significance ( $p < 0.05$ ) of parenting effects.

## 8.3. Results

### 8.3.1. Associations between perceived parenting and adolescent substance use behaviours

Associations between perceived parental care, parental control, parenting styles, and adolescent substance use behaviours, adjusted for age, gender and structural inequalities, are shown in Table 8-1, Table 8-2, and Table 8-3, respectively.

Compared to adolescents who perceived *High* parental care, adolescents who perceived *Medium* parental care were more likely to currently use alcohol, or to have ever used illicit drugs; adolescents who perceived *Low* parental care were more likely to currently use tobacco or alcohol, or to have ever used illicit drugs. Compared to adolescents who perceived *Low* parental control, adolescents who perceived *Medium* parental control were less likely to currently use tobacco or alcohol or to have ever used illicit drugs; adolescents who perceived *High* parental control were less likely to currently use alcohol. Compared to adolescents who perceived *Permissive* (high care, and low control) parenting, adolescents who perceived *Neglectful* (low care, low control) parenting were more likely to currently use tobacco or alcohol, or to have ever used illicit drugs; adolescents who perceived *Authoritative* (high care, high control) parenting were less likely to currently use alcohol; and those adolescents who perceived *Authoritarian* (low care, high control) parenting were more likely to currently use tobacco or to have ever used illicit drugs.

Table 8-1: Multinomial regression analyses of substance use behaviours by perceived parental care, age, gender, and structural inequalities.

	Current tobacco use (ref. no use)	Current alcohol use (ref. no use)	Lifetime illicit drug use (ref. no use)
<b>Age (years):</b>	<b>1.51 (1.29 - 1.78)*</b>	<b>1.49 (1.32 - 1.67)*</b>	<b>1.5 (1.32 - 1.7)*</b>
<b>Gender (ref. male):</b>			
Female	<b>1.65 (1.34 - 2.04)*</b>	<b>1.26 (1.07 - 1.48)*</b>	1.16 (0.98 - 1.37)
<b>Parental care (ref. high):</b>			
Medium	1.06 (0.8 - 1.41)	<b>1.22 (1.01 - 1.48)*</b>	<b>1.69 (1.35 - 2.11)*</b>
Low	<b>1.5 (1.17 - 1.92)*</b>	<b>1.54 (1.3 - 1.84)*</b>	<b>2.14 (1.75 - 2.63)*</b>
Chi2 test <i>p</i> value	<b>&lt;0.01</b>	<b>&lt;0.01</b>	<b>&lt;0.01</b>
<b>Household material disadvantage (ref. least):</b>			
Medium	<b>0.79 (0.64 - 0.98)*</b>	<b>0.75 (0.64 - 0.87)*</b>	<b>0.77 (0.65 - 0.9)*</b>
Most	<b>0.68 (0.51 - 0.89)*</b>	<b>0.63 (0.52 - 0.76)*</b>	<b>0.7 (0.57 - 0.87)*</b>
<b>Family structure (ref. two-parent):</b>			
Reconstituted	<b>1.68 (1.28 - 2.21)*</b>	<b>2.13 (1.72 - 2.63)*</b>	<b>1.68 (1.34 - 2.1)*</b>
Single-parent	<b>1.42 (1.13 - 1.77)*</b>	<b>1.64 (1.39 - 1.92)*</b>	<b>1.69 (1.42 - 2.01)*</b>
Other	1.15 (0.76 - 1.76)	1.26 (0.94 - 1.67)	1.05 (0.76 - 1.47)
<b>Household overcrowding (ref. not overcrowded)</b>			
Overcrowded	0.7 (0.41 - 1.19)	<b>0.39 (0.26 - 0.57)*</b>	<b>0.57 (0.38 - 0.87)*</b>
<b>Experiences of racism (ref. no racism)</b>			
Racism	1.1 (0.9 - 1.35)	1.1 (0.95 - 1.27)	<b>1.21 (1.04 - 1.42)*</b>
<b>Sample size:</b>	<i>n</i> = 4,495	<i>n</i> = 4,493	<i>n</i> = 4,497

\**p* ≤ 0.05

Table 8-2: Multinomial regression analyses of substance use behaviours by perceived parental control, age, gender, and structural inequalities.

	Current tobacco use (ref. no use)	Current alcohol use (ref. no use)	Lifetime illicit drug use (ref. no use)
<b>Age (years):</b>	<b>1.53 (1.3 - 1.79)*</b>	<b>1.49 (1.33 - 1.67)*</b>	<b>1.52 (1.34 - 1.72)*</b>
<b>Gender (ref. male):</b>			
Female	<b>1.67 (1.35 - 2.06)*</b>	<b>1.31 (1.12 - 1.54)*</b>	<b>1.2 (1.02 - 1.42)*</b>
<b>Parental control (ref. low):</b>			
Medium	<b>0.78 (0.61 - 0.98)*</b>	<b>0.84 (0.72 - 0.99)*</b>	<b>0.77 (0.65 - 0.93)*</b>
High	1.01 (0.8 - 1.26)	<b>0.77 (0.65 - 0.91)*</b>	0.9 (0.76 - 1.08)
Chi2 test <i>p</i> value	<b>0.05</b>	<b>0.01</b>	<b>0.02</b>
<b>Household material disadvantage (ref. least):</b>			
Medium	<b>0.8 (0.65 - 0.99)*</b>	<b>0.76 (0.66 - 0.89)*</b>	<b>0.79 (0.67 - 0.93)*</b>
Most	<b>0.69 (0.52 - 0.91)*</b>	<b>0.65 (0.54 - 0.79)*</b>	<b>0.72 (0.59 - 0.89)*</b>
<b>Family structure (ref. two-parent):</b>			
Reconstituted	<b>1.72 (1.31 - 2.27)*</b>	<b>2.18 (1.77 - 2.7)*</b>	<b>1.74 (1.39 - 2.18)*</b>
Single-parent	<b>1.41 (1.13 - 1.77)*</b>	<b>1.62 (1.38 - 1.91)*</b>	<b>1.67 (1.41 - 1.99)*</b>
Other	1.16 (0.76 - 1.77)	1.26 (0.94 - 1.68)	1.06 (0.76 - 1.48)
<b>Household overcrowding (ref. not overcrowded)</b>			
Overcrowded	0.68 (0.4 - 1.16)	<b>0.39 (0.26 - 0.57)*</b>	<b>0.57 (0.37 - 0.86)*</b>
<b>Experiences of racism (ref. no racism)</b>			
Racism	1.14 (0.93 - 1.39)	<b>1.16 (1 - 1.35)*</b>	<b>1.28 (1.1 - 1.5)*</b>
<b>Sample size:</b>	<i>n</i> = 4,496	<i>n</i> = 4,494	<i>n</i> = 4,498

\**p*≤0.05

Table 8-3: Multinomial regression analyses of substance use behaviours by perceived parenting style, age, gender, and structural inequalities.

	Current tobacco use (ref. no use)	Current alcohol use (ref. no use)	Lifetime illicit drug use (ref. no use)
<b>Age (years):</b>	<b>1.51 (1.29 - 1.78)*</b>	<b>1.47 (1.31 - 1.65)*</b>	<b>1.5 (1.32 - 1.7)*</b>
<b>Gender (ref. male):</b>			
Female	<b>1.64 (1.32 - 2.02)*</b>	<b>1.29 (1.1 - 1.52)*</b>	1.18 (1 - 1.4)
<b>Parenting style (ref. permissive):</b>			
Neglectful	<b>1.49 (1.17 - 1.89)*</b>	<b>1.41 (1.19 - 1.67)*</b>	<b>1.72 (1.43 - 2.06)*</b>
Authoritative	1.04 (0.73 - 1.49)	<b>0.6 (0.47 - 0.78)*</b>	0.96 (0.73 - 1.27)
Authoritarian	<b>1.46 (1.15 - 1.85)*</b>	1.13 (0.95 - 1.34)	<b>1.42 (1.18 - 1.71)*</b>
Chi2 test <i>p</i> value	<b>&lt;0.01</b>	<b>&lt;0.01</b>	<b>&lt;0.01</b>
<b>Household material disadvantage (ref. least):</b>			
Medium	<b>0.79 (0.64 - 0.98)*</b>	<b>0.74 (0.64 - 0.86)*</b>	<b>0.77 (0.65 - 0.9)*</b>
Most	<b>0.68 (0.51 - 0.89)*</b>	<b>0.63 (0.52 - 0.77)*</b>	<b>0.7 (0.57 - 0.87)*</b>
<b>Family structure (ref. two-parent):</b>			
Reconstituted	<b>1.68 (1.28 - 2.22)*</b>	<b>2.14 (1.73 - 2.65)*</b>	<b>1.69 (1.35 - 2.12)*</b>
Single-parent	<b>1.42 (1.13 - 1.78)*</b>	<b>1.64 (1.39 - 1.92)*</b>	<b>1.7 (1.43 - 2.02)*</b>
Other	1.16 (0.76 - 1.76)	1.25 (0.93 - 1.67)	1.05 (0.75 - 1.46)
<b>Household overcrowding (ref. not overcrowded)</b>			
Overcrowded	0.7 (0.41 - 1.18)	<b>0.39 (0.26 - 0.57)*</b>	<b>0.58 (0.38 - 0.88)*</b>
<b>Experiences of racism (ref. no racism)</b>			
Racism	1.1 (0.9 - 1.35)	1.13 (0.98 - 1.31)	<b>1.23 (1.05 - 1.44)*</b>
<b>Sample size:</b>	<i>n</i> = 4,479	<i>n</i> = 4,477	<i>n</i> = 4,481

\**p*≤0.05

### 8.3.2. Associations between perceived parenting and adolescent body size and related behaviours

Associations between perceived parental care, control, and parenting styles, and body size and related behaviours, adjusted for age, gender, and structural inequalities, are shown in Table 8-4, Table 8-5, and Table 8-6, respectively.

Compared to adolescents who perceived *High* parental care, those who perceived *Medium* or *Low* parental care were more likely to eat less than 5 portions of fruit and vegetables per day, but were less likely to be overweight; those who perceived *Low* parental care were also more likely to engage in <7 hours of physical activity than those who perceived *High* parental care. Compared to adolescents who perceived *Low* parental control, those who perceived *High* parental control were more likely to eat less than 5 portions of fruit and vegetables per day; there were no statistically significant differences in physical activity or body size. Compared to adolescents who perceived *Permissive* (high care, low control) parenting, those who perceived *Neglectful* (low care, low control) parenting were more likely to eat 2-4 portions than  $\geq 5$  portions of fruit and vegetables per day, and more likely to engage in <7 hours than  $\geq 14$  hours physical activity; there were no statistically significant differences in body size. Adolescents who perceived *Authoritarian* (low care, high control) parenting were more likely to eat less than 5 portions of fruit and vegetables per day, and more likely to engage in <7 hours of physical activity than those who perceived *Permissive* parenting; there were no statistically significant differences in body size between adolescents who perceived *Authoritarian* parenting and those who perceived *Permissive* parenting. There were no statistically significant differences in body size and related behaviours between adolescents who perceived *Authoritative* (high care, low control) parenting and those who perceived *Permissive* parenting.



Table 8-4: Multinomial regression analyses of fruit and vegetable consumption, physical activity, and body size by perceived parental care, age, gender, and structural inequalities.

	Fruit and vegetable consumption (ref $\geq 5$ portions/day)		Physical activity (ref $\geq 14$ hours/week)		Body size (ref. not overweight /obese)	
	2-4 portions/ day	<2 portions/day	7-14 hours/week	<7 hours/week	Overweight	Obese
<b>Age (years):</b>	1 (0.89 - 1.14)	1.03 (0.9 - 1.17)	1.12 (0.91 - 1.38)	1.15 (0.95 - 1.39)	0.86 (0.73 - 1.02)	1.09 (0.86 - 1.38)
<b>Gender (ref. male):</b>						
Female	1 (0.85 - 1.18)	0.87 (0.74 - 1.03)	<b>1.48 (1.11 - 1.99)*</b>	<b>4.11 (3.14 - 5.39)*</b>	<b>1.26 (1.03 - 1.55)*</b>	1.09 (0.82 - 1.46)
<b>Parental care (ref. high):</b>						
Medium	<b>1.7 (1.39 - 2.08)*</b>	<b>1.42 (1.15 - 1.75)*</b>	0.87 (0.63 - 1.21)	0.96 (0.71 - 1.3)	<b>0.72 (0.55 - 0.94)*</b>	0.73 (0.49 - 1.09)
Low	<b>1.84 (1.54 - 2.22)*</b>	<b>1.37 (1.14 - 1.66)*</b>	1.13 (0.83 - 1.54)	<b>1.42 (1.06 - 1.9)*</b>	<b>0.79 (0.62 - 1)*</b>	0.85 (0.6 - 1.2)
Chi2 test <i>p</i> value		<b>&lt;0.01</b>		<b>0.01</b>		0.10
<b>Household material disadvantage (ref. least):</b>						
Medium	<b>1.51 (1.28 - 1.78)*</b>	1.18 (0.99 - 1.39)	1.25 (0.95 - 1.65)	<b>1.41 (1.09 - 1.83)*</b>	1.04 (0.83 - 1.29)	1.04 (0.75 - 1.45)
Most	<b>1.63 (1.32 - 2.01)*</b>	<b>1.46 (1.17 - 1.82)*</b>	1.29 (0.9 - 1.85)	<b>1.58 (1.13 - 2.21)*</b>	0.91 (0.69 - 1.22)	1.31 (0.9 - 1.93)
<b>Family structure (ref. two-parent):</b>						
Reconstituted	<b>1.34 (1.06 - 1.7)*</b>	1.04 (0.81 - 1.34)	0.87 (0.59 - 1.29)	0.82 (0.57 - 1.18)	1.16 (0.84 - 1.59)	1.28 (0.81 - 2.04)
Single-parent	<b>1.45 (1.21 - 1.72)*</b>	1.04 (0.86 - 1.26)	0.89 (0.66 - 1.21)	0.88 (0.66 - 1.17)	1.2 (0.95 - 1.52)	<b>1.7 (1.23 - 2.35)*</b>
Other	1.21 (0.89 - 1.64)	0.83 (0.59 - 1.16)	0.92 (0.54 - 1.55)	0.84 (0.52 - 1.37)	1.4 (0.96 - 2.06)	1.27 (0.7 - 2.29)
<b>Household overcrowding (ref. not overcrowded)</b>						
Overcrowded	0.89 (0.64 - 1.25)	0.86 (0.6 - 1.22)	0.66 (0.4 - 1.08)	<b>0.52 (0.33 - 0.83)*</b>	1.06 (0.69 - 1.62)	1.1 (0.61 - 2)
<b>Experiences of racism (ref. no racism)</b>						
Racism	0.95 (0.81 - 1.12)	0.98 (0.83 - 1.16)	<b>0.58 (0.45 - 0.76)*</b>	<b>0.58 (0.45 - 0.74)*</b>	1.13 (0.91 - 1.39)	1.26 (0.94 - 1.7)
<b>Sample size:</b>		<i>n</i> = 4,501		<i>n</i> = 4,501		<i>n</i> = 3,258

\**p*  $\leq$  0.05

Table 8-5: Multinomial regression analyses of fruit and vegetable consumption, physical activity, and body size by perceived parental control, for age, gender, and structural inequalities.

	Fruit and vegetable consumption (ref $\geq 5$ portions/day)		Physical activity (ref $\geq 14$ hours/week)		Body size (ref. not overweight /obese)	
	2-4 portions/ day	<2 portions/day	7-14 hours/week	<7 hours/week	Overweight	Obese
<b>Age (years):</b>	1.03 (0.92 - 1.17)	1.05 (0.92 - 1.19)	1.13 (0.92 - 1.39)	1.16 (0.96 - 1.41)	0.85 (0.72 - 1)	1.09 (0.86 - 1.38)
<b>Gender (ref. male):</b>						
Female	1 (0.85 - 1.17)	0.86 (0.73 - 1.02)	<b>1.52 (1.13 - 2.04)*</b>	<b>4.25 (3.24 - 5.58)*</b>	1.22 (0.99 - 1.5)	1.08 (0.81 - 1.44)
<b>Parental control (ref. low):</b>						
Medium	1.07 (0.89 - 1.27)	1.15 (0.95 - 1.38)	1.14 (0.84 - 1.55)	1.16 (0.88 - 1.55)	0.98 (0.77 - 1.25)	1.15 (0.8 - 1.64)
High	<b>1.38 (1.15 - 1.65)*</b>	<b>1.26 (1.04 - 1.52)*</b>	1.05 (0.77 - 1.43)	1.1 (0.83 - 1.46)	1.07 (0.84 - 1.36)	1.16 (0.82 - 1.65)
chi2 test <i>p</i> value		<b>&lt;0.01</b>		0.86		0.85
<b>Household material disadvantage (ref. least):</b>						
Medium	<b>1.54 (1.31 - 1.81)*</b>	<b>1.18 (1 - 1.4)*</b>	1.25 (0.95 - 1.65)	<b>1.42 (1.1 - 1.83)*</b>	1.04 (0.83 - 1.29)	1.02 (0.73 - 1.42)
Most	<b>1.63 (1.32 - 2.01)*</b>	<b>1.46 (1.17 - 1.81)*</b>	1.29 (0.9 - 1.85)	<b>1.62 (1.15 - 2.26)*</b>	0.92 (0.69 - 1.22)	1.32 (0.9 - 1.94)
<b>Family structure (ref. two-parent):</b>						
Reconstituted	<b>1.41 (1.12 - 1.79)*</b>	1.07 (0.83 - 1.38)	0.89 (0.6 - 1.31)	0.86 (0.6 - 1.24)	1.12 (0.82 - 1.54)	1.26 (0.8 - 2)
Single-parent	<b>1.47 (1.23 - 1.75)*</b>	1.06 (0.88 - 1.28)	0.9 (0.66 - 1.22)	0.88 (0.66 - 1.16)	1.2 (0.95 - 1.52)	<b>1.7 (1.23 - 2.35)*</b>
Other	1.22 (0.9 - 1.65)	0.84 (0.6 - 1.17)	0.92 (0.54 - 1.55)	0.85 (0.52 - 1.39)	1.4 (0.95 - 2.05)	1.26 (0.7 - 2.28)
<b>Household overcrowding (ref. not overcrowded)</b>						
Overcrowded	0.86 (0.61 - 1.2)	0.84 (0.58 - 1.19)	0.66 (0.4 - 1.08)	<b>0.51 (0.32 - 0.81)*</b>	1.07 (0.7 - 1.64)	1.1 (0.61 - 2)
<b>Experiences of racism (ref. no racism)</b>						
Racism	0.97 (0.82 - 1.14)	0.98 (0.83 - 1.16)	<b>0.6 (0.46 - 0.78)*</b>	<b>0.61 (0.48 - 0.77)*</b>	1.1 (0.89 - 1.36)	1.24 (0.92 - 1.67)
<b>Sample size:</b>		<i>n</i> = 4,502		<i>n</i> = 4,418		<i>n</i> = 3,259

\**p* ≤ 0.05

Table 8-6: Multinomial regression analyses of fruit and vegetable consumption, physical activity, and body size by perceived parenting styles, age, gender, and structural inequalities.

	Fruit and vegetable consumption (ref ≥5 portions/day)		Physical activity (ref ≥14 hours/week)		Body size (ref. not overweight /obese)	
	2-4 portions/ day	<2 portions/day	7-14 hours/week	<7 hours/week	Overweight	Obese
<b>Age (years):</b>	1.02 (0.9 - 1.15)	1.04 (0.91 - 1.18)	1.12 (0.91 - 1.38)	1.14 (0.94 - 1.38)	0.86 (0.73 - 1.01)	1.09 (0.86 - 1.38)
<b>Gender (ref. male):</b>						
Female	0.99 (0.84 - 1.16)	0.86 (0.73 - 1.01)	<b>1.49 (1.11 - 2.01)*</b>	<b>4.14 (3.15 - 5.43)*</b>	<b>1.24 (1.01 - 1.52)*</b>	1.07 (0.8 - 1.43)
<b>Parenting style (ref. permissive):</b>						
Neglectful	<b>1.24 (1.03 - 1.5)*</b>	1.12 (0.93 - 1.37)	1.19 (0.86 - 1.65)	<b>1.38 (1.01 - 1.88)*</b>	0.8 (0.62 - 1.04)	0.89 (0.62 - 1.29)
Authoritative	1.12 (0.87 - 1.44)	1.15 (0.89 - 1.48)	0.86 (0.58 - 1.26)	0.77 (0.54 - 1.11)	0.9 (0.64 - 1.26)	0.91 (0.55 - 1.49)
Authoritarian	<b>1.6 (1.33 - 1.93)*</b>	<b>1.23 (1.01 - 1.5)*</b>	1.15 (0.82 - 1.6)	<b>1.37 (1.01 - 1.87)*</b>	1.04 (0.82 - 1.33)	1.08 (0.76 - 1.54)
Chi2 test <i>p</i> value		<b>&lt;0.01</b>		<b>0.01</b>		0.58
<b>Household material disadvantage (ref. least):</b>						
Medium	<b>1.52 (1.29 - 1.79)*</b>	<b>1.18 (1 - 1.4)*</b>	1.25 (0.95 - 1.65)	<b>1.41 (1.09 - 1.82)*</b>	1.03 (0.83 - 1.29)	1.04 (0.74 - 1.44)
Most	<b>1.6 (1.3 - 1.97)*</b>	<b>1.46 (1.17 - 1.81)*</b>	1.27 (0.89 - 1.83)	<b>1.58 (1.13 - 2.21)*</b>	0.92 (0.69 - 1.22)	1.32 (0.9 - 1.94)
<b>Family structure (ref. two-parent):</b>						
Reconstituted	<b>1.38 (1.09 - 1.74)*</b>	1.06 (0.83 - 1.37)	0.87 (0.59 - 1.28)	0.82 (0.57 - 1.18)	1.14 (0.83 - 1.57)	1.26 (0.79 - 2)
Single-parent	<b>1.47 (1.23 - 1.75)*</b>	1.05 (0.87 - 1.27)	0.9 (0.66 - 1.22)	0.88 (0.66 - 1.16)	1.18 (0.94 - 1.5)	<b>1.68 (1.22 - 2.32)*</b>
Other	1.22 (0.9 - 1.65)	0.83 (0.59 - 1.17)	0.91 (0.54 - 1.55)	0.84 (0.52 - 1.38)	1.39 (0.95 - 2.04)	1.25 (0.69 - 2.27)
<b>Household overcrowding (ref. not overcrowded)</b>						
Overcrowded	0.88 (0.63 - 1.23)	0.84 (0.59 - 1.21)	0.67 (0.41 - 1.1)	<b>0.53 (0.33 - 0.84)*</b>	1.06 (0.69 - 1.62)	1.1 (0.6 - 1.99)
<b>Experiences of racism (ref. no racism)</b>						
Racism	0.95 (0.81 - 1.11)	0.98 (0.83 - 1.16)	<b>0.59 (0.45 - 0.77)*</b>	<b>0.58 (0.46 - 0.75)*</b>	1.11 (0.9 - 1.38)	1.25 (0.93 - 1.68)
<b>Sample size:</b>		<i>n</i> = 4,485		<i>n</i> = 4,402		<i>n</i> = 3,247

\**p* ≤ 0.05

#### 8.4. Associations between perceived parenting and clusters of adolescent health behaviours

Associations between perceived parental care, control, and parenting styles, and clusters of adolescent health behaviours, adjusted for age, gender, and structural inequalities, are shown in Table 8-7, Table 8-8, and Table 8-9, respectively.

Compared to adolescents who perceived *High* parental care, those who perceived *Medium* or *Low* parental care were more likely to be in the *High substance use, physically active, High substance use, physically inactive, or High substance use, unhealthy diet* clusters rather than the *Low substance use, healthy diet* cluster. Compared to adolescents who perceived *Low* parental control, those who perceived *Medium* parental control were less likely to be in the *High substance use, physically active, or High substance use, physically inactive* clusters, than the *Low substance use, health diet* cluster; whereas those who perceived *High* parental control were more likely to be in the *Low substance use, unhealthy diet* cluster, than the *Low substance use, health diet* cluster. Compared to those who perceived *Permissive* (high care, low control) parenting, those who perceived *Neglectful* (low care, low control), or *Authoritarian* (low care, high control) parenting were more likely to be in the *High substance use, physically active, High substance use, physically inactive, or Low substance use, unhealthy diet* clusters, than the *Low substance use, healthy diet* cluster.

Table 8-7: Multinomial regression analysis of clustering of health behaviours by perceived parental care, age, gender, and structural inequalities.

	Health behaviour clusters (ref. low substance use, healthy diet):		
	High substance use, physically active	High substance use, physically inactive	Low substance use, unhealthy diet
<b>Age (years):</b>	<b>1.3 (1.03 - 1.65)*</b>	<b>1.57 (1.36 - 1.82)*</b>	0.95 (0.85 - 1.07)
<b>Gender (ref. male):</b>			
Female	<b>0.51 (0.37 - 0.69)*</b>	<b>1.73 (1.45 - 2.08)*</b>	1.06 (0.91 - 1.23)
<b>Parental care (ref. high):</b>			
Medium	<b>1.56 (1.03 - 2.36)*</b>	<b>1.69 (1.31 - 2.2)*</b>	<b>1.46 (1.2 - 1.77)*</b>
Low	<b>2.03 (1.39 - 2.95)*</b>	<b>2.32 (1.84 - 2.94)*</b>	<b>1.62 (1.36 - 1.93)*</b>
Chi2 test <i>p</i> value			<b>&lt;0.01</b>
<b>Household material disadvantage (ref. least):</b>			
Medium	<b>0.6 (0.44 - 0.83)*</b>	<b>0.78 (0.65 - 0.95)*</b>	<b>1.41 (1.2 - 1.66)*</b>
Most	<b>0.58 (0.38 - 0.87)*</b>	<b>0.67 (0.53 - 0.86)*</b>	<b>1.32 (1.08 - 1.61)*</b>
<b>Family structure (ref. two-parent):</b>			
Reconstituted	1.1 (0.68 - 1.76)	<b>2.39 (1.85 - 3.08)*</b>	1.25 (0.99 - 1.58)
Single-parent	1.36 (0.97 - 1.9)	<b>1.9 (1.55 - 2.34)*</b>	<b>1.3 (1.1 - 1.53)*</b>
Other	0.91 (0.47 - 1.74)	1.15 (0.77 - 1.69)	1.22 (0.91 - 1.63)
<b>Household overcrowding (ref. not overcrowded)</b>			
Overcrowded	1.04 (0.54 - 1.99)	<b>0.39 (0.22 - 0.69)*</b>	1.03 (0.76 - 1.4)
<b>Experiences of racism (ref. no racism)</b>			
Racism	<b>1.6 (1.19 - 2.13)*</b>	1.03 (0.85 - 1.24)	1.04 (0.89 - 1.22)
<b>Sample size:</b>			<i>n</i> = 4,502

\**p*≤0.05

Table 8-8: Multinomial regression analysis of clustering of health behaviours by perceived parental control, age, gender, and structural inequalities.

	Health behaviour clusters (ref. low substance use, healthy diet):		
	High substance use, physically active	High substance use, physically inactive	Low substance use, unhealthy diet
<b>Age (years):</b>	<b>1.32 (1.05 - 1.67)*</b>	<b>1.61 (1.39 - 1.86)*</b>	0.97 (0.86 - 1.09)
<b>Gender (ref. male):</b>			
Female	<b>0.53 (0.39 - 0.72)*</b>	<b>1.83 (1.53 - 2.18)*</b>	1.06 (0.91 - 1.23)
<b>Parental control (ref. low):</b>			
Medium	<b>0.68 (0.49 - 0.96)*</b>	<b>0.8 (0.65 - 0.98)*</b>	1.04 (0.87 - 1.24)
High	0.81 (0.58 - 1.13)	0.9 (0.73 - 1.11)	<b>1.22 (1.02 - 1.45)*</b>
Chi2 test <i>p</i> value			<b>0.01</b>
<b>Household material disadvantage (ref. least):</b>			
Medium	<b>0.63 (0.46 - 0.86)*</b>	<b>0.81 (0.67 - 0.97)*</b>	<b>1.43 (1.22 - 1.68)*</b>
Most	<b>0.6 (0.4 - 0.9)*</b>	<b>0.7 (0.55 - 0.9)*</b>	<b>1.32 (1.08 - 1.61)*</b>
<b>Family structure (ref. two-parent):</b>			
Reconstituted	1.14 (0.71 - 1.84)	<b>2.52 (1.96 - 3.25)*</b>	<b>1.31 (1.04 - 1.65)*</b>
Single-parent	1.33 (0.95 - 1.86)	<b>1.88 (1.53 - 2.3)*</b>	<b>1.3 (1.1 - 1.53)*</b>
Other	0.92 (0.48 - 1.76)	1.14 (0.77 - 1.69)	1.21 (0.91 - 1.62)
<b>Household overcrowding (ref. not overcrowded)</b>			
Overcrowded	1.02 (0.54 - 1.95)	<b>0.38 (0.21 - 0.67)*</b>	1 (0.73 - 1.35)
<b>Experiences of racism (ref. no racism)</b>			
Racism	<b>1.71 (1.28 - 2.29)*</b>	1.11 (0.92 - 1.34)	1.06 (0.91 - 1.24)
<b>Sample size:</b>			<i>n</i> = 4,503

\**p* ≤ 0.05

Table 8-9: Multinomial regression analysis of clustering of health behaviours by perceived parenting styles, age, gender, and structural inequalities.

	Health behaviour clusters (ref. low substance use, healthy diet):		
	High substance use, physically active	High substance use, physically inactive	Low substance use, unhealthy diet
<b>Age (years):</b>	<b>1.31 (1.04 - 1.66)*</b>	<b>1.57 (1.36 - 1.82)*</b>	0.96 (0.85 - 1.08)
<b>Gender (ref. male):</b>			
Female	<b>0.52 (0.38 - 0.71)*</b>	<b>1.77 (1.48 - 2.12)*</b>	1.06 (0.91 - 1.23)
<b>Parenting style (ref. permissive):</b>			
Neglectful	<b>1.71 (1.22 - 2.42)*</b>	<b>1.84 (1.48 - 2.28)*</b>	<b>1.22 (1.02 - 1.47)*</b>
Authoritative	0.89 (0.53 - 1.5)	0.85 (0.61 - 1.18)	1.04 (0.82 - 1.31)
Authoritarian	1.37 (0.95 - 1.98)	<b>1.52 (1.22 - 1.89)*</b>	<b>1.41 (1.19 - 1.69)*</b>
chi2 test <i>p</i> value			<b>&lt;0.01</b>
<b>Household material disadvantage (ref. least):</b>			
Medium	<b>0.6 (0.44 - 0.83)*</b>	<b>0.78 (0.65 - 0.95)*</b>	<b>1.41 (1.2 - 1.65)*</b>
Most	<b>0.58 (0.39 - 0.87)*</b>	<b>0.68 (0.53 - 0.87)*</b>	<b>1.29 (1.06 - 1.57)*</b>
<b>Family structure (ref. two-parent):</b>			
Reconstituted	1.12 (0.7 - 1.79)	<b>2.43 (1.88 - 3.13)*</b>	<b>1.27 (1.01 - 1.61)*</b>
Single-parent	1.36 (0.97 - 1.91)	<b>1.91 (1.56 - 2.35)*</b>	<b>1.31 (1.11 - 1.55)*</b>
Other	0.9 (0.47 - 1.73)	1.14 (0.77 - 1.68)	1.21 (0.91 - 1.62)
<b>Household overcrowding (ref. not overcrowded)</b>			
Overcrowded	1.04 (0.55 - 1.99)	<b>0.39 (0.22 - 0.69)*</b>	1.02 (0.75 - 1.38)
<b>Experiences of racism (ref. no racism)</b>			
Racism	<b>1.63 (1.22 - 2.18)*</b>	1.06 (0.88 - 1.28)	1.04 (0.89 - 1.22)
<b>Sample size:</b>			<i>n</i> = 4,486

\**p*≤0.05

## 8.5. Key findings

Here I describe my key findings from Chapter 8 where I found that perceived parental care, control, and parenting styles were associated with adolescent health behaviours, and the clustering of adolescent health behaviours (summarised in Table 8-10).

Adolescents who perceived *High* care, and either *Permissive* or *Authoritative* parenting styles were less likely to engage in substance use behaviours or to be overweight, tended to eat more fruit and vegetables, and be more physically active than those who perceived *Authoritarian* or *Neglectful* parenting styles.

Adolescents who perceived *High* parental care, *Medium* parental control, and *Authoritative*, or *Permissive* parenting styles were less likely to engage in substance use behaviours, compared to adolescents who perceived *Low* care, with either *Low* control (*Neglectful* parenting style) or *High* control (*Authoritarian* parenting style). Positive associations between both *Low* and *High* perceived parental control and adolescent substance use behaviours are consistent with similar effects of both perceived *Authoritarian* and *Neglectful* parenting. The effects of perceived parenting on adolescent fruit and vegetable consumption were also fairly consistent with my literature review findings. Adolescents who perceived *High* care, *Low* control, and *Authoritative*, or *Permissive* parenting styles tended to eat more fruit and vegetables, engage in more physical activity, and have healthy body weight, than adolescents who perceived *Low* care, *High* control, *Authoritarian* or *Neglectful* parenting.

Adolescents who perceived lower parental care, and those who perceived *Authoritarian* (low care, high control), or *Neglectful* (low care, low control) parenting styles, were more likely to be in clusters of unhealthy health behaviours. Associations between perceived parental control and clusters of adolescent health behaviours were more ambiguous. Compared to *Low* perceived parental control, *Medium* control was negatively associated with clusters characterised by adolescent substance use; whereas, *High* control was positively associated with membership of the *Low substance use: unhealthy diet* cluster, rather than the *Low substance use: healthy diet* cluster.



Table 8-10: Associations between perceived parenting and adolescent health behaviours.

			Perceived parental care		
			<i>High care:</i>	<i>Medium care:</i>	<i>Low care:</i>
			Reference category	Higher likelihoods of alcohol and illicit drug use Higher likelihood of less than 5-a-day (portions of fruit and vegetables) Higher likelihoods of unhealthy clusters	Higher likelihoods of tobacco, alcohol and illicit drug use Higher likelihood of less than 5-a-day F&V Higher likelihood of <7 hours physical activity per week Higher likelihoods of unhealthy clusters
perceived parental control	<i>Low control:</i>	Reference category	<b><u>Permissive parenting:</u></b>		<b><u>Neglectful parenting:</u></b>
	<i>Medium control:</i>	Lower tobacco, alcohol, and illicit drug use; Lower likelihoods of <i>High substance use: physically inactive</i> and <i>High substance use physically active</i> clusters	Reference category		Higher likelihoods of tobacco, alcohol, and illicit drug use Higher likelihood of 2-4 portions per day (rather than 5+) fruit and vegetable consumption Higher likelihood of <7 hours physical activity per week
	<i>High control:</i>	Lower likelihood of alcohol use Higher likelihood of less than 5-a-day F&V Higher likelihood of <i>Low substance use: unhealthy diet</i> cluster	<b><u>Authoritative parenting:</u></b> Lower likelihood of alcohol use		<b><u>Authoritarian parenting:</u></b> Higher likelihoods of tobacco, alcohol, and illicit drug use Higher likelihood of less than 5-a-day (portions of fruit and vegetables) Higher likelihood of <7 hours physical activity per week

## 9. Ethnic differences in parenting styles and adolescent health behaviours

### 9.1. Introduction

This chapter presents analyses that aim to address objectives D and E of my thesis, to investigate whether ethnic variations in health behaviours among DASH study adolescents were mediated or moderated by perceived parenting styles (Figure 9-1). This follows on from analyses that demonstrated ethnic variations in adolescent health behaviours (Chapter 6) and perceived parenting (Chapter 7), and associations between perceived parenting and adolescent health behaviours (Chapter 8) all of which were largely not explained by structural inequalities.

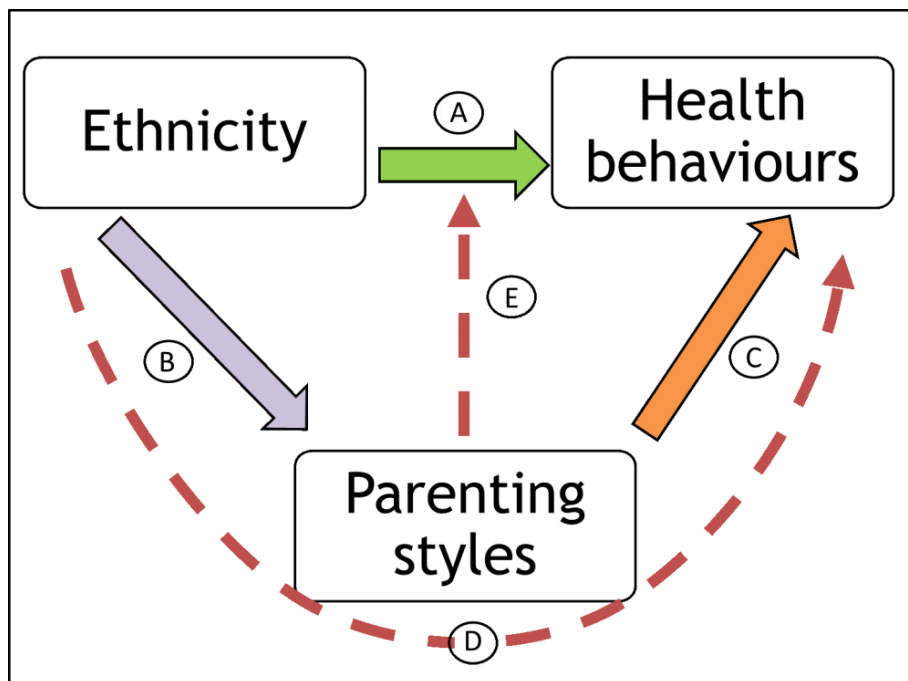


Figure 9-1: Thesis objectives D and E, investigating roles of perceived parenting styles in ethnic variations in adolescent health behaviours

I reviewed previous literature that described how differences in parenting styles were related to ethnic variations in adolescent health behaviours (4.2.4). Based on the previous literature, I expected that differences in perceived parenting styles would explain some ethnic variations in adolescent health behaviours among DASH study adolescents.

Two possible mechanisms of this relationship are: mediation, where ethnic differences in perceived parenting are, in turn, associated with ethnic variations in adolescent health behaviours; and moderation where the strength or direction of ethnic variations

in adolescent health behaviours differs between adolescents perceiving different parenting styles. Two research questions were formulated to focus my analysis on these mechanisms (Box 9-1).

Box 9-1. Objective D and E research questions:

1. Were ethnic variations in adolescent health behaviours, or in the clustering of adolescent health behaviours mediated by perceived parenting?
2. Were ethnic variations in adolescent health behaviours, or in the clustering of adolescent health behaviours moderated by perceived parenting?

## 9.2. Methods

In this analysis I investigate whether ethnic variations in adolescent health behaviours among DASH study participants were mediated or moderated by perceived parenting styles.

Adolescent health behaviour variables were tobacco use, alcohol use, illicit drug use, fruit and vegetables consumption, physical activity, body size, and clusters of health behaviours. Mediator variables were perceived parenting styles. Covariates include age, gender, cultural values (generational status, English language use with family, and religious attendance) and structural inequalities (household material disadvantage, family structure, household overcrowding, and experiences of racism). More information on DASH study variables can be found in chapter 5.

I previously found associations between structural inequalities (household material resources, family structure, household overcrowding, and experiences of racism) and both adolescent health behaviours (Chapter 6) and perceived parenting (Chapter 7). Since experience of these structural inequalities was patterned by ethnicity it is likely that they could confound relationships between perceived parenting and adolescent health behaviours, as well lying on the direct path between ethnicity and health behaviours, and should therefore be considered as intermediate confounders, i.e. confounders of the mediator-outcome relationship that are influenced by the exposure (Richiardi et al., 2013).

A regression of health behaviours, conditional on perceived parenting, adjusted for structural inequalities could underestimate ethnic variations in health behaviours because adjustment for them would remove part of the total effect of ethnicity. On the other hand, as they are confounders of the mediator-outcome relationship, a model which does not adjust for them could over-estimate the association between perceived parenting and health behaviours and lead to underestimation of the direct effect of

ethnicity. Inverse probability weighted marginal structural models, based on the counterfactual framework, are a statistical method used to adjust for intermediate confounding without blocking that part of the effect of the exposure on the outcome that goes via the intermediate confounder (VanderWeele, 2009). Inverse probability weights were calculated here by dividing the probability of the observed parenting style conditional on ethnicity, age, and gender by the probability of the observed parenting style conditional on ethnicity, age, gender, and structural inequalities (household material resources, family structure, household overcrowding, and experiences of racism). Probabilities were estimated in Stata using multinomial logistic regression models.

Inverse probability weighted marginal structural models (VanderWeele, 2009) were used to estimate controlled direct effects of ethnicity and thus address research questions regarding mediation and moderation of ethnic variations in adolescent health behaviours by perceived parenting styles. First, adolescent health behaviours were regressed on ethnicity, age, gender, and interactions between ethnicity and any cultural values found to moderate ethnic variations in health behaviours (Chapter 6), this estimates the total effect of ethnicity on health behaviours (structural inequalities being framed as mediators rather than confounders of the effect of ethnicity on health behaviours). Second, perceived parenting styles were added to regression models with an interaction term between ethnicity and perceived parenting styles, and with the inverse probability weights applied to control for intermediate confounding. This estimates a controlled direct effect of ethnicity (VanderWeele, 2009), i.e. the effect of ethnicity on the outcome when the mediator is fixed to a certain value. The interaction captures how the controlled direct effect can vary depending on which value of the mediator- parenting style- is chosen, and thus addresses the question on moderation. The mean of the inverse probability weights equalled 0.9999944 (a mean more different from 1 could indicate excessive variability in the weights), and differences in structural inequalities by parenting styles were reduced to almost zero after application of inverse probability weights, indicating that the weights were appropriately balancing structural inequalities across parenting styles. Percentages of ethnic variations in health behaviours, including differences moderated by cultural values (or acculturation), that were mediated by perceived parenting styles were calculated by dividing the difference between the unadjusted odds ratio and the controlled direct effect odds ratio estimate for *Permissive* parenting (the reference parenting style) by the unadjusted odds ratio minus 1. Impacts of controlled direct effects for other parenting styles are inferred from the interaction effects. This process was repeated for each adolescent health behaviour except body size because no ethnic variations were found in chapter 6.

## 9.3. Results

### 9.3.1. Ethnic variations in tobacco use and perceived parenting styles

In Chapter 6, I found that significant ethnic variations in adolescent tobacco use were moderated by gender and religious attendance. In this section, I investigate whether those ethnic variations were mediated or moderated by perceived parenting styles. Table 9-1 shows the results of marginal structural models predicting adolescent tobacco use, before and after adjusting for perceived parenting styles, and interactions between perceived parenting styles and ethnicity.

In comparison to White UK adolescents, tobacco use was less likely among Black Caribbean, but an interaction with religious attendance meant this was primarily among Black Caribbean adolescents who regularly attended a place of worship. Mediation by perceived parenting styles explained 11% and 38% of these variations, respectively. The latter interaction with religious attendance lost statistical significance upon adjustment for mediation via parenting. Black Caribbean adolescents were more likely than White UK adolescents to perceive *Authoritarian*, rather than *Permissive* parenting, which was in turn positively associated with tobacco use; this pathway could mediate greater likelihood of tobacco use among those Black Caribbean adolescents who attended a place of worship less frequently. However, among Black Caribbean adolescent who attended a place of worship more often the effect of adjusting for parenting style appears to operate in the opposite direction. This could suggest a moderation of the effects of *Authoritarian* parenting by religiosity which could be explored in further research, e.g. in more religious families perhaps stricter parenting was protective against tobacco use, while in less religious families this style of parenting leads to more tobacco use and accounts for some of the differences in tobacco use between religious and non-religious Black Caribbean adolescents.

There was no evidence that parenting styles explained lower tobacco use among Black African adolescents who attended a place of worship more frequently, however, among less religious Black African adolescents who were more likely to use tobacco than their more religious counterparts, parenting styles suppressed greater tobacco (with the controlled direct effect of ethnicity estimated as 19% larger than the unadjusted OR). Compared to White UK adolescents, Black African adolescents were more likely to perceive *Authoritarian*, than *Permissive* parenting styles that were associated with greater risks of tobacco use. Perceived parenting therefore operated in opposing directions in terms of explaining propensities for adolescent tobacco use among less religious Black Caribbean and Black African adolescents.

Compared to White UK adolescents, Indian adolescents were less likely to use tobacco, and, compared to their male counterparts, Indian females were even less likely to use tobacco. There was a similar pattern for Pakistani/Bangladeshi adolescent except that Pakistani/Bangladeshi males did not differ significantly from White UK adolescents in terms of tobacco use. None of these ethnic variations among Indian or Pakistani/Bangladeshi adolescents were clearly mediated by differences in perceived parenting styles.

Compared to White UK adolescents, Other ethnicity adolescents were less likely to use tobacco, but this pattern was moderated such that the controlled direct effect of being in this ethnic group differed by perceived parenting style. Among adolescents who perceived a *Permissive* parenting style the controlled direct effect on tobacco use was slightly (14%) larger than the total effect, and the direct effect was similar in magnitude among adolescents who perceived *Authoritative* or *Authoritarian* parenting. However, among adolescents who perceived *Neglectful* parenting the lower risk for tobacco use associated with being in this ethnic group was substantially attenuated. Thus, perceived parenting did not explain the lower rates of tobacco use among this group, but the difference would be smaller if all adolescents experienced *Neglectful* parenting.

In summary, these results indicate that only small proportions of variations in adolescent tobacco use, among Black Caribbean, Black African and Other ethnicity, compared to White UK, adolescents were mediated by perceived parenting styles. Some variations in tobacco use among adolescents who attended a place of worship less frequently were mediated by parenting styles, but in opposing directions depending on ethnic group, and this complex interaction between ethnicity, parenting and religiosity may warrant further study. However, in general the majority of ethnic variations in adolescent tobacco use were not explained by parenting styles.

Table 9-1: Marginal structural model predicting tobacco use by ethnicity, age, gender, interactions between ethnicity, gender and religious attendance; before and after adjusting for parenting style and interactions between parenting and ethnicity:

	Current tobacco use (ref: no current use):		
	Unadjusted OR	Adjusted OR	Mediated %
<b>Age (years):</b>	<b>1.58 (1.32 - 1.9)*</b>	<b>1.59 (1.31 - 1.93)*</b>	
<b>Gender (ref. male):</b> Female	<b>2.2 (1.63 - 2.96)*</b>	<b>2.26 (1.66 - 3.08)*</b>	
<b>Religious attendance (ref. Regular):</b>			
Seldom-never	1.12 (0.66 - 1.89)	1.16 (0.65 - 2.08)	
<b>Ethnicity (ref. White UK):</b>			
Black Caribbean	<b>0.22 (0.1 - 0.46)*</b>	<b>0.3 (0.12 - 0.79)*</b>	<b>(11%)</b>
Black African	<b>0.11 (0.05 - 0.24)*</b>	<b>0.14 (0.05 - 0.38)*</b>	(4%)
Indian	<b>0.39 (0.2 - 0.79)*</b>	0.38 (0.13 - 1.09)	(-2%)
Pakistani/Bangladeshi	0.82 (0.47 - 1.42)	0.89 (0.43 - 1.86)	(40%)
Other ethnicity	<b>0.39 (0.21 - 0.71)*</b>	<b>0.3 (0.14 - 0.65)*</b>	<b>(-14%)</b>
<b>Ethnicity x gender</b>			
Black Caribbean; female	1.02 (0.55 - 1.89)	0.89 (0.45 - 1.77)	(622%)
Black African; female	0.96 (0.46 - 2.01)	0.91 (0.43 - 1.9)	(-156%)
Indian; female	<b>0.26 (0.09 - 0.8)*</b>	<b>0.23 (0.07 - 0.71)*</b>	(-5%)
Pakistani/Bangladeshi; female	<b>0.06 (0.01 - 0.27)*</b>	<b>0.08 (0.02 - 0.37)*</b>	(2%)
Other ethnicity; female	0.85 (0.6 - 1.22)	0.8 (0.54 - 1.19)	(-37%)
<b>Ethnicity x religious attendance</b>			
Black Caribbean; Seldom-never	<b>2.35 (1.05 - 5.25)*</b>	1.83 (0.77 - 4.35)	<b>(38%)</b>
Black African; Seldom-never	<b>2.78 (1.23 - 6.27)*</b>	<b>3.12 (1.36 - 7.17)*</b>	<b>(-19%)</b>
Indian; Seldom-never	0.79 (0.27 - 2.25)	0.77 (0.27 - 2.19)	(-7%)
Pakistani/Bangladeshi; Seldom-never	0.6 (0.16 - 2.28)	0.45 (0.12 - 1.71)	(-38%)
Other ethnicity; Seldom-never	1.71 (0.83 - 3.52)	1.67 (0.74 - 3.76)	(5%)
<b>Perceived parenting style (ref. Permissive)</b>			
Neglectful		1.27 (0.8 - 2.01)	
Authoritative		1.76 (0.88 - 3.54)	
Authoritarian		<b>1.89 (1.14 - 3.14)*</b>	
<b>Perceived parenting style x ethnicity</b>			
Black Caribbean; Neglectful		0.73 (0.3 - 1.79)	
Black African; Neglectful		0.53 (0.16 - 1.73)	
Indian; Neglectful		1.35 (0.41 - 4.41)	
Pakistani/Bangladeshi; Neglectful		1.85 (0.96 - 3.57)	
Other ethnicity; Neglectful		<b>1.97 (1.13 - 3.42)*</b>	
Black Caribbean; Authoritative		0.8 (0.25 - 2.53)	
Black African; Authoritative		0.42 (0.1 - 1.77)	
Indian; Authoritative		0.49 (0.07 - 3.4)	
Pakistani/Bangladeshi; Authoritative		0.62 (0.18 - 2.11)	
Other ethnicity; Authoritative		0.63 (0.23 - 1.74)	
Black Caribbean; Authoritarian		0.79 (0.35 - 1.79)	
Black African; Authoritarian		0.56 (0.22 - 1.38)	
Indian; Authoritarian		1.35 (0.45 - 4.09)	
Pakistani/Bangladeshi; Authoritarian		0.55 (0.23 - 1.31)	
Other ethnicity; Authoritarian		1.23 (0.7 - 2.18)	
<b>Sample size:</b>	<i>n</i> = 4,673	<i>n</i> = 4,444	

\**p* ≤ 0.05

### 9.3.2. Ethnic variations in alcohol use and perceived parenting styles

In Chapter 6, I found there to have been significant ethnic variations in adolescent alcohol use. In this section I investigate whether those ethnic variations were mediated or and moderated by perceived parenting styles. Table 9-2 shows the results of marginal structural models predicting adolescent alcohol use, before and after adjusting for perceived parenting styles, and interactions between perceived parenting styles and ethnicity.

The results of these models show that, although adolescent alcohol use was significantly associated with perceived parenting styles, there was no evidence that ethnic differences in parenting styles mediated any ethnic variations in adolescent alcohol use.

Compared to White UK adolescents, Indian and Pakistani/ Bangladeshi adolescents were less likely to use alcohol, and this effect was moderated such that the controlled direct effect of being in these ethnic group differed by perceived parenting style. Compared to those who perceived a *Permissive* parenting style, Indian adolescents who perceived an *Authoritative* parenting style, and Pakistani/ Bangladeshi adolescents who perceived an *Authoritarian* parenting style were even less likely to use alcohol.



Table 9-2: Marginal structural model predicting alcohol use by ethnicity, and interactions between perceived parenting style and ethnicity, age, and gender.

	Current alcohol use (ref. no current use):		
	Unadjusted OR	Adjusted OR	Mediated (%)
<b>Age (years):</b>	<b>1.62 (1.45 - 1.82)*</b>	<b>1.59 (1.41 - 1.78)*</b>	
<b>Gender (ref. male):</b>			
Female	<b>1.58 (1.36 - 1.85)*</b>	<b>1.58 (1.35 - 1.85)*</b>	
<b>Ethnicity (ref. White UK):</b>			
Black Caribbean	<b>0.39 (0.31 - 0.48)*</b>	<b>0.37 (0.26 - 0.54)*</b>	(-2%)
Black African	<b>0.13 (0.1 - 0.18)*</b>	<b>0.13 (0.09 - 0.19)*</b>	(-1%)
Indian	<b>0.12 (0.08 - 0.18)*</b>	<b>0.14 (0.09 - 0.21)*</b>	(2%)
Pakistani/Bangladeshi	<b>0.01 (0 - 0.02)*</b>	<b>0 (0 - 0.03)*</b>	(0%)
Other ethnicity	<b>0.31 (0.26 - 0.39)*</b>	<b>0.32 (0.24 - 0.42)*</b>	(0%)
<b>Perceived parenting style (ref. Permissive)</b>			
Neglectful		<b>1.58 (1.12 - 2.24)*</b>	
Authoritative		0.99 (0.53 - 1.85)	
Authoritarian		1.19 (0.73 - 1.95)	
<b>Perceived parenting style x ethnicity</b>			
Black Caribbean; Neglectful		0.79 (0.41 - 1.51)	
Black African; Neglectful		0.96 (0.52 - 1.77)	
Indian; Neglectful		0.94 (0.52 - 1.71)	
Pakistani/Bangladeshi; Neglectful		6.88 (0.5 - 94.24)	
Other ethnicity; Neglectful		0.99 (0.64 - 1.52)	
Black Caribbean; Authoritative		0.84 (0.37 - 1.91)	
Black African; Authoritative		0.73 (0.33 - 1.59)	
Indian; Authoritative		<b>0.13 (0.03 - 0.62)*</b>	
Pakistani/Bangladeshi; Authoritative		2.71 (0.16 - 46.67)	
Other ethnicity; Authoritative		0.58 (0.26 - 1.27)	
Black Caribbean; Authoritarian		1.34 (0.72 - 2.5)	
Black African; Authoritarian		1.35 (0.72 - 2.54)	
Indian; Authoritarian		1.22 (0.66 - 2.25)	
Pakistani/Bangladeshi; Authoritarian		<b>0 (0 - 0)*</b>	
Other ethnicity; Authoritarian		1.07 (0.58 - 1.98)	
<b>Sample size:</b>	<i>n</i> = 4,717	<i>n</i> = 4,477	

\**p*≤0.05

### 9.3.3. Ethnic variations in illicit drug use and perceived parenting styles

In Chapter 6, I found significant ethnic variations in adolescent illicit drug use moderated by religious attendance. In this section I investigate mediation and moderation of these ethnic variations by perceived parenting styles. Table 9-3 shows the results marginal structural models predicting adolescent illicit drug use, before and after adjusting for perceived parenting styles, and interactions between perceived parenting styles and ethnicity.

In comparison to White UK adolescents, illicit drug use was significantly less likely among Black Caribbean adolescents. Mediation by perceived parenting appears to explain 28% of this ethnic variation, with the controlled direct effect of Black Caribbean ethnicity no longer statistically significant. Black Caribbean adolescents were more likely to perceive *Authoritative* or *Authoritarian* parenting styles that were in turn associated with greater risks of adolescent illicit drug use. However, the effect of adjusting for perceived parenting appears to operate in the opposite direction, explaining rather than suppressing the ethnic variation. This could perhaps indicate moderation of the effects of perceived *Authoritative* or *Authoritarian* parenting by other variables which could be explored in further research, for example perhaps in more religious Black Caribbean families, *Authoritative* or *Authoritarian* parenting styles were protective against adolescent illicit drug use.

In comparison to White UK adolescents, illicit drug use was also significantly less likely among Black African adolescents, and a significant interaction with religious attendance meant that their lower likelihood of illicit drug use was concentrated among more religious Black African adolescents. Mediation by perceived parenting did not explain any ethnic variation among more religious Black African adolescents. However, among less religious Black African adolescents, an otherwise even greater likelihood of illicit drug use was suppressed (with the adjusted OR increasing by 19%). Black African adolescents were more likely to perceive *Authoritative* or *Authoritarian* parenting styles that were, in turn, associated with greater risks of adolescent illicit drug use. However, among less religious Black African adolescents the effect of adjusting for perceived parenting style appears to operate in the opposite direction, suppressing rather than explaining the effect as would expected. This could suggest moderation of the effects of *Authoritative* or *Authoritarian* parenting by religiosity which could be explored in further research, for example, perhaps in more religious Black African families *Authoritative* or *Authoritarian* styles of parenting had no effect, whereas in less religious families these Higher control parenting styles were protective against adolescent illicit drug use.

While illicit drug use was significantly less likely among Indian, and Pakistani/Bangladeshi adolescents, compared to White UK adolescents, there was no evidence of mediation by perceived parenting styles.

In comparison to White UK adolescents, Other ethnicity adolescents were less likely to have used illicit drugs than White UK adolescent. Mediation by perceived parenting styles suppressed an otherwise even lower likelihood of illicit drug use, with adjusted ORs magnified by 18%. Other ethnicity adolescents were more likely to perceive *Authoritative* or *Authoritarian* parenting styles that were, in turn, associated with greater risks of adolescent illicit drug use. Therefore, mediation by parenting styles appears to suppress some ethnic variation among Other ethnicity adolescents.

In summary, these results indicate that only small proportions of variations in adolescent illicit drug use, among Black Caribbean, Black African and Other ethnicity, compared to White UK, adolescents were mediated by perceived parenting styles. Some variation in illicit drug use among Black African adolescents who attended a place of worship more frequently were mediated by parenting styles but in the opposite direction than would be expected. The interaction between ethnicity, parenting and religiosity may be an area worth further investigation. However, there is little evidence that ethnic variations in illicit drug use were strongly mediated by perceived parenting styles.

Table 9-3: Marginal structural model predicting illicit drug use by interactions between religious attendance and ethnicity, interactions between perceived parenting style and ethnicity, age, and gender.

	Lifetime illicit drug use		
	Unadjusted OR	Adjusted OR	Mediated (%)
<b>Age (years):</b>	<b>1.58 (1.38 - 1.81)*</b>	<b>1.57 (1.36 - 1.81)*</b>	
<b>Gender (ref. male):</b>			
Female	<b>1.22 (1.02 - 1.45)*</b>	1.17 (0.98 - 1.41)	
<b>Religious attendance (ref. Regular):</b>			
Seldom-never	1.01 (0.62 - 1.64)	1.02 (0.59 - 1.77)	
<b>Ethnicity (ref. White UK):</b>			
Black Caribbean	<b>0.53 (0.32 - 0.9)*</b>	0.66 (0.35 - 1.26)	(28%)
Black African	<b>0.25 (0.15 - 0.42)*</b>	<b>0.23 (0.11 - 0.49)*</b>	(-3%)
Indian	<b>0.2 (0.11 - 0.36)*</b>	<b>0.23 (0.11 - 0.49)*</b>	(4%)
Pakistani/ Bangladeshi	<b>0.34 (0.19 - 0.6)*</b>	<b>0.3 (0.15 - 0.61)*</b>	(-5%)
Other ethnicity	<b>0.44 (0.26 - 0.76)*</b>	<b>0.34 (0.18 - 0.66)*</b>	(-18%)
<b>Ethnicity x religious attendance</b>			
Black Caribbean; Seldom-never	1.34 (0.7 - 2.55)	1.11 (0.57 - 2.17)	(68%)
Black African; Seldom-never	<b>1.86 (1 - 3.47)*</b>	<b>2.03 (1.01 - 4.06)*</b>	(-19%)
Indian; Seldom-never	1.03 (0.59 - 1.79)	1.13 (0.62 - 2.05)	(-395%)
Pakistani/Bangladeshi; Seldom-never	0.77 (0.32 - 1.84)	0.7 (0.28 - 1.78)	(-32%)
Other ethnicity; Seldom-never	1.53 (0.85 - 2.75)	1.57 (0.82 - 3)	(-9%)
<b>Perceived parenting style (ref. Permissive)</b>			
Neglectful		<b>1.43 (1.02 - 2.01)*</b>	
Authoritative		1.72 (0.97 - 3.07)	
Authoritarian		<b>1.59 (1.07 - 2.38)*</b>	
<b>Perceived parenting style x ethnicity</b>			
Black Caribbean; Neglectful		0.89 (0.48 - 1.65)	
Black African; Neglectful		1.22 (0.72 - 2.08)	
Indian; Neglectful		0.74 (0.24 - 2.26)	
Pakistani/Bangladeshi; Neglectful		1.58 (0.86 - 2.91)	
Other ethnicity; Neglectful		<b>1.72 (1.09 - 2.7)*</b>	
Black Caribbean; Authoritative		0.46 (0.2 - 1.06)	
Black African; Authoritative		0.75 (0.29 - 1.91)	
Indian; Authoritative		0.4 (0.1 - 1.59)	
Pakistani/Bangladeshi; Authoritative		0.94 (0.34 - 2.62)	
Other ethnicity; Authoritative		0.52 (0.24 - 1.09)	
Black Caribbean; Authoritarian		0.82 (0.43 - 1.56)	
Black African; Authoritarian		0.95 (0.47 - 1.93)	
Indian; Authoritarian		0.91 (0.46 - 1.8)	
Pakistani/Bangladeshi; Authoritarian		0.98 (0.44 - 2.18)	
Other ethnicity; Authoritarian		1.33 (0.8 - 2.22)	
<b>Sample size:</b>	<i>n</i> = 4,669	<i>n</i> = 4,445	

\**p* ≤ 0.05

#### 9.3.4. Ethnic variations in fruit and vegetable consumption and perceived parenting styles

In Chapter 6, I found significant ethnic variations in fruit and vegetable consumption among DASH study adolescents that were moderated by English language use. In this chapter I investigate whether these ethnic variations were mediated or moderated by perceived parenting styles. Table 9-4 shows the results of marginal structural models predicting adolescent fruit and vegetable consumption, before and after adjusting for perceived parenting styles, and interactions between perceived parenting styles and ethnicity.

In comparison to White UK adolescents, Black Caribbean, Black African, and Pakistani/ Bangladeshi adolescents were more likely to eat  $<2$  portions, rather than at  $\geq 5$  portions, of fruit and vegetables per day, than were White UK adolescents. Adjustment for perceived parenting styles, and their interactions with ethnicity, explained 35%, 48%, and 45% of these ethnic variations, respectively. Pakistani/ Bangladeshi adolescents who spoke less English with family were more likely than their counterparts who spoke more English with family to eat 2-4 portions, or  $<2$  portions, rather than  $\geq 5$  portions of fruit and vegetables per day; that moderated ethnic variation was not explained by adjustment for perceived parenting styles, and their interactions with ethnicity.

Black Caribbean, Black African, and Pakistani/ Bangladeshi adolescents were more likely than White UK adolescents to perceive *Authoritative* parenting. This parenting style was in turn associated with lower daily fruit and vegetable consumption: 2-4 portions (borderline significant;  $p=0.06$ ) and  $<2$  portions (not significant;  $p=0.37$ ). Therefore, this pathway could have mediated some of the greater likelihood of eating  $<2$  portions, rather than  $\geq 5$  portions, of fruit and vegetables among Black Caribbean, Black African, and Pakistani/ Bangladeshi adolescents.

Furthermore, results of the marginal structural model suggest that some ethnic variations in fruit and vegetable consumption were moderated by parenting styles. Compared to those who perceived *Permissive* parenting, ethnic minority adolescents who perceived *Neglectful* or *Authoritarian* parenting were less likely to eat  $\geq 5$  portions of fruit and vegetables per day, though not all of these differences were clear at the 95% confidence level.

In summary, these results suggest that considerable proportions of the ethnic variations in fruit and vegetable consumption among Black Caribbean, Black African adolescents could be mediated by perceived *Authoritative* parenting, or moderated by *Neglectful* or *Authoritarian* parenting.

Table 9-4: Marginal structural model predicting fruit and vegetable consumption by interactions between English language use and ethnicity, interactions between perceived parenting style and ethnicity, age, and gender.

	2-4 portions FV/day (ref:≥5 portions/ day):			<2 portions FV/day (ref:≥5 portions/ day):		
	Unadjusted OR	Adjusted OR	Mediated (%)	Unadjusted OR	Adjusted OR	Mediated (%)
<b>Age (years):</b>	1.03 (0.91 - 1.16)	1.03 (0.91 - 1.16)		1.02 (0.91 - 1.14)	0.99 (0.88 - 1.11)	
<b>Gender (ref. male):</b>						
Female	<b>0.84 (0.72 - 0.98)*</b>	<b>0.82 (0.7 - 0.95)*</b>		0.95 (0.8 - 1.11)	0.9 (0.78 - 1.05)	
<b>English language use (ref. Mostly-all):</b>						
Some/little-no	0.52 (0.17 - 1.63)	0.51 (0.16 - 1.63)		0.27 (0.06 - 1.17)	0.27 (0.06 - 1.16)	
<b>Ethnicity (ref. White UK):</b>						
Black Caribbean	1.22 (0.86 - 1.73)	0.94 (0.64 - 1.38)	(126%)	<b>2.13 (1.48 - 3.08)*</b>	<b>1.7 (1.12 - 2.58)*</b>	(38%)
Black African	1.41 (0.95 - 2.09)	1.22 (0.72 - 2.06)	(47%)	<b>2.66 (1.71 - 4.14)*</b>	<b>1.91 (1.1 - 3.32)*</b>	(45%)
Indian	1.23 (0.81 - 1.86)	0.77 (0.44 - 1.34)	(199%)	1.01 (0.61 - 1.66)	0.67 (0.35 - 1.31)	(4919%)
Pakistani/ Bangladeshi	1.05 (0.61 - 1.8)	0.88 (0.45 - 1.72)	(335%)	<b>1.86 (1.12 - 3.08)*</b>	1.45 (0.82 - 2.54)	(48%)
Other ethnicity	1.1 (0.82 - 1.47)	1 (0.72 - 1.38)	(102%)	1.34 (0.98 - 1.85)	1.02 (0.68 - 1.53)	(94%)
<b>Ethnicity x English language use</b>						
Black Caribbean; Some/little-no	1.06 (0.29 - 3.88)	1.03 (0.27 - 3.89)	(45%)	3.7 (0.79 - 17.35)	3.93 (0.83 - 18.69)	(-9%)
Black African; Some/little-no	2 (0.61 - 6.51)	1.94 (0.57 - 6.63)	(6%)	2.86 (0.64 - 12.72)	2.84 (0.65 - 12.46)	(1%)
Indian; Some/little-no	1.68 (0.47 - 6.01)	1.8 (0.48 - 6.8)	(-17%)	2.85 (0.6 - 13.55)	2.91 (0.61 - 13.84)	(-3%)
Pakistani/B' deshi; Some/little-no	<b>3.65 (1.02 - 13.09)*</b>	3.63 (0.97 - 13.65)	(0%)	<b>4.74 (0.97 - 23.14)*</b>	4.44 (0.91 - 21.54)	(8%)
Other ethnicity; Some/little-no	1.75 (0.54 - 5.65)	1.98 (0.59 - 6.64)	(-29%)	2.47 (0.52 - 11.63)	2.76 (0.6 - 12.75)	(-20%)
<b>Perceived parenting style (ref. Permissive)</b>						
Neglectful		0.84 (0.59 - 1.19)			0.73 (0.52 - 1.02)	
Authoritative		1.92 (0.97 - 3.77)			1.38 (0.67 - 2.83)	
Authoritarian		0.81 (0.49 - 1.35)			1.06 (0.61 - 1.83)	
<b>Perceived parenting style x ethnicity</b>						
Black Caribbean; Neglectful		1.75 (0.97 - 3.15)			1.54 (0.86 - 2.74)	
Black African; Neglectful		1.29 (0.77 - 2.17)			<b>2.11 (1.14 - 3.91)*</b>	
Indian; Neglectful		1.62 (0.91 - 2.88)			<b>1.98 (1.02 - 3.83)*</b>	
Pakistani/Bangladeshi; Neglectful		1.11 (0.6 - 2.06)			1.41 (0.77 - 2.59)	
Other ethnicity; Neglectful		1.49 (0.89 - 2.48)			<b>2.24 (1.34 - 3.72)*</b>	
Black Caribbean; Authoritative		0.74 (0.31 - 1.75)			0.83 (0.29 - 2.36)	
Black African; Authoritative		0.64 (0.28 - 1.49)			1.1 (0.44 - 2.76)	
Indian; Authoritative		0.78 (0.24 - 2.52)			1.21 (0.42 - 3.51)	
Pakistani/Bangladeshi; Authoritative		0.87 (0.33 - 2.27)			0.92 (0.28 - 3)	
Other ethnicity; Authoritative		<b>0.38 (0.15 - 0.98)*</b>			0.58 (0.26 - 1.3)	
Black Caribbean; Authoritarian		1.64 (0.71 - 3.8)			1.67 (0.83 - 3.37)	
Black African; Authoritarian		1.61 (0.72 - 3.61)			1.59 (0.68 - 3.71)	
Indian; Authoritarian		<b>3.62 (1.71 - 7.65)*</b>			2.3 (0.93 - 5.67)	
Pakistani/Bangladeshi; Authoritarian		1.61 (0.73 - 3.55)			1.72 (0.85 - 3.5)	
Other ethnicity; Authoritarian		1.13 (0.6 - 2.15)			1.29 (0.65 - 2.57)	
<b>Sample size:</b>				n = 4,611	n = 4,391	

\*p≤0.05

### 9.3.5. Ethnic variations in physical activity and perceived parenting styles

In Chapter 6, I found that Black Caribbean adolescent were less likely than White UK adolescents to engage in less than 7 hours of physical activity per week. Table 9-5 shows the results of marginal structural models predicting adolescent physical activity, before and after adjusting for perceived parenting styles, and interactions between perceived parenting styles and ethnicity. These results provide no evidence that perceived parenting styles mediated or moderated that ethnic variation in adolescent physical activity.

Table 9-5: Marginal structural model predicting physical activity by ethnicity, and interactions between perceived parenting style and ethnicity, age, and gender.

	7-14 hours PA/week (ref:≥14 hours/day):			<7 hours PA/week (ref:≥14 hours/day):		
	Unadjusted OR	Adjusted OR	Mediated (%)	Unadjusted OR	Adjusted OR	Mediated (%)
<b>Age (years):</b>	1.14 (0.92 - 1.41)	1.09 (0.87 - 1.36)		1.18 (0.97 - 1.44)	1.12 (0.89 - 1.4)	
<b>Gender (ref. male):</b>						
Female	<b>1.58 (1.26 - 1.99)*</b>	<b>1.44 (1.12 - 1.86)*</b>		<b>4.6 (3.52 - 6.01)*</b>	<b>4.05 (3.01 - 5.45)*</b>	
<b>Ethnicity (ref. White UK):</b>						
Black Caribbean	0.75 (0.46 - 1.24)	0.68 (0.36 - 1.31)	(-28%)	0.68 (0.42 - 1.09)	0.7 (0.35 - 1.39)	(8%)
Black African	0.88 (0.57 - 1.37)	0.72 (0.42 - 1.23)	(-140%)	0.78 (0.52 - 1.17)	0.64 (0.39 - 1.04)	(-67%)
Indian	0.87 (0.54 - 1.41)	1.65 (0.81 - 3.37)	(604%)	1.11 (0.67 - 1.84)	1.8 (0.8 - 4.03)	(-631%)
Pakistani/ Bangladeshi	1.08 (0.64 - 1.83)	1 (0.5 - 2.03)	(97%)	1.02 (0.68 - 1.53)	0.88 (0.54 - 1.44)	(673%)
Other ethnicity	0.92 (0.62 - 1.38)	0.75 (0.45 - 1.23)	(-230%)	0.79 (0.56 - 1.12)	0.66 (0.42 - 1.05)	(-63%)
<b>Perceived parenting style (ref. Permissive)</b>						
Neglectful		1.1 (0.47 - 2.57)			1.17 (0.63 - 2.18)	
Authoritative		0.58 (0.19 - 1.81)			0.8 (0.28 - 2.29)	
Authoritarian		0.88 (0.32 - 2.4)			1.04 (0.44 - 2.43)	
<b>Perceived parenting style x ethnicity</b>						
Black Caribbean; Neglectful		1 (0.35 - 2.84)			0.91 (0.4 - 2.08)	
Black African; Neglectful		1.52 (0.45 - 5.12)			1.71 (0.66 - 4.4)	
Indian; Neglectful		0.94 (0.19 - 4.62)			1.45 (0.31 - 6.7)	
Pakistani/Bangladeshi; Neglectful		0.66 (0.19 - 2.35)			1 (0.32 - 3.1)	
Other ethnicity; Neglectful		1.48 (0.47 - 4.67)			1.61 (0.71 - 3.64)	
Black Caribbean; Authoritative		1.19 (0.26 - 5.49)			0.66 (0.15 - 2.92)	
Black African; Authoritative		1.87 (0.34 - 10.21)			1.32 (0.3 - 5.72)	
Indian; Authoritative		0.68 (0.17 - 2.69)			0.39 (0.1 - 1.58)	
Pakistani/Bangladeshi; Authoritative		3.49 (0.4 - 30.39)			1.97 (0.24 - 16.01)	
Other ethnicity; Authoritative		1.58 (0.43 - 5.77)			1.04 (0.34 - 3.18)	
Black Caribbean; Authoritarian		1.15 (0.28 - 4.69)			1.01 (0.36 - 2.86)	
Black African; Authoritarian		1.74 (0.47 - 6.46)			1.67 (0.6 - 4.64)	
Indian; Authoritarian		<b>0.2 (0.07 - 0.62)*</b>			0.45 (0.14 - 1.45)	
Pakistani/Bangladeshi; Authoritarian		1.45 (0.41 - 5.15)			1.95 (0.63 - 6.07)	
Other ethnicity; Authoritarian		1.87 (0.57 - 6.07)			1.66 (0.6 - 4.58)	
<b>Sample size:</b>				<b>n = 4,655</b>	<b>n = 4,402</b>	

\*p<0.05

### 9.3.6. Ethnic variations in the clustering of health behaviours and perceived parenting styles

In Chapter 6, I found that there were significant ethnic variations in the clustering of adolescent health behaviours which were moderated by English language use with family. In this chapter I investigate whether those ethnic variations were mediated or moderated by perceived parenting styles. Table 9-6 shows the results of marginal structural models predicting clustering of adolescent health behaviours, before and after adjusting for perceived parenting styles, and interactions between parenting and ethnicity.

Compared to White UK adolescents, Black Caribbean, Black African, and Pakistani/ Bangladeshi adolescents were more likely to be in the *Low substance use: unhealthy diet* cluster, rather than the *Low substance use: healthy diet* cluster; also, a significant interaction meant that Other ethnicity adolescents who spoke less English language with family were less likely than those who spoke more English to be members of that cluster of health behaviours. While adjustment for perceived parenting styles only explained 7% of the greater likelihood of membership of the *Low substance use: unhealthy diet* cluster among Black Caribbean adolescents, it explained 52% and 32% of the greater likelihood of membership in this cluster among Black African and Pakistani/ Bangladeshi adolescents, respectively, and 22% of the lower likelihood among Other ethnicity adolescents who spoke less English language with their family.

Black African, and Pakistani/ Bangladeshi adolescents were more likely to perceive *Authoritarian* parenting that was associated with membership in the *Low substance use: unhealthy diet* cluster, although the latter association was not statistically significant. Furthermore, although *Neglectful* parenting was not significantly more likely among Black African, compared to White UK adolescents a significant interaction meant that compared to White UK adolescents who perceived *Neglectful* parenting, Black African adolescents who perceived *Neglectful* parenting were significantly more likely to be members in the *Low substance use: unhealthy diet* cluster. Therefore, greater likelihood of membership in the *Low substance use: unhealthy diet* cluster could be mediated via more perceived *Authoritarian* parenting or more vulnerability to *Neglectful* parenting among Black African adolescents, and via more perceived *Authoritarian* parenting among Pakistani/ Bangladeshi adolescents. Other ethnicity adolescents who spoke less English with family were more likely to perceive *Neglectful* parenting that, because of a significant interaction was associated with greater likelihood of membership in the *Low substance use: unhealthy diet* cluster among these adolescents. Furthermore, Other ethnicity adolescents were more likely than White UK



adolescent to perceive *Authoritarian* parenting that was associated with cluster membership. On the other hand, perceived *Authoritative* parenting was more likely among Other ethnicity adolescents and was negatively associated with cluster membership, although the later association was not statistically significant. Therefore, the fact that a proportion of the lower likelihood of membership in the *Low substance use: unhealthy diet* cluster among Other ethnicity adolescents, who spoke less English with family, is explained by perceived parenting styles is counterintuitive. This may indicate that the effects of perceived parenting styles on cluster membership are moderated by English language use with family, a question that could be investigated by further research.

In comparison to White UK adolescents, membership in the *High substance use: physically inactive* cluster, rather than the *Low substance use: healthy diet* cluster was less likely among all ethnic minority groups. Mediation by perceived parenting styles suppressed an otherwise even lower likelihood of cluster membership among Other ethnicity adolescents (OR was magnified by 65% on adjustment). Other ethnicity adolescents were more likely to perceive *Authoritative*, and *Authoritarian*, rather than *Permissive*, parenting styles, which were positively associated with cluster membership, although statistically significant only for perceived *Authoritarian* parenting. Therefore, membership of the *High substance use: physically inactive* cluster could be mediated via perceived *Authoritative*, or *Authoritarian* parenting styles, but since suppression rather than explanation was observed this effect is likely masked by some other, protective factors. Parenting styles did not mediate variations in membership of this cluster among the other ethnic groups.

Table 9-6: Marginal structural model predicting clusters of health behaviours by interactions between English use with family and ethnicity, and interactions between perceived parenting style and ethnicity, age, and gender.

	High substance use, physically active <sup>a</sup>			High substance use, physically inactive <sup>a</sup>			Low substance use, unhealthy diet <sup>a</sup>		
	Unadjusted OR	Adjusted OR	Mediated (%)	Unadjusted OR	Adjusted OR	Mediated (%)	Unadjusted OR	Adjusted OR	Mediated (%)
Age (years):	1.4 (1.13 - 1.74)*	1.38 (1.09 - 1.74)*		1.69 (1.43 - 2.01)*	1.66 (1.38 - 1.98)*		0.97 (0.87 - 1.08)	0.94 (0.84 - 1.05)	
Gender (ref: Male):									
Female	0.54 (0.36 - 0.8)*	0.53 (0.35 - 0.79)*		1.79 (1.51 - 2.13)*	1.76 (1.45 - 2.13)*		1 (0.85 - 1.17)	0.98 (0.84 - 1.14)	
Ethnicity (ref: White UK):									
Black Caribbean	0.75 (0.49 - 1.15)	1.03 (0.55 - 1.93)	(113%)	0.56 (0.42 - 0.73)*	0.56 (0.36 - 0.87)*	(1%)	1.56 (1.2 - 2.02)*	1.52 (1.1 - 2.11)*	(7%)
Black African	0.34 (0.19 - 0.62)*	0.33 (0.1 - 1.14)	(-2%)	0.24 (0.16 - 0.37)*	0.2 (0.11 - 0.38)*	(-5%)	2 (1.52 - 2.62)*	1.48 (1.02 - 2.15)*	(52%)
Indian	0.18 (0.08 - 0.41)*	0.18 (0.07 - 0.48)*	(0%)	0.16 (0.09 - 0.26)*	0.15 (0.07 - 0.35)*	(0%)	0.84 (0.58 - 1.2)	0.66 (0.41 - 1.07)	(-108%)
Pakistani/ Bangladeshi	1.03 (0.59 - 1.82)	1.45 (0.66 - 3.2)	(-1289%)	0.14 (0.06 - 0.36)*	0.08 (0.02 - 0.35)*	(-8%)	1.77 (1.26 - 2.49)*	1.52 (1.03 - 2.25)*	(32%)
Other ethnicity	1.1 (0.76 - 1.61)	0.88 (0.48 - 1.6)	(216%)	0.67 (0.53 - 0.85)*	0.46 (0.33 - 0.65)*	(-65%)	1.08 (0.86 - 1.36)	0.91 (0.67 - 1.24)	(212%)
Ethnicity x English language use <sup>c</sup>									
Black Caribbean; Some/little-no	1.34 (0.45 - 4)	1.66 (0.5 - 5.55)	(-94%)	1.05 (0.57 - 1.92)	1.27 (0.67 - 2.38)	(-477%)	1.29 (0.71 - 2.34)	1.46 (0.76 - 2.79)	(-60%)
Black African; Some/little-no	0.86 (0.27 - 2.75)	0.98 (0.29 - 3.27)	(86%)	0.59 (0.3 - 1.16)	0.5 (0.23 - 1.06)	(-22%)	0.82 (0.58 - 1.17)	0.85 (0.58 - 1.24)	(13%)
Indian; Some/little-no	2.32 (0.81 - 6.62)	2.79 (1.02 - 7.67)*	(-36%)	0.67 (0.29 - 1.52)	0.76 (0.35 - 1.67)	(27%)	0.94 (0.58 - 1.52)	0.99 (0.59 - 1.65)	(80%)
Pakistani/ Bangladeshi; Some/little-no	0.37 (0.16 - 0.88)*	0.38 (0.17 - 0.88)*	(1%)	0.73 (0.21 - 2.58)	0.66 (0.18 - 2.36)	(-26%)	0.82 (0.54 - 1.23)	0.81 (0.52 - 1.26)	(-4%)
Other ethnicity; Some/little-no	0.4 (0.21 - 0.75)*	0.42 (0.22 - 0.78)*	(3%)	0.25 (0.16 - 0.38)*	0.28 (0.18 - 0.45)*	(5%)	0.71 (0.54 - 0.95)*	0.78 (0.57 - 1.05)	(22%)
Perceived parenting style (ref. Permissive)									
Neglectful		1.62 (0.89 - 2.95)			1.28 (0.79 - 2.07)			0.81 (0.56 - 1.17)	
Authoritative		2.15 (0.76 - 6.1)			1.27 (0.7 - 2.32)			0.81 (0.33 - 1.96)	
Authoritarian		1.76 (0.66 - 4.67)			1.89 (1.16 - 3.09)*			1.37 (0.77 - 2.45)	
Perceived parenting style x ethnicity									
Black Caribbean; Neglectful		0.63 (0.23 - 1.74)			0.99 (0.46 - 2.13)			1.07 (0.61 - 1.88)	
Black African; Neglectful		1.42 (0.28 - 7.17)			1.47 (0.74 - 2.92)			1.95 (1.1 - 3.46)*	
Indian; Neglectful		0.85 (0.2 - 3.53)			0.77 (0.18 - 3.36)			1.66 (0.89 - 3.09)	
Pakistani/Bangladeshi; Neglectful		0.5 (0.17 - 1.5)			5.89 (1.6 - 21.72)*			1.21 (0.68 - 2.17)	
Other ethnicity; Neglectful		1.53 (0.72 - 3.28)			2.16 (1.17 - 3.98)*			1.97 (1.14 - 3.43)*	
Black Caribbean; Authoritative		0.11 (0.01 - 1.27)			0.75 (0.31 - 1.83)			1.03 (0.35 - 3.06)	
Black African; Authoritative		0.26 (0.02 - 3.02)			1.33 (0.47 - 3.78)			1.8 (0.66 - 4.94)	
Indian; Authoritative		0.62 (0.05 - 8)			0.45 (0.06 - 3.21)			1.71 (0.5 - 5.84)	
Pakistani/Bangladeshi; Authoritative		0.26 (0.05 - 1.53)			3.23 (0.68 - 15.41)			1.33 (0.43 - 4.1)	
Other ethnicity; Authoritative		0.58 (0.15 - 2.28)			0.82 (0.34 - 1.96)			1.03 (0.38 - 2.79)	
Black Caribbean; Authoritarian		0.45 (0.11 - 1.83)			0.88 (0.43 - 1.79)			0.98 (0.49 - 1.94)	
Black African; Authoritarian		0.85 (0.18 - 3.97)			0.98 (0.41 - 2.34)			1.17 (0.57 - 2.39)	
Indian; Authoritarian		0.74 (0.16 - 3.56)			1.06 (0.32 - 3.51)			1.1 (0.5 - 2.45)	
Pakistani/Bangladeshi; Authoritarian		0.43 (0.1 - 1.85)			0.64 (0.16 - 2.55)			1.07 (0.52 - 2.19)	
Other ethnicity; Authoritarian		1.3 (0.41 - 4.11)			1.29 (0.69 - 2.43)			0.91 (0.47 - 1.75)	
Sample size:							n = 4,612	n = 4,392	

\*p<0.05

<sup>a</sup>reference category: Low substance use, healthy diet cluster of health behaviours

<sup>c</sup>main effect of English language use with family constrained to 1

### 9.3.7. Key findings

Here I describe my key findings from Chapter 9 where I investigated whether perceived parenting styles mediated or moderated any ethnic variations in adolescent health behaviours. I found some evidence that some ethnic variations in adolescent tobacco illicit drug use, fruit and vegetable consumption, and the clustering of adolescent health behaviours were mediated and/or moderated by perceived parenting. However, most of those variations were only explained in small amounts and on the whole they remain unexplained.

Perceived parenting styles mediated lower likelihoods of tobacco and illicit drug use among Black Caribbean adolescents compared to White UK adolescents, by 11% and 28% respectively. Black Caribbean adolescents who attended a place of worship less frequently were more likely to use tobacco and mediation by perceived parenting styles explained 38% of that moderated ethnic variation. Black African adolescents' lower likelihoods of tobacco and illicit drug use, compared to White UK adolescents, were similarly moderated, with higher likelihoods of substance use among less religious adolescents. Mediation by perceived parenting suppressed otherwise even higher likelihoods of both tobacco and illicit drug use, among less religious Black African adolescents, by 19%. **Perceived parenting styles had opposite effects on substance use among less religious Black Caribbean adolescents compared to less religious Black African adolescents perhaps indicating that proxies of cultural values are not consistent across ethnic groups.**

Other ethnicity adolescents also had lower likelihoods of using tobacco or illicit drugs than White UK adolescents, however, among those adolescents, perceived parenting styles suppressed otherwise even lower likelihoods by 14% and 18%, respectively. Generally, the controlled direct effects did not differ considerably depending on parenting style, however there was an interaction such that the Other ethnicity effects would not be so reduced if parenting were set to *Neglectful*. Thus, the effects of being Other ethnicity on tobacco and illicit drug use were both mediated and moderated by parenting style.

Black Caribbean and Black African adolescents were more likely than White UK adolescents to eat <2 *portions* rather than  $\geq 5$  *portions* of fruit and vegetables per day, and setting parenting styles to *Permissive* for all adolescents, resulted in controlled direct effects for these ethnic groups that were reduced respectively by 38% and 45%, compared to the unadjusted effects. Generally, the controlled direct effects did not differ considerably depending on parenting style, however there were interactions such that the Black Caribbean and Black African effects would not be so reduced if parenting

were set to *Neglectful*. Thus the effects of Black Caribbean and Black African ethnicity on fruit and vegetable consumption were both mediated and moderated by perceived parenting style.

Black African and Pakistani/ Bangladeshi adolescents were more likely than White UK adolescents to be in the *Low substance use: unhealthy diet* cluster, rather than the *Low substance use: healthy diet* cluster, and setting parenting styles to *Permissive* for all adolescents, resulted in controlled direct effects for these ethnic groups that were reduced respectively by 52% and 32%, compared to the unadjusted effects. Generally, the controlled direct effects did not differ considerably depending on parenting style, however there was an interaction such that the Black African effect would not be so reduced if parenting were set to *Neglectful*. Thus, the effect of being Black African on membership in this cluster is both mediated and moderated by parenting style.

Other ethnicity adolescents were less likely than White UK adolescents to be in the *High substance use, physically inactive* cluster, rather than the *Low substance use: healthy diet* cluster. Controlled direct effects based on setting parenting styles to *Permissive* were magnified by 65% relative to the unadjusted effects, indicating suppression. However, there was also moderation such that this suppression was less evident if parenting were set to *Neglectful*, indicated by the positive OR for the interaction between Other ethnicity and *Neglectful* parenting.

## 10. Discussions

The overall aim of my thesis was to investigate whether perceived parenting styles explained any ethnic variations in health behaviours among DASH study adolescents. To achieve that aim I set five objectives (Figure 10-1). Objective A was to investigate ethnic variations in adolescent health behaviours as the basis for subsequent objectives. Objectives B and C were to investigate ethnic variations in perceived parenting and relationships between perceived parenting styles and adolescent health behaviours; together these objectives were intended to identify requisite evidence for the mediation of ethnic variations in adolescent health behaviours by perceived parenting styles. Objectives D and E were to further investigate possible roles of perceived parenting styles as mediators or moderators of ethnic variations in adolescent health behaviours.

In Chapter 4, I reviewed relevant literature and formulated research questions for each of my thesis objectives. In Chapters 6-9 I carried out analysis to address those research questions, and here I discuss key findings with reference to existing research in the area and consider their implications.

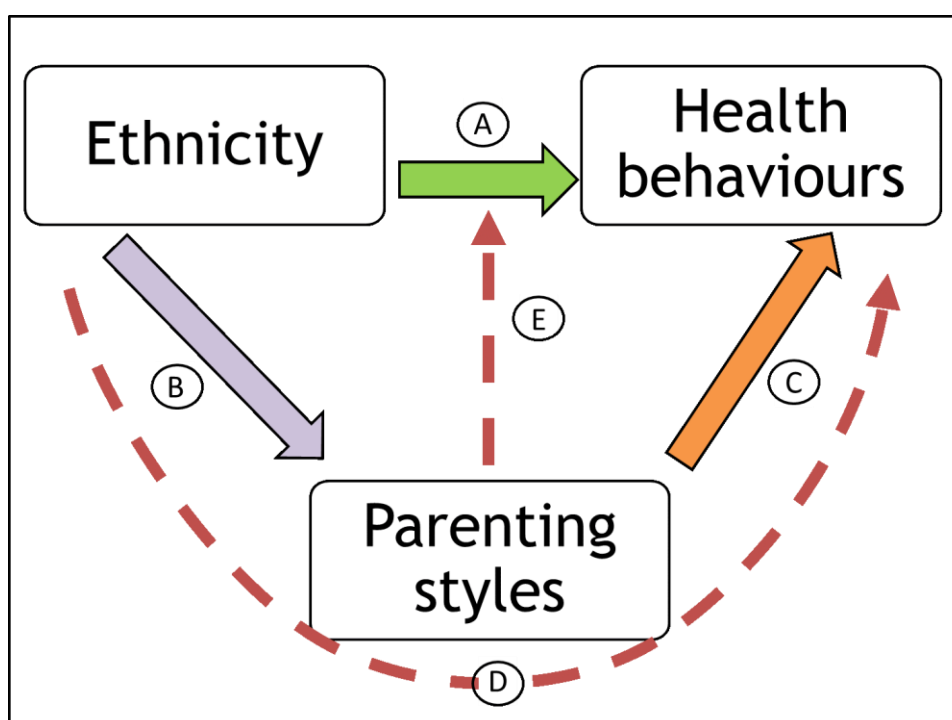


Figure 10-1: Conceptual diagram of thesis objectives

## 10.1. Ethnic variations adolescent health behaviours

I reviewed literature that has investigated, and sought to explain, ethnic variations in adolescent health behaviours (4.2.1). I found that adolescent health behaviours often vary by ethnicity, and those variations may be moderated by cultural values or mediated by structural inequalities. Based on my literature review findings I formulated four research questions (Box 10-1) which I carried out analyses to address in Chapter 6. Here I discuss my key findings with reference to existing literature, the aims and objectives of my Thesis, and possible interventions.

Box 10-1. Objective A - Research questions:

1. Was there clustering of adolescent health behaviours?
2. Were there ethnic variations in adolescent health behaviours or the clustering of adolescent health behaviours?
3. Were ethnic variations in health behaviours or the clustering of health behaviours moderated by cultural values?
4. Were ethnic variations in health behaviours or the clustering of health behaviours mediated by structural inequalities?

### 10.1.1. Key findings:

*Was there clustering of health behaviours?*

I identified four clusters of adolescent health behaviours defined by substance use, fruit and vegetable consumption, and physical activity (6.3.1.3). Adolescent body size did not contribute to the characterisation of clusters. The four clusters of adolescent health behaviours were characterised as:

- *High substance use: physically active*
- *High substance use: physically inactive*
- *Low substance use: healthy diet*
- *Low substance use: unhealthy diet*

The clearest division seemed to be between high vs low substance use, with tobacco, alcohol and illicit drug use tending to cluster together. Within the high substance using groups there was a clear division with regards to low vs high physical activity, but in both groups dietary behaviour were mixtures of healthy, unhealthy and intermediate. Among adolescents with low rates of substance use, the clearest division seemed to be in terms of healthy vs unhealthy diet, with both groups tending towards lower physical activity.

It is important to recognise that the pattern of clustering seen was not one where unhealthy behaviours all simply clustered together. There was not necessarily a clear link between unhealthy diet and high substance use, and the *High substance use: physically active* cluster shows that substance use behaviours did sometimes occur in combination with healthier levels of physical activity. This could perhaps reflect socially-motivated substance use as a part of involvement with sports teams or clubs (Moore and Chudley, 2005).

*Were there ethnic variations in adolescent health behaviours or in the clustering of adolescent health behaviours?*

Ethnic variations in tobacco and alcohol use among DASH study adolescents at 14-16 years old (Harding et al., 2015a, Harding et al., 2015b), and fruit and vegetable consumption, physical activity and body size at 11-13 years old (Harding et al., 2008) have been reported from previous analyses of the DASH study. Compared to White UK adolescents, ethnic minorities were less likely to use tobacco and alcohol. Black Caribbean, Black African and Pakistani/ Bangladeshi adolescents tended to eat fewer portions of fruit and vegetables per day and Black Caribbean adolescents were less likely to be physically inactive. Re-iterating these findings here was an important first step in establishing the state of ethnic variations in health behaviours, to see if these variations can be explained by parenting styles. My analyses add to this existing knowledge by investigating ethnic variations in illicit drug use as well as in addressing clustering, and mediation/moderation of ethnic variations.

Ethnic minority adolescents were less likely than White UK adolescents to use illicit drugs (6.3.1.1). There is limited existing knowledge of ethnic variations in illicit drug use among UK adolescents. The smoking drinking and drug use (SDD) survey found no significant ethnic differences in drug use (Fuller and Hawkins, 2012), whereas Jayakody et al. (2006) found higher levels of cannabis use among Black Caribbean, and Mixed ethnicity compared to White adolescents. Study sampling frames and ethnic categorisations may explain these conflicting findings.

The SDD survey looked at illicit drug use across broad ethnic categories (White, Black, Asian, and Mixed ethnicity), and sampled adolescents widely from 522 schools across England. The use of broad ethnic categories would have limited their ability to detect variations in drug use between more specific ethnic groups, and the use of a wide sampling frame would have limited their ability to detect ethnic variations in more specific contexts. In contrast, Jayakody et al. (2006) used more specific ethnic categories and sampled 2789 adolescents from 28 schools across three East London

boroughs. This approach would have allowed them to detect more nuanced ethnic variations in adolescent drug use.

The DASH study sampled 4779 adolescents from 52 schools across eight London boroughs (including two in East London). Despite the DASH study's larger sample size, its less focussed sampling frame would make it more difficult to detect ethnic variations that had occurred in specific contexts. If, consistent with Jayakody et al. (2006), Black Caribbean DASH study participants living in East London were more likely to use illicit drugs than White UK counterparts this ethnic variation may have been masked by lower levels of illicit drug use among Black Caribbean participants, or higher use among White UK participants, living in other areas. Furthermore, although DASH study ethnic categories are well defined, the relatively small numbers of Mixed ethnicity adolescents were included in the Other ethnicity category. If, as found by Jayakody et al. (2006), Mixed ethnicity adolescents were more likely to use illicit drugs than White UK adolescents that ethnic variation would likely have been masked by lower levels of illicit drug use across the rest of the Other ethnicity group. I recommend further research into ethnic variations in health behaviours among Other ethnicity adolescents in the DASH study, and in particular those of Mixed ethnicity adolescents, though larger samples of mixed ethnicity adolescents from across the UK might be needed to gain further insight in this area.

As expected based on ethnic variations in individual adolescent health behaviours there were also ethnic variations in the clustering of adolescent health behaviours (6.3.1.3). Broadly, ethnic minority adolescents were less likely, than White UK adolescents, to be in clusters characterised by substance use and more likely to be in the cluster characterised by poorer diet. This pattern is more or less what might have been expected from the ethnic patterning of the individual health behaviours, and therefore confirms that other literature has not missed any important ethnic variations in health behaviours by treating behaviours individually rather than in clusters.

*Were ethnic variations in health behaviours or the clustering of adolescent health behaviours moderated by cultural values?*

Generational status, English language use with family, and religious attendance were used as proxy measures of acculturation away from collectivist cultural values. Based on my literature review (4.2.1), I expected lower substance use, lower fruit and vegetable consumption, and greater body size among ethnic minority adolescents to have been concentrated among those who were more acculturated. Some ethnic variations in health behaviours were moderated by cultural values.



Lower likelihoods of tobacco use among Indian, and Pakistani/ Bangladeshi adolescents were concentrated amongst females. This is consistent with Bradby's (2007) qualitative study of tobacco use among British Asians (Indian or Pakistani background, living in Glasgow). That study found that British Asian females who were known to have used tobacco suffered more serious and lasting reputational damage than did British Asian males. Similar gender specific attitudes might moderate ethnic variations in tobacco use among Indian and Pakistani/ Bangladeshi adolescents in the DASH study.

Lower likelihoods of tobacco and illicit drug use among Black Caribbean adolescents and lower tobacco use among Black African adolescents were concentrated among those who attended a place of worship more often. This is consistent with Wallace et al. (2016) who found more religious US adolescents were less likely to engage in substance use in a large ethnically diverse US sample. Furthermore, Christianity is said to be particularly important for Black Caribbean and Black African communities in the UK as was described by Kalilombe (1997).

Among Pakistani/ Bangladeshi adolescents lower fruit and vegetable consumption was concentrated among those who spoke less English with their families. Brown and Konner (1987) suggest that ethnic minorities may have cultural memories of countries where food scarcity is more typical and may therefore have strong preferences for more energy dense foods. In the UK, where energy dense foods are readily accessible, those preferences would be likely to lead to lower consumption of fruit and vegetables, which are less energy dense. Another possible explanation is limited financial resources. Acculturation tends to be positively associated with SES status (Negy and Woods, 1992), and those of higher SES tend to be more acculturated to mainstream values. Assuming that more English language use reflects greater acculturation, those who spoke less English with their family would have lower SES (i.e. more limited financial resources).

Those limited financial resources would encourage the consumption of more affordable energy dense foods rather than fruit and vegetables and lead to overweight/ obesity. If this explanation were correct, I would expect mediation by structural inequalities to explain some of the ethnic variations that were moderated by English language use.

Indeed, consistent with this explanation, some of the lower fruit and vegetable consumption among Pakistani/ Bangladeshi adolescents who spoke less English with their family was explained by structural inequalities. This explanation is further supported by descriptive statistics (Section 5.1.6, Table 5-7) which show adolescents who spoke less English with their families were more likely to live in more materially disadvantaged households.

On the other hand, structural inequalities did not mediate any ethnic variations in adolescent overweight or obesity (my analysis of mediation of ethnic variations in adolescent health behaviours is discussed more in the following section). In contrast, and inconsistent with Brown and Konner (1987), the higher likelihood of obesity among Black African adolescents was concentrated among those who spoke more English with their families. This could be explained if the traditional Black African diet is actually healthier and less obesogenic than the UK mainstream diet. If this were so, then acculturation would, in this instance, be associated with a diet more similar to the white UK majority.

Ethnic variations in the clustering of adolescent health behaviour were also somewhat moderated by cultural values. Lower likelihoods of being in the *High substance use: physically active* among Pakistani/ Bangladeshi and Other ethnicity adolescents and the lower likelihoods of being in the *High substance use: physically inactive* cluster among Other ethnicity adolescents were concentrated among those who spoke less English with their families (i.e. were less acculturated). Since these clusters of health behaviours were characterised by substance use these findings are consistent with my expectations, based on existing research, that adolescents who hold more collectivist cultural values would be less likely to engage in substance use behaviours.

*Were ethnic variations in health behaviours, or the clustering of health behaviours, mediated by structural inequalities?*

Household material disadvantage, non-two-parent families, household overcrowding, and experiences of racism were used as measures of structural inequalities. Based on my literature review (4.2.1), I expected lower substance use to be suppressed, and lower fruit and vegetable consumption, physical inactivity, and greater body size among ethnic minority adolescents to have been partially explained by structural inequalities. However, while some ethnic variations in health behaviours were mediated by structural inequalities, most remained unexplained.

In general, the analyses in chapter 6 found that structural inequalities did not mediate ethnic variations in adolescent health behaviours. Here, I describe the exceptions to that pattern with reference to existing knowledge in the area.

Structural inequalities suppressed an even lower likelihood of illicit drug use among Black Caribbean, compared to White UK adolescents. Black Caribbean adolescents were more likely to live in *Reconstructed* or *Single-parent*, rather than *Two-parent* families, and were more likely to have experienced racism. These structural inequalities were in turn associated with adolescent illicit drug use consistent with existing knowledge in this area that adolescent substance use tends to be positively associated with lower SES (Lemstra et al., 2008) and discrimination (Gibbons et al., 2010).

As expected, mediation by structural inequalities explained 11-28% of the lower fruit and vegetable consumption among Black Caribbean, Black African, Other ethnicity, and Pakistani/ Bangladeshi adolescents who spoke less English with their family. Compared to White UK adolescents, Black Caribbean and Black African and Other ethnicity adolescents were more likely to live in households with greater material disadvantage, and to live in *One-parent*, rather than *Two-parent* families and these structural inequalities were in turn associated with lower fruit and vegetable consumption. Furthermore, as shown by descriptive statistics (Section 5.1.6), adolescents who spoke less English with their families tended to live in more materially disadvantaged households.

Among Pakistani / Bangladeshi adolescents, ethnic variation was moderated by language use with variation concentrated among those who spoke less English with their family and structural inequalities explained some of that moderated ethnic variation. Pakistani/ Bangladeshi adolescents were more likely than White UK adolescents, to live in more materially disadvantaged households, which were in turn associated with lower fruit and vegetable consumption. These findings are consistent with other research in

findings that lower SES is associated with lower fruit and vegetable consumption (Caprio et al., 2008). The mediation of lower fruit and vegetable consumption among Pakistani/Bangladeshi adolescents who spoke less English with their family by structural inequalities suggests that less acculturated adolescents were exposed to more structural inequalities. Indeed, my descriptive statistics show that adolescents who spoke less English with their families tended to live in more materially disadvantaged households (5.1.6, Table 5-7). This is consistent with research finding associations between acculturation and higher socioeconomic status (Negy and Woods, 1992, Unger et al., 2004).

Mediation by structural inequalities also explained some of the higher likelihoods of *Low substance use: unhealthy diet* cluster among Black Caribbean and Black African adolescents and suppressed otherwise lower likelihoods of *High substance use: physically active* among Black Caribbean, and Other ethnicity adolescents and among Black African adolescent who spoke less English with their families.

### 10.1.2. Implications

I carried out analyses to investigate ethnic variations in adolescent health behaviours (Thesis objective A) in Chapter 6. Here, I consider implications of the key findings of those analyses in relation to the aims of my Thesis and possible interventions to modify adolescent health behaviours.

There were ethnic variations in adolescent health behaviours and in the clustering of adolescent health behaviours, and there was some indication that these variations were moderated by cultural values, or indicators of acculturation. However, ethnic variations were not explained fully, or even largely, by structural inequalities. This key finding provides a starting point for my investigation of whether perceived parenting mediated or moderated ethnic variations in adolescent health behaviours, as another possible mechanism for these ethnic variations beyond structural inequality.

Although cultural values and structural inequalities do not fully explain ethnic variations in adolescent health behaviours, some of my findings do have implications for interventions aimed at reducing unhealthy behaviours in adolescence.

Firstly, increased understanding of the clustering of health behaviours may help such efforts. For example, it was clear that substance use behaviours tended to cluster together, so services and/or interventions that aim to deal with substance use problems among adolescents might need to be aware of this and recognise that if there is a problem with use of one substance then there may be issues with use of other substances too. On the other hand, low fruit and vegetable consumption was not clearly

clustered with substance use behaviours, so it may be more efficient for services and interventions that aim to improve diet to be managed and run independently. The *High substance use: physically active* cluster that was observed here is of particular interest and suggests that adolescents who engage in high levels of physical activity may also be at risk for substance use.

Concerning ethnic variations in health behaviours, ethnic minority adolescents who were more acculturated tended to have behaviours that were more similar to the white UK majority, i.e. better diet, but higher rates of substance use. This implies that acculturation may not always be a positive influence on adolescent health behaviours, and therefore acculturation of ethnic minority families should not necessarily be a political goal or be institutionalised, e.g. through measures and policies focused on ethnic minority groups adopting the majority language. A better understanding of what specific aspects of ethnic minority cultures improve substance use outcomes, and which are detrimental for diet, could help in designing interventions that improve substance use among the White UK majority, and improve diet among ethnic minority groups.

Black Caribbean and Black African adolescents who attended a place of worship less frequently were more likely to use tobacco or illicit drugs so an intervention to encourage attendance at places of worship might reduce tobacco and illicit drug use among Black Caribbean and Black African adolescents. Alternatively, interventions to discourage substance use targeted at adolescents who do not attend places of worship could reduce tobacco and illicit drug use among Black Caribbean and Black African adolescents. However, since Black Caribbean and Black African adolescents were less likely than White UK adolescents to use either tobacco or illicit drugs, these interventions could be expected to increase ethnic variations. Increasing religious attendance, or targeted substance use interventions designed for those who do not regularly attend religious services may also be possible avenues for intervention to reduce higher substance use rates among White UK adolescents, but this would need further research. For example, it may not be religious attendance alone that is important, but how this interacts with and supports an ethnic group's cultural values, so increasing religious attendance may not be effective for ethnic groups that do not share those values.

Household material disadvantage and family structure mediated some of the higher likelihoods of consuming less than 5 portions of fruit and vegetables per day compared to White UK adolescents, among Black Caribbean, Black African and Pakistani/Bangladeshi adolescents who spoke less English with their families. Therefore, interventions that alleviate structural inequalities or dietary interventions among those

who are exposed to more structural inequalities might help alleviate these dietary disadvantages.

In actuality though, socioeconomic changes in the UK context may have exacerbated these ethnic variations in fruit and vegetable consumption. Given that the data studied here were collected just before the 2007/08 global financial crisis that was followed by UK government austerity measures this may be particularly important. Between 2010 and 2019 the UK government made reductions of more than £30 billion in spending to welfare payments, housing subsidies and social services (Mueller, 2019). Between 2012 and 2019 the number of children in relative poverty increased by 600,000 and the number of children obtaining food from Trussell Trust food banks increased more than three times (Mueller, 2019). With this in mind, future research should investigate the impact of the financial crisis and UK government austerity measures on ethnic variations in adolescent dietary behaviours including fruit and vegetable consumption. Adolescents from ethnic minority groups could be even more disadvantaged now than they were found to be here.

## 10.2. Ethnic variations in perceived parenting

I reviewed literature that investigated, and sought to explain, ethnic variations in parenting styles (4.2.2). Existing literature suggests that parenting styles tend to vary by ethnicity and some ethnic variations may be moderated by cultural values, or mediated by structural inequalities. Based on those literature review findings I formulated three research questions (Box 10-2) which I addressed analytically in Chapter 7. Here, I discuss the findings of that analysis with reference to existing literature, the aims and objectives of my Thesis, and possible interventions.

Box 10-2. Objective B - Research questions:

1. Were there ethnic variations in perceived parenting styles?
2. Were any ethnic variations in perceived parenting styles moderated by cultural values?
3. Were any ethnic variations in perceived parenting styles mediated by structural inequalities?

### 10.2.1. Key findings:

Here I discuss key findings of my analysis of ethnic variations in perceived parenting styles with reference to existing research in the area. Perceived parenting styles varied by ethnicity among DASH study adolescents. Those ethnic variations were in general not moderated by cultural values while some were partially mediated by structural inequalities. In the subsequent sections, I discuss my findings for each of my research questions.

*Were there ethnic variations in perceived parenting styles?*

My analysis replicated findings of previous analyses of ethnic variations in perceived parental care and control among DASH study adolescents (Harding et al., 2015a, Harding et al., 2015b). Black Caribbean, and Black African adolescents were more likely to perceive *Low*, rather than *High* parental care than White UK adolescents; and all ethnic minority adolescents were more likely to perceive *Medium*, or *High*, rather than *Low* parental control than White UK adolescents. In this study, I have built on that existing knowledge by investigating ethnic variations in perceived parenting styles that combine the dimensions of perceived parental care and control.

Various sources have indicated that US ethnic minority parents exhibit styles of parenting characterised by high parental control combined with high parental care. Among Black Americans this has been called *No Nonsense* parenting (Brody and Flor, 1998, Young, 1974), and among Asian Americans it has been called *Child-Training*

(Chao, 1994). Furthermore, some US studies have found there to be positive associations between perceived parental care and control among ethnic minority adolescents (Hill et al., 2003, Rohner and Pettengill, 1985). Based on that literature, I expected ethnic minority DASH study adolescents to have higher likelihoods of perceived (high control, high care) *Authoritative* rather than (low control, high care) *Permissive* parenting, compared to White UK adolescents whereas ethnic variations in perceived (low care, high control) *Authoritarian* and perceived (low care, low control) *Neglectful* parenting were not expected. For that to have been the case there would need to have been ethnic variations in associations between perceived parental care and control with more positive associations found among ethnic minority adolescents. However, in Section 5.1.3, I found there to be no significant ethnic variations in the association between perceived parental care and control. Based on ethnic variations in perceived parental care and control and the lack of ethnic variation in the association between perceived parental care, and control, my expectations for ethnic variations in perceived parenting styles changed. Based on higher likelihoods of both *Low* perceived parental care and *High* perceived parental control, I expected Black Caribbean and Black African adolescents to be more likely than White UK adolescents to perceive *Authoritarian*, rather than *Permissive* parenting, and based on higher likelihoods of *High* parental control, I expected Indian, Pakistani/ Bangladeshi, and Other ethnicity adolescents be more likely than White UK adolescents to perceive both *Authoritative* and *Authoritarian* parenting rather than *Permissive* parenting.

Consistent with those expectations, Indian, Pakistani/ Bangladeshi and Other ethnic minority adolescents were more likely than White UK adolescents to perceive both *Authoritative* and *Authoritarian*, rather than *Permissive* parenting and Black Caribbean and Black African adolescents were more likely than White UK adolescents to perceive *Authoritarian* rather than *Permissive* parenting. However, unexpectedly, Black Caribbean and Black African adolescents were also more likely than White UK adolescents to perceive *Authoritative* rather than *Permissive* parenting, and Indian and Pakistani/ Bangladeshi adolescents were less likely to perceive *Neglectful*, rather than *Permissive* parenting. These findings indicate that higher likelihoods of *High* rather than *Low* perceived parental control were stronger than higher likelihoods of *Low* rather than *High* perceived parental care.

*Were ethnic variations in perceived parenting styles moderated by cultural values?*

Generational status, English language use with family, and religious attendance were used as proxy measures of acculturation away from collectivist cultural values. Based on my literature review (4.2.2), I expected ethnic variations in perceived parenting to have



been concentrated among adolescents who were less acculturated. For example, Rudy and Grusec (2006) found that parents who held more collectivist values tended to value parental respect (control). The results of my analyses in Chapter 7 show that some ethnic variations in perceived parenting were moderated by cultural values.

*Low* rather than *High* parental care was concentrated among Black Caribbean adolescents who were born abroad. This is consistent with my expectation that ethnic variations in perceived parenting would be concentrated among those who were less acculturated. An alternative explanation is that lower perceived parental care reflects conflict between adolescents and parents caused by differential acculturation. Adolescents who were born abroad are likely to have spent a substantial proportion of their lives in the UK and to have acculturated to mainstream cultural values such as adolescent autonomy. Their parents, on the other hand, are likely to have come to the UK as adults and to be less acculturated to mainstream cultural values such as parental respect. Differences in acculturation can result in parent-child conflict (Lawton et al., 2018) that would be reflected in lower perceived parental care. A second alternative explanation is that adolescents born abroad were exposed to more structural inequalities than those born in the UK. Indeed, descriptive statistics support that explanation (Section 5.1.6, Table 5-7) as those who were born abroad were more likely to live in the most disadvantaged households (30% compared to 17%), and less likely to live in the least disadvantaged households (27% compared to 41%). However, my mediation analysis does not support that explanation (those findings are discussed further in the next section).

The lower likelihood of perceived *Neglectful* rather than *Permissive* parenting, among Pakistani/ Bangladeshi compared to White UK adolescents, was concentrated among those who spoke more English with their family. This finding is inconsistent with my expectation that ethnic variations in perceived parenting would be concentrated among those who were less acculturated. A possible explanation for this unexpected finding is that acculturation tends to be positively associated with socioeconomic status (Negy and Woods, 1992). As increased English language use is assumed to be a marker of acculturation, I would expect adolescents who spoke less English with their family to be more exposed to structural inequalities, which would in turn explain a higher likelihood of *Neglectful* parenting. This suggestion is supported by descriptive statistics (Section 5.1.6, Table 5-7). Adolescents who spoke less English with their family were more likely to live in the most disadvantaged households (24% compared to 19%), and less likely to live in the least disadvantaged households (32% compared to 40%). And this was borne out by my mediation analysis as 21% of the higher likelihood of perceived *Neglectful*, rather than *Permissive* parenting among Pakistani/ Bangladeshi adolescents who spoke

less English with their families was explained by structural inequalities as shown in Table 7-27. The findings of that mediation analysis are discussed further in the next section.

*Were ethnic variations in perceived parenting styles mediated by structural inequalities?*

Household material disadvantage, non-two-parent families, household overcrowding, and experiences of racism were used as measures of structural inequalities. I reviewed existing literature that described and sought to explain ethnic variations in perceived parenting styles (4.2.2). Previous research has reported that low parental care, high parental control, and authoritarian parenting, are associated with economic stress (Conger et al., 1995, Conger et al., 2002, McLoyd, 1990, McLoyd et al., 1994), lower SES (Dornbusch et al., 1987, Glasgow et al., 1997), non-two-parent families (Barrett and Turner, 2005, Forehand et al., 1990), and experiences of racism (Murry et al., 2001). Based on those literature review findings I expected ethnic variations in perceived parenting (lower parental care among Black Caribbean adolescents, and higher parental control and authoritarian styles of parenting among ethnic minority adolescents) to have been to some extent mediated by structural inequalities. The results of my analyses in Chapter 7 show that while some ethnic variations in perceived parenting were mediated by structural inequalities most remained unexplained.

Somewhat consistent with expectations I found that ethnic variations in *Low* rather than *High* perceived parental care and *Authoritarian* rather than *Permissive* parenting were partially mediated by structural inequalities. Structural inequalities explained higher likelihoods of *Low* rather than *High* perceived parental care among Black Caribbean and Black African compared to White UK adolescents (by 37% and 17%, respectively) and explained higher likelihoods of *Authoritarian* rather than *Permissive* parenting among Black Caribbean, Black Caribbean and Other ethnicity adolescents (by 20%, 13%, and 13%, respectively). Household material disadvantage, *Reconstituted* rather than *Two-parent* families, and experiences of racism were each positively associated with *Low* rather than *High* care, and with *Authoritarian*, rather than *Permissive* parenting and Black Caribbean, Black African and Other ethnicity adolescents were more likely to be exposed to those structural inequalities than White UK adolescents.

I found that mediation by structural inequalities (family structure and experiences of racism) suppressed higher likelihoods of *Medium* and *High* rather than *Low* perceived parental control among Pakistani/ Bangladeshi compared to White UK adolescents (by 26% and 14%, respectively), and suppressed a higher likelihood of *Medium* rather than *Low* control among Black Caribbean adolescents (by 21%). An explanation for these

somewhat unexpected findings might be found in the effects of family structures on perceived parental control.

Compared to *Two-parent* families, *Single-parent* families were negatively associated with *Medium* rather than *Low* perceived parental control. This is consistent with lower levels of monitoring of adolescents living in single parent households compared to adolescents living in two parent households reported by existing literature, for example Steinberg (1987). Black Caribbean adolescents were more likely than White UK adolescent to live in *Single-parent* rather than *Two-parent* families which therefore could have suppressed an otherwise higher likelihood of *Medium* rather than *Low* perceived parental control. *Reconstituted* families, were positively associated with *High* rather than *Low* perceived parental control. This is consistent with greater resistance against control by step-parents in reconstituted families as suggested by Amato (1987), for example. Given that Pakistani/ Bangladeshi adolescents were less likely than White UK adolescents to live in *Reconstituted* rather than *Two-parent* families this could have suppressed an otherwise higher likelihood of *High* rather than *Low* perceived parental control. On the other hand, Pakistani/ Bangladeshi adolescents were also less likely than White UK adolescents to live in *Single-parent* families which were negatively associated with *Medium* rather than *Low* perceived parental control so my finding that structural inequalities suppressed an otherwise higher likelihood of *Medium* rather than *Low* perceived parental control is counterintuitive.

Mediation by structural inequalities also explained a higher likelihood of *Neglectful* rather than *Permissive* parenting among Pakistani/ Bangladeshi adolescents who spoke less English with their family (by 19%). As mentioned in the previous section, the higher likelihood of *Neglectful* rather than *Permissive* parenting among Pakistani/ Bangladeshi adolescents who spoke less English with their family was unexpected based on the findings of my literature review. However, an alternative explanation is that those less acculturated adolescents were more exposed structural inequalities. This is consistent with previous research suggesting that acculturation is positively associated with SES, for example Negy and Woods (1992).

### 10.2.2. Implications:

I carried out analyses to investigate ethnic variations in perceived parenting styles (Objective B) in Chapter 7. Here I consider the implications of my key findings in relation to the aims of my Thesis and possible parenting interventions.

There were ethnic variations in perceived parenting styles. This key finding provides a basis for my investigation of whether perceived parenting mediated or moderated ethnic variations in adolescent health behaviours, as a possible mechanism for those ethnic variations beyond structural inequality. Some ethnic variations in perceived parenting were moderated by cultural values or indicators of acculturation, but on the whole they were not fully or even largely explained by structural inequalities. Although cultural values and structural inequalities do not fully explain ethnic variations in perceived parenting some of my findings do indicate targets for interventions.

Mediation by structural inequalities (household material disadvantage, family structure and experiences of racism) to some extent explained higher likelihoods of perceived *Low* rather than *High* parental care and (low care, high control) *Authoritarian* rather than (high care, low control) *Permissive* parenting among Black Caribbean, Black African and Other ethnicity, compared to White UK adolescents. Similarly, those structural inequalities explained a higher likelihood of (low care, low control) *Neglectful* rather than (high care, low control) *Permissive* parenting among Pakistani/ Bangladeshi adolescents who spoke less English with their family. Mediation by structural inequalities (household material disadvantage, family structure and experiences of racism) suppressed otherwise higher likelihoods of perceived *Medium* rather than *Low* parental control among Black Caribbean adolescents, and otherwise higher likelihoods of perceived High rather than *Low* parental control among Pakistani/ Bangladeshi adolescents.

Based on these findings interventions to alleviate structural inequalities could modify parenting styles among certain ethnic groups. For instance, The Scottish Government have recently published plans for Scottish Child Payments to low-income families (Scottish Government, 2019). Future research to evaluate the impact of those payments on both structural inequalities and perceived parenting styles should be carried out to inform policy plans across the UK. Alternatively, interventions to support positive parenting styles might be targeted to parents who are exposed to more structural inequalities.

A recent systematic review by Medlow et al. (2016), included nine randomised trials of parenting interventions that measured both parenting and adolescent at baseline and post-intervention. These studies looked at a variety of parenting interventions, which in general showed that parenting interventions increased positive parenting measures. For example, Irvine et al. (1999) trialled an intervention that encouraged authoritative parenting , among 302 families of 12 year old US adolescents. Compared to the control

group, the intervention reduced over-reactivity, coerciveness and laxness and increased expectation setting, problem solving, and tracking and reinforcing.

### 10.3. Parenting styles and adolescent health behaviours

I reviewed literature that investigated, associations between parenting styles and adolescent health behaviours (4.2.3). Existing literature suggests that more authoritative styles of parenting, which combine high care with high control, tend to be associated with healthier adolescent behaviours, whereas more authoritarian styles of parenting, which combine low care and high control, tend to be associated with unhealthier adolescent behaviours. I formulated a single research questions (Box 10-3) which I addressed analytically in Chapter 8. Here, I discuss the key findings of that analysis with reference to existing literature, the aims and objectives of my Thesis, and possible interventions.

Box 10-3: Objective C - Research question:

- Were perceived parenting styles associated with adolescent health behaviours?

#### 10.3.1. Key findings:

Here I discuss the key findings of my analysis of associations between perceived parenting styles and adolescent health behaviours (summarised in Table 8-10) with reference to existing research in the area. My findings are fairly consistent with expectations based on the existing literature: optimal parenting appears to consist of high parental care, medium parental control, and authoritative parenting styles.

Adolescents who perceived *Low* or *Medium*, rather than *High*, perceived parental care were more likely to engage in substance use behaviours, to eat less than five portions of fruit and vegetables per day, were more likely to be physically inactive and were more likely to be in unhealthy clusters of health behaviours. This suggests that high levels of parental care are optimal for adolescent health behaviours.

Adolescents who perceived *Medium* rather than *Low* control were less likely to engage in substance use behaviours and were less likely to be in clusters of health behaviours characterised by substance use. Adolescents who perceived *High* rather than *Low* control were also less likely to use alcohol but were also more likely to eat less than five portions of fruit and vegetables per day and were more likely to be in the *Low substance use: unhealthy diet* cluster of behaviours. These findings suggest that moderate parental control is optimal, and that lower or higher parental control may both have negative effects on adolescent health behaviours.

The effects of perceived parenting styles appear to follow the effects of perceived parental care. Compared to *Permissive* (high care, low control) or *Authoritative* (high care, high control) parenting styles, *Authoritarian* (low care, high control) and

*Neglectful* (low care, low control) parenting styles were each associated with unhealthier adolescent behaviours.

### 10.3.2. Implications:

I carried out analyses to investigate whether perceived parenting styles were associated with adolescent health behaviours (objective C) in Chapter 8. Here I consider the implications of my key findings in relation to the aims of my Thesis and possible parenting interventions.

Perceived parenting styles were associated with adolescent health behaviours. This key finding provides a basis for my investigation of whether perceived parenting mediated or moderated ethnic variations in adolescent health behaviours, as a possible mechanism for those ethnic variations beyond structural inequality.

Broadly speaking, adolescents who perceived lower levels of parental care, and (low care, low control) *Neglectful* or (low care, high control) *Authoritarian*, rather than (high care, low control) *Permissive* or (high care, high control) *Authoritative* parenting tended to have unhealthier behaviours. Although perceived *Medium* rather than *Low* control was associated with healthier behaviours this effect appears to have been masked by the effects of perceived parental care.

Based on these findings interventions aimed at modifying adolescent health behaviours via parenting should encourage high parental care, which will tend to lead towards more *Authoritative* and *Permissive* parenting. Further research may be needed to better understand the effects of perceived parental control on adolescent health behaviours. Further analysis of the DASH study could use additional family related variables to investigate whether parent-child relationship quality or adolescent psychological well-being might help elucidate or moderate those relationships. Considering that ethnic minority groups tended to perceive both more *Authoritative* and more *Authoritarian* parenting, the relationships that these parenting styles exhibit with health behaviours may represent something of a double-edged sword for ethnic minority groups, with some experiencing better outcomes due to *Authoritative* parenting, and some experiencing worse outcomes due to *Authoritarian* parenting. Further, that ethnic variations in parenting were often weaker among more acculturated adolescents, this again indicates that acculturation is not universally desirable, and may have both positive and negative outcomes. An important area for further research in relation to acculturation may be in the effects of mismatches in acculturation between parents and youth, which I was not able to examine with the data available here.

## 10.4. Ethnicity, parenting styles and adolescent health behaviours

I reviewed previous literature that described how differences in parenting styles were related to ethnic variations in adolescent health behaviours (4.2.4). Based on previous literature, I expected that differences in perceived parenting styles would explain some ethnic variations in adolescent health behaviours among DASH study adolescents. More specifically, I expected more *Authoritative* styles of parenting to mediate healthier adolescent behaviours. A single research question was formulated (Box 10-4) which I addressed analytically in Chapter 9. Here, I discuss the key findings of that analysis with reference to existing literature, the aims and objectives of my Thesis, and possible interventions.

Box 10-4. Objective D and E research questions:

1. Were ethnic variations in adolescent health behaviours, or in the clustering of adolescent health behaviours mediated by perceived parenting?
2. Were ethnic variations in adolescent health behaviours, or in the clustering of adolescent health behaviours moderated by perceived parenting?

### 10.4.1. Key findings:

I followed a well-established approach to mediation analysis to address the first part of my research question (Baron and Kenny, 1986). First, I carried out analysis to demonstrate ethnic variations in health behaviours among DASH study adolescents (Chapter 6; discussions 10.1); that provided a starting point for my analysis to investigate whether ethnic variations in adolescent health behaviours were mediated or moderated by perceived parenting styles. I then carried out analyses to investigate ethnic variations in perceived parenting (Chapter 7; discussions 10.2), and associations between perceived parenting and adolescent health behaviours (Chapter 8; discussions 10.3). Based on the findings of those analyses I changed my expectation for mediation of ethnic variations in adolescent health behaviours by perceived parenting somewhat.

In general, ethnic minority adolescents were more likely than White UK adolescents to perceive *Authoritative* and *Authoritarian*, rather than *Permissive* parenting, and Indian and Pakistani/ Bangladeshi adolescents were less likely than White UK adolescents to perceive *Neglectful* rather than *Permissive* parenting. Broadly speaking, compared to *Permissive* (high care, low control) and *Authoritative* (high care, high control) parenting, (low care, low control) *Neglectful* and (low care, high control) *Authoritarian* parenting were associated with more unhealthy behaviours. Given that ethnic minority adolescents were more likely than White UK adolescents to perceive both *Authoritative*



and *Authoritarian*, rather than *Permissive* of parenting, I expected the effects of those parenting styles on adolescent health behaviours to somewhat cancel each other out.

I carried out analyses in Chapter 9 to further investigate whether ethnic variations in adolescent health behaviours were mediated or moderated by perceived parenting styles. There, I used marginal structural models with inverse probability of treatment weights. Those methods allowed me to account for possible confounding of relationships between the mediator (perceived parenting styles) and outcome (adolescent health behaviours) by structural inequalities. As with previous analyses mediated effects were calculated using Equation 1. These methods also allow for interactions between the mediator (perceived parenting styles) and the exposure (ethnicity) - these interactions represent moderation of ethnic variations in adolescent health behaviours by perceived parenting styles. More detailed descriptions of my methods can be found in Chapter 5.

My results suggest that some ethnic variations in adolescent tobacco use, illicit drug use, fruit and vegetable consumption, and the clustering of adolescent health behaviours were mediated and/or moderated by perceived parenting.

Perceived parenting styles mediated lower likelihoods of tobacco and illicit drug use among Black Caribbean adolescents compared to White UK adolescents, by 11% and 28% respectively. Black Caribbean adolescents who attended a place of worship less frequently were more likely to use tobacco and mediation by perceived parenting styles explained 38% of that moderated ethnic variation. Black African adolescents' lower likelihoods of tobacco and illicit drug use, compared to White UK adolescents, were similarly moderated, with higher likelihoods of substance use among less religious adolescents. Mediation by perceived parenting suppressed otherwise even higher likelihoods of both tobacco and illicit drug use, among less religious Black African adolescents, with ORs magnified by 19%. In contrast, Perceived parenting explained some substance use among less religious Black Caribbean adolescents, which may indicate that religious attendance has different meaning depending on ethnicity.

Other ethnicity adolescents also had lower likelihoods of using tobacco or illicit drugs than White UK adolescents, however, among those adolescents, perceived parenting styles suppressed otherwise even lower likelihoods, with adjusted ORs magnified by 14% and 18%, respectively. Generally, the controlled direct effects did not differ considerably depending on parenting style, however there was an interaction such that the Other ethnicity effects would not be so reduced if parenting were set to *Neglectful*. Thus, the effects of being Other ethnicity on tobacco and illicit drug use were both mediated and moderated by parenting style.

Black Caribbean and Black African adolescents were more likely than White UK adolescents to eat  $<2$  portions rather than  $\geq 5$  portions of fruit and vegetables per day, and setting parenting styles to *Permissive* for all adolescents, resulted in controlled direct effects for these ethnic groups that were reduced respectively by 38% and 45%, compared to the unadjusted effects. Generally, the controlled direct effects did not differ considerably depending on parenting style, however there were interactions such that the Black Caribbean and Black African effects would not be so reduced if parenting were set to *Neglectful*. Thus the effects of Black Caribbean and Black African ethnicity on fruit and vegetable consumption were both mediated and moderated by perceived parenting style.

Black African and Pakistani/ Bangladeshi adolescents were more likely than White UK adolescents to be in the *Low substance use: unhealthy diet* cluster, rather than the *Low substance use: healthy diet* cluster, and setting parenting styles to *Permissive* for all adolescents, resulted in controlled direct effects for these ethnic groups that were reduced respectively by 52% and 32%, compared to the unadjusted effects. Generally, the controlled direct effects did not differ considerably depending on parenting style, however there was an interaction such that the Black African effect would not be so reduced if parenting were set to *Neglectful*. Thus, the effect of being Black African on membership in this cluster is both mediated and moderated by parenting style.

Other ethnicity adolescents were less likely than White UK adolescents to be in the *High substance use, physically inactive* cluster, rather than the *Low substance use: healthy diet* cluster. Controlled direct effects based on setting parenting styles to *Permissive* were magnified by 65% relative to the unadjusted effects, indicating suppression. However, there was also moderation such that this suppression was less evident if parenting were set to *Neglectful*, indicated by the positive OR for the interaction between Other ethnicity and *Neglectful* parenting.

#### 10.4.2. Implications:

I carried out analyses to investigate mediation of ethnic variations in adolescent health behaviours by perceived parenting styles (objectives D and E) in Chapter 9. Here I consider the implications of my key findings in relation to the aims of my Thesis and implications for policy or intervention.

The overall aim of my thesis is to investigate whether perceived parenting styles explain ethnic variations in health behaviours among DASH study adolescents. For this to be the case the following conditions should be met. Firstly, there should be ethnic variations in adolescent health behaviours, secondly there should be ethnic variations in perceived

parenting styles, and third there should be associations between perceived parenting styles and adolescent health behaviours. Furthermore, for perceived parenting styles to explain ethnic variations in adolescent health behaviours ethnic variations in adolescent health behaviours should be reduced upon adjustment for perceived parenting styles.

While the first three of these conditions were all met, the fourth criteria was only partially fulfilled. There were some minor reductions in ethnic variations in adolescent health behaviours, especially dietary behaviours, when adjusting for parenting styles, but ethnic variations remained largely unexplained. This is probably because ethnic minority adolescents tended to perceive both more *Authoritative* and more *Authoritarian* parenting than White UK adolescents and these differing parenting styles had opposing associations with health behaviours. Adjusting for parenting styles therefore meant these opposing influences somewhat cancelled each other out, resulting in little change to the ethnic variations in health behaviours overall.

This does not necessarily mean that intervening on parenting styles would have no impact. The controlled direct effect estimates were based on the idea of intervening such that all adolescents perceive a particular parenting style (i.e. *Permissive*) parenting. This hypothetical universality of parenting means that the opposing influences of the ethnic variations in parenting can work against each other and that intervening would have little impact on ethnic variations overall. However, if interventions on parenting were less universal, for example, only intervening to change ethnic minority parenting where it is *Authoritarian* (i.e. only where it would lead to worse outcomes) then the impacts could be different. A possible avenue for further study would be to estimate what set of interventions on parenting for which ethnic minority groups might result in optimal outcomes across both ethnic minority and White majority groups.

## 10.5. Strengths and limitations

The main strengths of my Thesis relate to the DASH study that provides the data for my study, and the methodology that I have chosen to use to achieve my research aims.

The ethnic diversity of the DASH study sample and its range of behavioural, socioeconomic, psychosocial, and sociocultural measures presents the opportunity to look at ethnic variations in adolescent health behaviours and to investigate possible mechanisms. I took advantage of the range of information collected by the DASH study, selecting variables to represent cultural values and structural inequalities, to examine their roles in ethnic variations in adolescent health behaviours and parenting styles. Although other variables could have been included, the variables that I did include were selected purposively as potentially important confounders or moderators based on the literature review in chapter 4. My outcome variables are current tobacco and alcohol use, lifetime illicit drug use, body size based on BMI, daily fruit and vegetable consumption, and weekly physical activity, which is a wider range of health behaviour outcomes than included in previous studies of this type. I used latent class analysis to derive clusters of adolescent health behaviours in the DASH study sample. As discussed in my background chapter (Section 3.4), since health behaviours tend to co-occur, looking at their clusters is potentially more informative than looking at individual health behaviours, when considering interventions or policy.

I chose to use a range of statistical methods that were well suited to my research aims. Latent class analysis allowed me to identify clusters of adolescent health behaviours, whereas the majority of previous research has only examined ethnic variations in health behaviours independently of each other. This acknowledges that ethnic variations and patterns of mediation and moderation could potentially vary for different combinations of health behaviour outcomes. My investigation of clusters of health behaviours confirmed that findings were similar to those that would have been expected from investigating each behaviour independently. On the other hand, cluster analysis is a somewhat reductionist approach and, despite testing for model invariance by ethnicity, some information about the how prevalences of different health behaviours vary independently of each other in different groups of adolescents will be hidden.

Marginal Structural Modelling with Inverse Probability of Treatment Weights allowed me to investigate whether ethnic variations in adolescent health behaviours were mediated by parenting style, while adjusting for intermediate-confounding by structural inequalities. Structural inequalities were treated as intermediate confounders because they are likely to be confound of mediator-outcome relationships (i.e. between parenting and adolescent health behaviours) and are determined by ethnicity. Including

structural inequalities weight calculations controls for mediator-outcome confounding without excluding the effect of ethnicity that goes via structural inequalities. Intermediate confounding was a consistent weakness of previous research (see section 4.2.4), with results from traditional regression-based models potentially biased both without and without adjustment for such factors. Mine is the first study to use look use this sort of analysis to look whether ethnic variations in adolescent health behaviours were mediated by parenting style.

Limitations of this study include response biases (which include attrition from the study, non-response to particular questions, and systematic measurement error), assumptions about causal direction between variables (which have implications for which are considered confounders or mediators), and the DASH sampling strategy. Measurement error generally can lead to under-estimation of relationships between variables, meaning that results are conservative where measurement error may be present. However, where errors in measurement are systematic (i.e. related to the variables in question), then this can potentially lead to biases in either direction (i.e. over-estimation of relationships is possible too). A similar point might be made about non-response. If non-responses are random, or predictable from included variables, then they simply reduce statistical power for identifying relationships. However, if non-responses are systematic, and in particular are related to the values of the unmeasured, missing responses, then this can bias observed relationships such that both under and over-estimation are possible.

The DASH study made efforts to reduce response bias, by administering questionnaires under exam conditions and reassuring of participants that their answers would be anonymous. Nonetheless, responses may have been biased towards social desirable response options (such as indicating low substance use), and that bias might have varied by ethnicity (Furnham, 1986).

If this were the case, my analyses in Chapter 6 could have over-estimated ethnic variations in behaviours. Over-estimation of ethnic variations could also have biased my mediation analyses in Chapter 9, i.e. if ethnic minority adolescents were more likely to engage in substance use behaviours than reported, then proportions that were mediated by parenting styles could have been under-estimated. Specifically, if likelihoods of tobacco and illicit drug use among Black Caribbean and Black African adolescents, particularly those who attended a place of worship more frequently, were underestimated (i.e. overestimating ethnic variations), the proportion of these ethnic variations mediated by parenting styles could have been underestimated. Bias in

substance abuse measures could be addressed using laboratory tests; however, this would require extra resources and might discourage study participation.

Body mass index was calculated from standing height and body weight measures taken by trained researchers, and body size categories (*Not Overweight, Overweight, Obese*) were assigned based on body mass index (described in 5.1.2). Body mass index is a non-invasive, quick, easy, cost-effective and useful measure of adolescent body size (Adab et al., 2018). However, differences in adolescent body composition are likely to somewhat confound ethnic differences in levels of overweight and obesity based on body mass index; for instance, BMI has been found to underestimate body fat among South Asian children and overestimate body fat among Black African children (Hudda et al., 2017). Further work is needed to better-understand how such ethnic differences in body composition affect measures of adolescent overweight and obesity based on body mass index.

Large proportions of missing responses for body size among White UK adolescents (18%) and Other ethnicity adolescents (75%) occurred because physical measures (body weight and standing height) were prioritised for the other ethnic groups to conserve study resources. This missingness might have resulted in under-estimation of ethnic variations in overweight and obesity. It could also have affected the latent class assignment, possibly explaining why body size had little bearing on clustering. However, this missingness should not have led to over-estimation of ethnic variations in body-size, unless body-size also affected the likelihood of a measure being taken. Further work could include the multiple imputation of missing values based on the available data.

Participants were asked how many minutes of physical activity they had engaged in during the preceding seven days. This is a cost-effective method used to assess physical activity. However, studies comparing it with objective measures, such as accelerometry, generally indicate poor validity with substantial over-estimates of physical activity (Lee et al., 2011). There is no particular reason to believe such response biases might be related to ethnicity or other study variables however, so this probably just means that relationships between physical activity and other variables are under-estimated.

Participants were asked how many portions of fruit and vegetables they ate on a typical day. This is likely to be a reliable measure (Livingstone and Robson, 2000, Prochaska and Sallis, 2004) although three sources of measurement error are acknowledged here. Firstly, the concept of a 'typical day' could confuse some participants resulting in missing or inaccurate responses. Secondly, participants may understand portion sizes differently and therefore under- or over-estimate consumption relative to each other.

Thirdly, participants may provide socially desirable answers, for instance if embarrassed by low fruit and vegetable consumption. Issues with portion size and social desirability might be reduced by using measures such as 24-hour recall or food diaries. However, such measures are more complex to administer, and more time and resource intensive, with adolescents needing to complete these over several days, or needing help to complete the measures. It is possible that social desirability bias was related to ethnicity and socioeconomic status. Ethnic minority adolescents tended to have lower socioeconomic status than White UK adolescents (as shown by descriptive analysis in section 5.1.6), and lower socioeconomic status adolescents with low fruit and vegetable consumption might report higher consumption or not respond through embarrassment. This could mean that ethnic variations in fruit and vegetable consumption were underestimated.

The focus of my Thesis is to investigate whether parenting styles moderated or mediated any ethnic variations in adolescent health behaviours. A shortened form of the Parental Bonding Instrument, validated for use among adolescents (Klimidis et al., 1992a, Klimidis et al., 1992b), was used to measure perceived parental care and control. Care and control scales were categorised as *High*, *Medium*, and *Low*, as for previous analyses of the DASH study. I combined *High* with *Medium* care to create a binary (*High-Low*) care variable, and combined *Low* with *Medium* control to create a binary (*Low-High*) control variable. I combined binary perceived care and control variables to construct a typology of four perceived parenting styles (Section 5.1.3). The use of a parenting styles typology provides information that may not be provided by looking at levels perceived parental care and control independently (Given, 2008). I found that compared to *Low* parental control, *Medium* parental control was associated with lower likelihoods of adolescent substance use behaviours, whereas *High* parental control was associated with higher likelihoods of substance use behaviours, so one avenue of further work would be to refine this typology. Categorising parenting styles based on three levels of perceived parental control might better capture the optimal style of parenting. In addition to questions about perceived parental care and control, respondents were asked how well they got on with their parents (mother and father figures separately); their responses could be incorporated into a parenting style typology as a parent-child relationship quality dimension. Also, while these parenting dimensions are perhaps most often explored in the literature, there could be other aspects of parenting that are important and might be explored in further work, such as specific parenting practices (e.g. parental monitoring), or parental attitudes towards specific health behaviours.

The omission of parental attitudes towards health behaviours is a potential source of bias. For example, if parental attitudes towards substance use influenced both parenting style (as I have measured it) and adolescent substance use, they would be confounders of relationships between parenting style and adolescent substance use, and by omitting parental attitudes my analyses in chapter 8 may have over-estimated those relationships. Furthermore, if parental attitudes were also determined by ethnicity they would lie on a causal path between ethnicity and adolescent substance use and would be intermediate-confounders with respect to analyses in chapter 9, and would need to have been included in the probability of treatment weight calculations for the marginal structural models (VanderWeele, 2009). However, I thought it more plausible that parental attitudes towards substance use were determined by parenting styles, rather than vice versa. Given that assumption, it would have been inappropriate to include a measure of parental attitudes towards substance use in the models, as this would have blocked part of the effects of interest (i.e. the effects of parenting style that operate via parental attitudes towards substance use).

Similar arguments can be made about whether peer or parental behaviours should have been included. Peer and parental behaviours are likely to be determined by ethnicity and influence adolescent behaviours, placing them on the causal pathway. If that were the case then adjusting for peer and parental behaviours would exclude the effects of ethnicity on adolescent health behaviours that went through peer or parental behaviours and bias estimates of the effects of ethnicity on health behaviours.

It is also possible that peer and parental behaviours influence parenting style. For instance, parents who are concerned about peer behaviours might be stricter, and parents with unhealthy behaviours might be more lenient. If that were the case, peer or parental behaviours should be treated as confounders of the effects of parenting style on adolescent health behaviours. By not adjusting for peer or parental behaviours estimates of the effects of parenting on adolescent health behaviours (chapter 8), and estimates of the effects of ethnicity on adolescent health behaviours that were mediated by parenting style (chapter 9), might be biased.

For example, Adolescents were asked whether their parents used tobacco. This variable could have been included in calculations for inverse probability of treatment weights for marginal structural models investigating mediation by parenting style of ethnic variations in adolescent tobacco use. This could have accounted for confounding of the effects of parenting style on adolescent tobacco use by parental tobacco use without excluding the effect of ethnicity that went via parental tobacco use. Adolescents were not asked about parents' other health behaviours, and they were not asked about peer



behaviours. Nevertheless, I made an assumption that peer and parent behaviour were more likely to be determined by parenting style, rather than vice versa. For example, it may be that more lenient parenting allows for more interaction with substance-using peers, or that less caring/more controlling parents are more likely to drink and smoke. This assumption means that adjustment for these variables in my models would be inappropriate and I therefore did not adjust for parental tobacco use in this way.

Measures of cultural values (generational status, religious attendance, and English language use) were chosen as proxies for collectivist cultural values, and acculturation. Including these variables in my study provided insight into the role of acculturation in ethnic variations in adolescent health behaviours and parenting styles, with acculturation often resulting in weaker ethnic effects. It was assumed that adolescents born in the UK, attended a place of worship less frequently, or spoke more English with their family were more acculturated, holding fewer collectivist cultural values. However, we do not know that was the case, and any connection between these measures and collectivist values might vary by ethnicity. Direct measures of collectivist cultural values, such as parental respect, would be useful additions to the study.

Another measure of acculturation that could have been included is peer ethnicity. Adolescents were asked whether their friends mostly belonged to their ethnic group, or other ethnic groups. Adolescents whose friends were mostly the same ethnicity as them might be less acculturated, holding more collectivist values. Further work could include ethnic diversity of friendships as an additional cultural moderator of ethnic variations in adolescent health behaviours and perceived parenting styles.

Household material disadvantage, family structure, household overcrowding, and experiences of racism were used as measures of structural inequalities. Household material disadvantage, family structure, and household overcrowding were considered measures of household socioeconomic status. Although these types of measures are commonly used as measures of socioeconomic status, especially among adolescents who may not be capable of accurately reporting their parents' incomes, education or occupational status, they are likely to be generally inaccurate measure of material disadvantage or socioeconomic status. A potential avenue for further work is to perform sensitivity analyses using simulations to estimate the degree of unmeasured confounding required to negate my findings (VanderWeele and Arah, 2011).

In relation to this section of my findings, this could mean that structural inequalities, and particularly household socioeconomic status, if I had been able to measure this more accurately, could potentially explain more of the ethnic variations in health behaviours than indicated. Thus, the estimates for proportions of ethnic variations

explained by structural inequalities are potentially conservative. One way to overcome this would have been to obtain detailed socioeconomic information directly from adolescents' parents. An area-based measure, such as the Indices of Multiple Deprivation, might also have been a useful addition, to be used in combination with my other structural inequality variables.

Some assumptions regarding causal direction between variables have already been discussed above, but my analyses assumed, for example, that parenting styles were determinants of health behaviours and that ethnicity determined other factors rather than vice versa, so the possibility of reverse causation needs to be considered.

It is difficult to imagine that adolescent health behaviours, parenting styles, or structural inequalities could cause ethnicity; therefore, we can say with some certainty that ethnic variations in the outcomes (adolescent health behaviours) and the mediators (structural inequalities and parenting styles) result in some way from ethnicity. Similarly, it seems more plausible that structural inequalities influence parenting styles, than vice-versa.

In my analyses, I assumed that parenting styles influenced adolescent health behaviours; however, reverse causation is a possibility. For instance, parents might react to concerns about unhealthy behaviours with greater parental control. In preliminary analysis, I found moderate positive correlations between baseline and follow-up parental care and control scores. This indicates that parenting styles were relatively stable between the two time points, whereas adolescents tended to initiate unhealthy behaviours after the baseline interviews. This supports the assumption that parenting styles influence adolescent health behaviours; however, we cannot entirely discount reverse causation. If parenting styles were in fact caused by adolescent health behaviours, we would be wrong to conclude that intervening to modify parenting would affect adolescent health behaviours.

The DASH sampling strategy more also limit the generalisability of the findings. The DASH study selected 51 schools in London boroughs that had large ethnic minority populations. This strategy had the advantage of produced a large and ethnically diverse sample at baseline. Ethnicity was self-reported (from 25 available ethnicities) and where possible missing values were imputed based on parents' and grandparents' countries of birth. Adolescents who identified as Black British or Asian British were categorised based on parents' and grandparents' countries of birth. Ethnic minorities were then categorised as Black Caribbean, Black African, Indian, Pakistani/ Bangladeshi or Other ethnicities.

The Black African group includes adolescents who identified their ethnicity as Black and Somalian, Ugandan, Nigerian, Ghanaian or Other African. There may be some similarities between these groups, but also heterogeneity that will have been hidden. Adolescents who did not fall into another group were categorised as 'Other ethnicity'. This is a diverse group including adolescents who identified as White and Irish, Greek, Turkish, Jewish, Kurdish, or Other White, Chinese, Vietnamese or Other Asian, and Mixed ethnicities (White and Black Caribbean, White and Black African, White and Asian, and Other Mixed).

Grouping ethnicities together in this way provides statistical power necessary for looking at ethnic differences. However, heterogeneity within groups is lost. Clearly, the Other ethnicity group may have little in common. Further work should attempt to investigate adolescent health behaviours and the role of parenting in smaller groups.

The sample breakdown by ethnicity and gender is shown in Table 5-3. At baseline, the sample size was 6,639. Forty-nine of the same schools took part at follow-up when the sample size was 4,785. My results were based on measures taken at follow-up and could potentially be biased if there were systematic differences in whether respondents were successfully followed-up. Apart from the loss of two schools, the main reason for attrition was pupils leaving their baseline school. The ethnic and gender breakdown of the sample was consistent at the two time points. With the exception of the body-size variable, missingness was low for each of the analytical variables and this was consistent across ethnic groups. None the less, further work could include the multiple imputation of missing values based on the available data, or weighting with respect to baseline characteristics.

However, potential attrition bias aside, the findings of my analysis may be specific to adolescents living in London at that time and should therefore be generalised to other populations with caution. In this respect, it is important to consider the characteristics of ethnic minority populations of interest. For instance, there may be different findings if the same study were carried out on the same ethnic groups in different parts of the country (e.g. South Asians in the West Midlands).

There are both strengths and limitations associated with my literature review. I carried out reviews of reviews to cover three broad and multi-disciplinary areas of literature (ethnic variations in adolescent health behaviours, ethnic variations in parenting styles, and associations between parenting styles and adolescent health behaviours). The advantage of this approach is that it allowed me to explore existing knowledge in these areas where comprehensive reviews of primary studies were not possible as part of this project. These reviews of reviews allowed me to develop research questions and

hypotheses for my analyses. In some areas however (in particular, ethnic variation in health behaviours and ethnic variations in parenting), most of the articles included were not systematic reviews. As the reviews included do not provide information about how studies were identified it is difficult to judge the quality of the evidence that they provide. Furthermore, articles discuss possible explanations of ethnic variations in adolescent health behaviours but often do not provide adequate evidence to assess the validity of their ideas. Therefore, it was necessary to identify additional research to fill those gaps. I carried out a detailed systematic review of primary studies that had looked at the central question of my Thesis (whether parenting mediated or moderated and ethnic variations in adolescent health behaviours). In that review I carried out systematic searches and quality assessment of the studies included (Section 4.2.4).

## 11. Conclusion

I carried out a series of analyses to investigate whether ethnic variations in health behaviours were mediated or moderated by perceived parenting styles, among almost five thousand adolescents who took part in the DASH study follow-up.

Broadly speaking, ethnic minority adolescents were less likely to engage in substance use but had poorer diets. Some of these ethnic variations were concentrated among less acculturated adolescents, indicating that cultural assimilation can be both harmful and beneficial. Poorer diets were partly mediated by structural inequalities. Parental care affected adolescent health behaviours more clearly than parental control. Unhealthier behaviours were associated with low parental care and *Authoritarian* or *Neglectful* parenting, whereas healthier behaviours were associated with higher care *Authoritative* and *Permissive* parenting. Both *Authoritative* and *Authoritarian* parenting styles were more common among ethnic minority adolescents and their effects might cancel each other out in my mediation analysis. Nonetheless, my findings provide evidence that targeted interventions to increase *Authoritative* and reduce *Authoritarian* parenting might be effective.

I used latent class analysis to investigate how adolescent health behaviours are clustered. My findings confirm that adolescent health behaviours are clustered together, supporting more person-centred approaches in addition to looking at prevalences of individual behaviours. This knowledge is particularly relevant to those designing interventions. Since substance use behaviours clustered together interventions targeting multiple behaviours have greater potential benefits than those targeting single behaviours, and could be more cost-effective than delivering several interventions. Researchers should be aware that substance use behaviours also clustered with high physical activity here. Further research should look at why this is the case, and interventions could target substance use that occurs among more physically active adolescents.

My research findings also increase our understanding of the roles of acculturation and structural inequalities in ethnic variations in adolescent health behaviours. More acculturated ethnic minority adolescents' health behaviours seem to converge with those of White UK adolescents. That is, they tend to have better diets, but higher rates of substance use, than less acculturated adolescents. This suggests that acculturation is not necessarily beneficial for adolescent health behaviours, and ethnic minority families should not be aimed at encouraging to acculturation at the expense of any cultural values responsible for lower levels of adolescent substance use. Ideally, integration of ethnic minority families in policy and institutional settings should not just aim to

acculturate ethnic minorities to the white majority, but also identify aspects of ethnic minority culture that could benefit the white majority. Research should further investigate the cultural determinants of adolescent health behaviours in order to better understand what aspects of ethnic minority culture are leading to lower substance use, and see whether these values can be used to promote lower substance use in the white majority.

Structural inequalities are conditions that are unequally distributed across groups in society. I selected household material disadvantage, family structure, household overcrowding and experiences of racism as measures of structural inequalities. Ethnic minority adolescents in the DASH study disproportionately experienced these conditions, and in some cases these inequalities were concentrated among less acculturated families. Based on findings that structural inequalities mediated healthier diets among ethnic minority adolescents, we may be able to alleviate some dietary inequalities by either targeting dietary interventions to adolescents who are exposed to more structural inequalities (based on ethnicity and acculturation) or by reducing structural inequalities.

Compared to White UK adolescents, Black Caribbean and Black African adolescents perceived lower parental care, while all ethnic minority adolescents perceived greater parental control and both more *Authoritative* and more *Authoritarian* styles of parenting. My analysis went further by investigating whether acculturation and structural inequalities played any role in those ethnic variations.

My findings indicate that some ethnic variations in parenting were moderated by acculturation, and some were partly mediated by structural inequalities. Among Black Caribbean, Black African and Other ethnicity adolescents, structural inequalities explained higher likelihoods of *Low* (rather than *High*) parental care and *Authoritarian* parenting (rather than *Permissive* parenting). Among Black Caribbean adolescents, otherwise higher likelihoods of *Medium* rather than *Low* parental control, and among Pakistani/ Bangladeshi adolescents, otherwise higher likelihoods of *High* rather than *Low* parental control, were suppressed by structural inequalities. *Low* parental care was concentrated among Black Caribbean adolescents who were born abroad, and *Neglectful* parenting was concentrated among Pakistani/ Bangladeshi adolescents who spoke less English with their family. The latter of those two moderated ethnic variations was partly mediated by structural inequalities.

Policies that alleviate structural inequalities such as Scottish Child Payments (Scottish Government, 2019) could therefore potentially promote higher care, and more *Permissive* or *Authoritative* styles of parenting, and reduce ethnic variations in

parenting. Such interventions could be targeted to Black Caribbean, Black African, Other ethnicity adolescents, and less acculturated Pakistani/ Bangladeshi/ Pakistani adolescents. As such policies are implemented their impact on families in different ethnic groups should be evaluated to inform future policy decisions. Further research should investigate how the 2008 financial crisis has affected structural inequalities and whether this has affected ethnic variations in parenting.

I went on to look at the influence of parenting on adolescent health behaviours. As anticipated based on my literature review, higher levels of parental care, and more *Authoritative* or *Permissive* parenting, were linked to healthier adolescent behaviours. Although the influence of parental control were less clear, *Medium* control appeared to inhibit substance use behaviours (compared to *Low* control), while higher levels of control were linked to unhealthier diets. These findings indicate that interventions that encourage authoritative parenting could be used to modify adolescent behaviours.

My findings indicate that moderate control may be beneficial compared to lower or higher levels. Interventions that increase parental control could have negative effects. More research is therefore needed to investigate the optimum levels of parental control.

My key research question was: do parenting styles mediate or moderate ethnic variations in adolescent health behaviours? To answer this question I carried out causal mediation analysis using marginal structural models with inverse probability of treatment weights. With this methodology, I was able to control for intermediate confounding of relationships between parenting and adolescent health behaviours by structural inequalities, which are most likely determined by ethnicity. Previous studies looking at this question have used other methods and have not treated intermediate confounders appropriately and may therefore be biased. Therefore, in this respect, my study makes an important contribution to strengthening methodological rigour in this area of research.

The results of my mediation analyses indicated that only small amounts of any ethnic variations in adolescent health behaviours were removed by setting all respondents to the same parenting style. The largest proportions of ethnic variations in health behaviours that could be reduced in this way were in fruit and vegetable consumption. Thus, a universally-targeted intervention aimed at getting all parents of adolescents to use a particular parenting style, such as *Authoritative*, might be expected to reduce ethnic variations in fruit and vegetable consumption, but have relatively little impact on ethnic variations in substance use. The lack of stronger mediation effects may be due to the fact that ethnic minority adolescents reported both more *Authoritative* and

more *Authoritarian* parenting, and the effects of these two styles of parenting would cancel each other out to some extent when setting everyone to the same parenting style. Nonetheless, interventions that are more specifically targeted could have different impacts. For example, an *Authoritative* style of parenting was associated with lower substance use and substance use was most prevalent among white UK adolescents. Intervening to increase the prevalence of *Authoritative* parenting in the White UK families (but not ethnic minority families) could therefore potentially reduce this ethnic disparity in adolescent substance use. Furthermore, interventions to prevent adolescent health behaviours could be targeted to ethnic groups where levels of *Authoritarian* parenting are highest.



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## 13. Appendices

### Appendix A: Literature review search terms

MeSH terms							
Ethnic groups	Parent-Child Relations	Smoking	Alcohol drinking	Substance-Related Disorders	Exercise	Food habits	Body weight
Population groups	Parenting		Alcoholism	Marijuana abuse	Physical fitness	Food preferences	Obesity
Continental population groups	Child rearing		Alcoholic intoxication	Marijuana smoking		Fruit	Overweight
Minority groups	Family Conflict		Binge drinking	Inhalant Abuse		Vegetables	
	Intergenerational Relations			Cocaine-Related Disorders		Adolescent Nutritional Physiological Phenomena	
				Heroin Dependence		Diet	
				Opioid-Related Disorders		Nutritive value	
				Substance Abuse, Intravenous		Satiation	
				Amphetamine-Related Disorders			

**Embase search terms:**

Ethnic groups	child parent relation	adolescent smoking	drinking behavior	addiction	Sedentary lifestyle	Child nutrition	Obesity
Population groups	child rearing	smoking	Alcoholism	cannabis addiction	Exercise	Eating habit	Morbid obesity
Ancestry groups	family conflict	cigarette smoking	alcohol intoxication	inhalant abuse	Physical activity	Fast food	Body mass
Minority group			binge drinking	substance abuse		Food intake	Skinfold thickness
Ethnicity			alcohol consumption	drug abuse		Fruit	Childhood obesity
Ethnology				drug dependence		Satiety	
				cocaine dependence		Vegetable	
						Caloric intake	
						Carbohydrate intake	
						Diet	
						Dietary intake	
						Fat intake	
						Sugar intake	



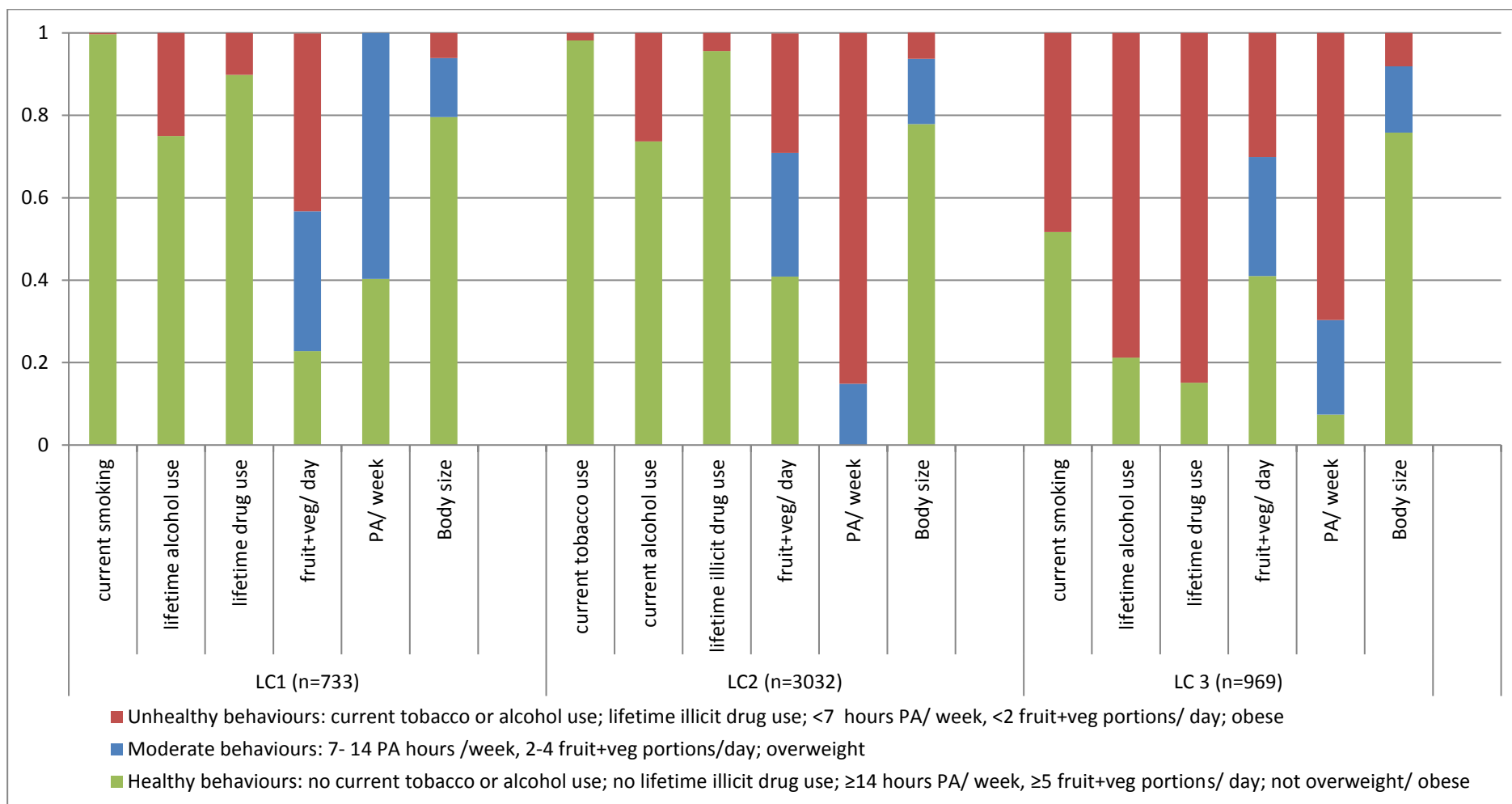
**SocIndex search terms:**

Ethnic groups	Parent & Child	Adolescent psychology	Smoking	BINGE drinking	heroin abuse	Exercise	Nutrition	Obesity
Ethnicity	Child rearing	Teenage girls	TEENAGERS -- Tobacco use	ALCOHOLISM	marijuana abuse	Physical fitness	Food habits	Body weight
Ethnology		Teenage boys	YOUTH -- Tobacco use	ALCOHOLISM -- Social aspects	cocaine abuse		Food consumption	Overweight persons
		Teenagers	CIGARETTE smokers	ALCOHOLIC intoxication	Drug abuse		Fast food	Body size
		Students	TOBACCO use	ALCOHOLIC beverages	drug use			
				DRINKING of alcoholic beverages	substance abuse -- prevention			
				YOUTH & alcohol	substance abuse			
				BLACK youth -- Alcohol use				
				YOUNG adults -- Alcohol use				

Free text:								
"ethnic"	"Parent**"	"Adolescen**"	"Smoking"	"Drunk**"	"cannabis"	"activity behavio**"	"dietary behavio**"	"Body weight"
"ethnicity"	"Authoritative parent**"	"Teenage**"	"cigar**"	"Drinking alcohol"	"glue sniffing"	"sedentary behavio**"	"food choice"	"Obesity"
"race"	"Low care-high control parent**"	"Student**"	"tobacco"	"Alcohol consumption"	"sniffing glue"	"exercise"	"fruit intake"	"Overweight"
"racial"	"Permissive parent**"	"Youth"	"smok**"	"Consuming alcohol"	"ecstasy"		"fruit consumption"	
"Black African"	"Low care-low control parent**"	"Young people"		"Alcohol use"	"Cocaine"		"vegetable intake"	
"Black British"	"Uninvolved parent**"	"Young person**"		"Using alcohol"	"Crack"		"vegetable consumption"	
"Black person"	"Parenting style**"	"Boy**"		"Alcohol misuse"	"heroin"		"FV"	
"Black people"	"Parental care"	"Girl**"		"Alcohol abuse"	"amphetamine**"		"FV intake"	
"African decent"	"Parental control"				"LSD"		"FV consumption"	
"African origin"	"Parental responsiveness"				"khat"		"junk food"	
"African"	"Parental monitoring"						"fast food"	
"Caribbean"	"Parental warmth"							
"African Caribbean"	"Harsh parent**"							
"Black Caribbean"	"Strict parent**"							
"Afro-Caribbean"	"Parental discipline"							
"West Ind**"	"Parent attachment"							
"British South Asian"	"child attachment"							

"British Asian"	"parent involvement"							
"South Asian British"	"Parental involvement"							
"South Asian"	"parental support"							
"Pakistan**"								
"India**"								
"Bangladesh**"								

## Appendix B: Latent Class Charts



Item response probabilities for model consisting of three latent classes of adolescent health behaviours