Racism, ethnic density and psychological well-being through adolescence: evidence from the Determinants of Adolescent Social well-being and Health longitudinal study

Thomas Astell-Burt*, Maria J. Maynard, Erik Lenguerrand and Seeromanie Harding

Social and Public Health Sciences Unit, Medical Research Council (MRC), 4 Lilybank Gardens, Glasgow G12 8RZ, UK

(Received 14 March 2011; final version received 1 November 2011)

Objective. To investigate the effect of racism, own-group ethnic density, diversity and deprivation on adolescent trajectories in psychological well-being.

Design. Multilevel models were used in longitudinal analysis of psychological well-being (total difficulties score (TDS) from Goodman’s Strengths and Difficulties Questionnaire, higher scores correspond to greater difficulties) for 4782 adolescents aged 11–16 years in 51 London (UK) schools. Individual level variables included ethnicity, racism, gender, age, migrant generation, socio-economic circumstances, family type and indicators of family interactions (shared activities, perceived parenting). Contextual variables were per cent eligible for free school-meals, neighbourhood deprivation, per cent own-group ethnic density, and ethnic diversity.

Results. Ethnic minorities were more likely to report racism than Whites. Ethnic minority boys (except Indian boys) and Indian girls reported better psychological well-being throughout adolescence compared to their White peers. Notably, lowest mean TDS scores were observed for Nigerian/Ghanaian boys, among whom the reporting of racism increased with age. Adjusted for individual characteristics, psychological well-being improved with age across all ethnic groups. Racism was associated with poorer psychological well-being trajectories for all ethnic groups \((p < 0.001)\), reducing with age. For example, mean difference in TDS (95% confidence interval) between boys who experienced racism and those who did not at age 12 years \(= 1.88 \pm 1.75\) to \(= 2.01\); at 16 years \(= 1.19 \pm 1.07\) to \(= 1.31\). Less racism was generally reported in schools and neighbourhoods with high than low own-group density. Own ethnic density and diversity were not consistently associated with TDS for any ethnic group. Living in more deprived neighbourhoods was associated with poorer psychological well-being for Whites and Black Caribbeans \((p < 0.05)\).

Conclusion. Racism, but not ethnic density and deprivation in schools or neighbourhoods, was an important influence on psychological well-being. However, exposure to racism did not explain the advantage in psychological well-being of ethnic minority groups over Whites.

Keywords: psychological well-being; adolescence; racism; deprivation; ethnic density/diversity; neighbourhoods; schools

*Corresponding author. Email: t.astell-burt@sphsu.mrc.ac.uk

ETHNICITY & HEALTH
Vol. 17, Nos. 1–2, February–April 2012, 71–87

ISSN 1355-7858 print/ISSN 1465-3419 online
© 2012 Taylor & Francis
http://dx.doi.org/10.1080/13557858.2011.645153
http://www.tandfonline.com
Introduction

Emerging evidence in the UK suggests that some ethnic minorities have better psychological well-being in early adolescence than their White peers (Fagg et al. 2006, Maynard et al. 2007, Goodman et al. 2008, Goodman et al. 2010, Maynard and Harding 2010a, 2010b), and that markers of the quality of family interactions and connectedness, such as shared activities and perceived parenting, are key correlates of psychological well-being regardless of socio-economic circumstances (Maynard and Harding 2010a, 2010b). Adolescence is, however, a formative period when family influences may decrease and characteristics of the wider context, neighbourhoods and schools in particular, could become critical influences (Jencks and Mayer 1990). There is a significant body of literature on the harmful effect of racism on physical health and psychological well-being (Paradies 2006). Some evidence suggests that individuals spending much of their time among people of the same ethnicity are less likely to report racism (Bécares et al. 2009, Das-Munshi et al. 2010). The ethnic density hypothesis posits that common social norms and support networks in ethnically dense areas may be protective of health (Pickett and Wilkinson 2008). Longitudinal studies of these issues in ethnically diverse cohorts are sparse. In this article, we explore the extent to which trajectories in psychological well-being between early and late adolescence are influenced by the experience of racism, whether the prevalence of racism varies from one context to another, and whether ethnic density and deprivation play a significant role in shaping psychological well-being through this early stage of the life course.

Evidence in support of the ethnic density hypothesis in relation to psychological well-being, mainly from cross-sectional studies, has been equivocal to date. Beneficial effects on health of more ethnically dense contexts (Boydell et al. 2001, Veling et al. 2008, Das-Munshi et al. 2010, Gieling et al. 2010), a mix of beneficial and negative associations depending on the ethnic group (Halpern and Nazroo 1999, Bécares et al. 2009), negative effects at higher levels of exposure (Fagg et al. 2006), and no effect of ethnic density on psychological well-being (Xue et al. 2005, Pickett et al. 2009) have all been reported. Only a few of these studies have considered psychological well-being in childhood and adolescence (Xue et al. 2005, Fagg et al. 2006, Gieling et al. 2010).

The historic differences in migration between the USA and the UK relates to contrasts in settlement patterns between the two countries. For example, in the 2000 US census, while 60 per cent of the Black American population in Chicago lived in neighbourhoods where they formed between 90 and 100% of the population, there are no single ethnic minority neighbourhoods in the UK (Peach 2009). Neighbourhoods thought to be ethnically dense in the UK are ethnically and socially diverse (Simpson and Finney 2009) although, overall, ethnic minorities are more likely to live in deprived areas than their White peers. Ethnic diversity may also be an important influence on psychological well-being.

Blumer’s group position theory of prejudice and the conflict hypothesis contend that individuals within ethnically-diverse contexts have less trust and fewer ties with people of other ethnic groups, focusing interactions more towards those of the same ethnicity (Blumer 1958). The conflict and ethnic density hypotheses both imply that ethnic diversity increases the risk of tension between ethnic groups. Putman’s constrict hypothesis goes further in contending that greater ethnic diversity results in
withdrawal from collective life and the reduction of both in-group and out-group solidarity; that is, in Putnam’s terms, less ‘bonding’ and ‘bridging’ social capital (Putnam 2007). Not only may the risk of experiencing racism be greater, but ethnic diversity may also have an independently negative effect on health through the absence of local social support. By contrast, Allport’s contact hypothesis proposes that positive relations between ethnic groups and social solidarity are encouraged in more ethnically diverse settings, where the opportunity for contact with people from a different ethnic group is greater (Allport 1954). With more contact, people are said to overcome initial reservations and prejudices, while developing trust and solidarity. Unlike the ethnic density hypothesis which implies benefits of being around people similar to oneself, the contact hypothesis suggests that prejudicial beliefs may be reinforced when individuals are surrounded by more of their own group and with fewer opportunities to meet other ethnic groups on a regular basis, thereby increasing the risk of experiencing racism when interactions do occur. In comparison to the rapidly expanding literature on ethnic density, however, these theories of ethnic diversity have received less attention in research on ethnic inequalities in health.

In this analysis, we use UK-based longitudinal data at 11–16 years on the main ethnic groups in the Determinants of Adolescent Social well-being and Health (DASH) study (Harding et al. 2007) to address the following questions: (1) What is the effect of racism on ethnic-specific age trajectories of psychological well-being? (2) Is ethnic density or deprivation related to perceived racism across different ethnic groups? (3) Does the ethnic density of neighbourhoods or schools modify the effect of racism on psychological well-being, independent of deprivation or family life?

Methods
Detailed information on the DASH study is available elsewhere (Harding et al. 2007). In brief, DASH is a longitudinal study of 6645 adolescents from 51 schools in 10 of London’s 32 boroughs. These 10 boroughs were selected as having high proportions and numbers of people from ethnic minority groups. Ethical approval was obtained from the Multi-centre Research Ethics Committee and from Local Education Authorities. The baseline survey was conducted in 2003/2004 when participants were aged 11–13 years, with 4782 adolescents participating in a follow-up in 2005/2006 at age 14–16 years. In both surveys, each individual self-completed a structured questionnaire on their health and social circumstances. The sample included White UK, Indian, Pakistani and Bangladeshi, Black Caribbean, Nigerian and Ghanaian, and Other African boys and girls. For reporting convenience we refer to the White UK in the text as ‘White’; Nigerians and Ghanaians, Other Africans and Black Caribbeans are referred to as ‘Black African origin’ where similar patterns are reported. Data for the remaining DASH participants of other ethnicities (e.g., Mixed) are not presented in this article as they are of insufficient number to draw reliable statistical inference.

Outcome measure
Psychological well-being was measured using Goodman’s 25-item Strengths and Difficulties Questionnaire (SDQ), a behavioural screening tool providing coverage of
children’s behaviour, emotions and peer relations (Goodman 1997), validated for use in multi-cultural settings (Achenbach et al. 2008). The SDQ comprises five scales: emotional symptoms; conduct problems; hyperactivity; peer problems; and pro-social behaviour. The first four of these scales are summed to calculate a total difficulties score (TDS) ranging from 0 to 40, with higher scores representing increasing difficulties (http://www.sdqinfo.com). Differences in scores between groups are within the ‘normal’ range and are therefore not indicative of clinical morbidity, per se. Each 1-point increase in child-reported SDQ, however, corresponds to an increased probability of clinician-assigned mental disorder (Goodman and Goodman 2009).

**Individual level explanatory or confounding variables**

Experience of racism was the key variable of interest, assessed with the question: ‘Has anyone made you feel bad or hassled you because of your race, skin colour or where you were born?’ Separate responses were requested for the settings ‘at home’, ‘at school’ and ‘where you live’ (Krieger 1990, Krieger and Sidney 1996). A single dichotomous outcome variable was constructed with affirmative responses in any or all settings as the ‘yes’ category.

Ethnicity was primarily self-reported; individuals identifying as ‘Black British’, ‘Asian British’ or no ethnic group were re-classified according to parental ethnicity and parental/grandparental country of birth.

Family type was defined as two-parent, reconstructed or cohabiting, lone parent and other (e.g., foster parents). Family activities were assessed using a cumulative frequency of activities, including watching television, eating meals together, indoor and outdoor games, visiting family and friends. Perceived parental care and control were measured using an eight-item scale; higher scores denote more care and control respectively. Individual socio-economic circumstances (SEC) were measured using tertiles of a score based on 17 standard of living items. Generation status was defined as UK-born or overseas-born.

**Contextual explanatory variables**

School characteristics were derived from the 2003 and 2006 school censuses (http://www.teachernet.gov.uk/management/ims/datacollections/) and neighbourhood characteristics from the 2001 census (http://www.neighbourhood.statistics.gov.uk). We calculated the neighbourhood measures based on output areas (OAs), the smallest level at which census data are accessible, which contain about 297 individuals on average (Vickers and Rees 2007).

Own-group ethnic density was calculated as the percentage of the same ethnic group within the residential neighbourhood or the school attended. For example, Black Caribbean adolescents were assigned the percentage of the neighbourhood population that identified as Black Caribbean in the 2001 Census, where a higher percentage denotes greater own-group ethnic density. Nigerians, Ghanaians and Other Africans were each assigned ‘Black African’ density in neighbourhoods as census data was not available for each group individually. Own-group ethnic density varied, with any ethnic minority group being far less likely to be the majority group than Whites. Mean ethnic minority density in schools varied between 3.1% (95%
confidence interval: 2.9–3.3) for Other Africans to 26.8% (26.0–27.5) for Nigerians and Ghanaians; in neighbourhoods it varied between 13.0% (95% confidence interval 12.7–13.3) for Black Caribbeans to 18.2% (17.4–19.1) for Indians. The corresponding figures for Whites were 33.3% (32.3–34.3) in schools and 60.1% (59.2–61.0) in neighbourhoods.

Ethnic diversity was calculated using the Herfindahl index (Putnam 2007), which is the sum of the squared proportions of each ethnic group within a neighbourhood or school. A score equal to the proportion of all possible ethnic groups reflects an ethnically diverse context. For example, 10 ethnic groups equally proportionally represented within a neighbourhood would give a score on the Herfindahl index of 0.1. Higher scores denote contexts where the proportional representation of some ethnic groups are greater than for others, while a score of one indicates the presence of one ethnic group only.

Deprivation measures were derived separately for neighbourhoods and schools. In neighbourhoods, we used the 2001 census to calculate the Carstairs index (Carstairs and Morris 1989) based on overcrowding, male unemployment, low social class and car ownership. In schools, we calculated the percentage of the school population eligible for free school meals, which individuals were entitled to receive if their families claimed UK welfare benefits (http://www.direct.gov.uk/en/Parents/Schoolslearninganddevelopment/SchoolLife/DG_4016089). Higher Carstairs scores and percentages of free school meals denote more deprived circumstances.

**Statistical analysis**

Repeated measures were obtained from the same pupils at 11–13 and 14–16 years. Although pupils were nested within schools and neighbourhoods, preliminary analyses showed clustering at each level was not statistically significant. A two-level random slopes (on age) model with measurements nested within pupils was used, with a continuous measure of TDS as the outcome. All variables were considered as time-dependant, except generational status, gender and ethnicity. The log-likelihood ratio test was used to identify statistically significant effects ($p < 0.05$).

To investigate ethnic-specific age trajectories of psychological well-being and the effect of racism on these trajectories, gender-specific models were run, adjusting for racism and other individual level explanatory variables. Age was linearly associated with TDS through adolescence (polynomial functions of age were not statistically significant). We fitted interaction terms to explore how TDS trajectories varied between ethnic groups (age × ethnicity), the effect of racism on TDS varied through adolescence (age × racism) and for differential effects of racism across ethnic groups (racism × ethnicity). We used information on all individuals to estimate mean TDS between 12 and 16 years old, accounting for 98% of the sample.

Ethnic-specific cross-tabulations and logit regression were used to explore the extent that ethnic density or deprivation (each expressed in tertiles) was related to the reporting of racism for different ethnic groups. Using ethnic-specific models, we explored to what extent the ethnic density and deprivation (tertiles) of neighbourhoods and schools modified the effect of racism on TDS, independent of individual explanatory variables. Contextual variables were added to the baseline model (adjusted for all individual level variables) sequentially. To maintain statistical power, gender was included as an explanatory variable, controlling for gender-specific age trajectories.
within ethnic groups using interaction terms. We explored modification of the racism effect using interaction terms between contextual variables and racism. Results from linear mixed models are presented as predicted mean values with 95% confidence intervals.

Approximately 20% of answers to the racism question at 11–13 years were absent, with some variation by ethnic group. We used Multiple Imputation by Chained Equations (27 imputations combined using Rubin’s rules to handle missing data (White et al. 2010)). Models were run in Stata v.10.

Results

Table 1 shows that by age 14–16 years, all ethnic minority groups reported significantly more experiences of racism than their White peers. The reporting of racism significantly increased for Nigerian/Ghanaian boys and girls, while a decrease was noted among Pakistani/Bangladeshi boys. The increased prevalence of racism reported among Nigerian/Ghanaian boys coincided with the lowest age-adjusted mean TDS (i.e., the most favourable psychological well-being) at baseline and follow-up. By 14–16 years, significantly lower mean TDS scores were observed among Pakistani/Bangladeshi and Black African origin boys, and Indian girls compared to their White peers. Mean TDS scores among boys (except for Nigerian/Ghanaian boys) were significantly lower at 14–16 years compared to 11–13 years.

Compared to their White peers, all ethnic minorities (with the exception of Indian boys at 11–13 years and Indian girls at 14–16 years) were more likely to attend schools or live in neighbourhoods that were classified as deprived. White boys and girls were significantly more likely to attend schools and live in neighbourhoods with high own-group ethnic density than their peers in other ethnic groups (except for Pakistani/Bangladeshi boys and girls, and Nigerians/Ghanaian girls in schools, by 14–16 years). Other Africans attended schools with the lowest levels of own-group density. Whites were also more likely to be situated in the schools and neighbourhoods with low ethnic diversity than any other ethnic group.

In baseline models adjusted for individual-level characteristics only (including perceived racism), the psychological well-being advantage for the ethnic minority groups noted above remained. Mean differences in TDS (95% confidence intervals) for these ethnic minority groups compared to Whites among boys were $-0.79 \ (-1.54, -0.03)$ for Black Caribbeans; $-2.52 \ (-3.44, -1.60)$ Nigerians/Ghanaians; $-1.32 \ (-2.12, -0.51)$ Pakistani/Bangladeshis; $-1.10 \ (-2.05, -0.15)$ Other Africans; and $-1.96 \ (-2.92, -1.01)$ for Indian girls. In these adjusted models, psychological well-being scores improved through adolescence among both boys and girls, and this effect was constant by ethnicity. Figure 1 shows the effect of racism on psychological well-being through adolescence, adjusting for individual-level characteristics only. Those who reported racism had higher mean TDS (poorer psychological well-being) compared to those who did not, in each ethnic group. The improvement in psychological well-being was greater for those who reported racism than those who did not, indicating that the impact of racism on psychological well-being decreased with age. Age-specific mean difference in TDS (95% confidence interval) between those who experienced racism and those who did not at age 12 years $= +1.88 \ (+1.75 \ to \ +2.01); +1.19 \ (+1.07 \ to \ +1.31)$ at age 16 years for boys; $+2.29 \ (+2.12 \ to \ +2.47)$ at age 12 years; $+1.43 \ (+1.29 \ to \ +1.57)$ at
Table 1a. Sample characteristics\textsuperscript{a} at age 11–13 and 14–16 years, by ethnic group and gender (boys)

|                      | White UK | Indian | Pakistani and Bangladeshi | Black Caribbean | Nigerian and Ghanaian | Other African |
|----------------------|----------|--------|---------------------------|-----------------|------------------------|-------------|
|                      | 11–13y   | 14–16y | 11–13y                    | 14–16y          | 11–13y                 | 14–16y      | 11–13y | 14–16y |
| **N**                | 492      | 237    | 306                       | 390             | 207                    | 211         |
| **Individual level variables (%)** |          |        |                           |                 |                        |             |
| Racism experienced  | 17.8     | 20.4   | 30.7\(\dagger\)          | 32.2\(\dagger\)  | 26.6\(+\)              | 23.6        | 29\(\dagger\) | 38.7\(+\) |
| Migrant generation  | 4.4      | 27.1   | 28.8\(\pm\)              | 29.4\(\pm\)     | 24.2\(\pm\)            | 24.2        | 72.5    | 72.5    |
| Higher deprived tertile circumstances | 54.6     | 20.5\(\dagger\) | 57.5                       | 14.4\(\dagger\)  | 72.5 \(\pm\)              | 22.3\(\dagger\) | 69.2 \(\pm\) | 25.9     |
| Lower deprived tertile | 8.9     | 48.9\(\dagger\) | 6.9                       | 47.8\(\dagger\)  | 2.2 \(\dagger\)              | 34.6\(\dagger\) |
| In lone parent households | 19.9    | 19.6   | 3.8 \(\pm\)               | 7.6 \(\pm\)     | 9.5 \(\pm\) \(\dagger\) | 11.5\(\dagger\) |
| Parental care        | 25.8     | 44.0\(\dagger\) | 33.0\(\dagger\)          | 38.0\(\dagger\)  | 29.4 \(\pm\)              | 40.9\(\dagger\) |
| Higher care tertile  | 39.1     | 26.2\(\dagger\) | 41.7                       | 31.4\(\dagger\)  | 40.4 \(\dagger\)              | 29.3\(\dagger\) |
| Parental control     | 54.4     | 46.8\(\dagger\) | 40.9\(\dagger\)          | 41.7 \(\pm\)    | 37.3 \(\pm\)              | 44.7\(\dagger\) |
| Higher control tertile | 21.9   | 23.6   | 34.7 \(\pm\)              | 34.9 \(\dagger\) | 36.5 \(\pm\)              | 32.4\(\dagger\) |
| Family activities    | 33.7     | 62.4\(\dagger\) | 22.4\(\dagger\)          | 39.4\(\dagger\)  | 17.1 \(\dagger\)              | 39.5\(\dagger\) |
| Higher activities tertile | 26.1    | 8.4\(\dagger\) | 32.4                       | 11.1\(\dagger\)  | 38.8 \(\pm\)              | 17.3\(\dagger\) |
| Total difficulties Age-adjusted mean score | 11.29   | 10.3\(\dagger\) | 10.61                       | 9.76\(\dagger\)  | 10.11\(\dagger\)              | 9.48\(\dagger\) |
| Ethnic density       | 41.3     | 50.2\(\dagger\) | 41.4                       | 47.3\(\dagger\)  | 27.8 \(\pm\)              | 32.4\(\dagger\) |
| Ethnic diversity     | 22.0     | 33.0\(\dagger\) | 50.6 \(\pm\)              | 52.7 \(\pm\)\(\dagger\)  | 29.4\(\dagger\) \(\dagger\) | 35.3 \(\pm\) |
| Ethnic specific prevalence significantly different from the White UK prevalence category \(p < 0.05\), \(\dagger\) \(p < 0.01\), \(+\) \(p < 0.001\); \(\dagger\) Prevalence significantly different from the corresponding prevalence measured at 11–13 years \(p < 0.05\), \(\dagger\) \(p < 0.01\), \(+\) \(p < 0.001\)
|                          | White UK       | Indian          | Pakistani and Bangladeshi | Black Caribbean | Nigerian and Ghanaian | Other African |
|--------------------------|----------------|-----------------|---------------------------|----------------|------------------------|--------------|
|                          | 11–13y         | 14–16y         | 11–13y                    | 14–16y         | 11–13y                | 14–16y       | 11–13y                | 14–16y       | 11–13y                | 14–16y       |
| N                        | 381            | 182            | 140                       | 389            | 298                    | 176          |                         |              |                         |              |
| Individual level variables (%) |                |                |                           |                |                        |              |                         |              |                         |              |
| Racism                   |                |                |                           |                |                        |              |                         |              |                         |              |
|                          | 14.4           | 16.5           | 27.3¥                    | 32.0±          | 31.7±                  | 22.9†        | 28.5±                  | 24.6†        | 34.4!!                 | 26.2†        |
|                          |                |                |                           |                |                        |              |                         |              |                         |              |
| Migrant generation       |                |                |                           |                |                        |              |                         |              |                         |              |
|                          | 4.2            | 28.6±          | 17.9±                    | 23.9±          | 16.1±                  | 68.0±        |                         |              |                         |              |
| Socio-economic circumstances |                |                |                           |                |                        |              |                         |              |                         |              |
| Higher deprived tertile  | 56.5           | 18.6!!         | 66.0†                    | 75.9±          | 23.1!!                 | 72.4±        | 32.1!!                 | 84.3±        | 31.8!!                 | 78.9±        |
|                          |                |                |                           |                |                        |              |                         |              |                         |              |
| Family type              |                |                |                           |                |                        |              |                         |              |                         |              |
| In lone parent households | 22.3           | 19.8           | 5.5                      | 8.2†           | 8.6                    | 17.1         | 45.8                    | 47.4±        | 23.5                    | 26.6†        |
| Parental care            |                |                |                           |                |                        |              |                         |              |                         |              |
| Lower care tertile       | 22.8           | 44.8†          | 31.8†                    | 46.9!!         | 31.4†                  | 45.6!!       | 31.7†                  | 58.2!!       | 36.4±                  | 63.4!!       |
| Higher care tertile      | 46.2           | 23.6!!         | 38.8                      | 26.1!!         | 41.4                    | 26.6!!       | 41.3                    | 15.4!!       | 35.6±                  | 15.8!!       |
| Parental control         |                |                |                           |                |                        |              |                         |              |                         |              |
| Lower control tertile    | 63.4           | 50!!           | 45.1                     | 58.2!!         | 36.7                    | 56.6!!       | 44.7                    | 55.4!!       | 41.4±                  | 55.1!!       |
| Higher control tertile   | 15.6           | 22.0!!         | 32.4                      | 24.2           | 36.1                    | 21.4!        | 30.1±                   | 19.2!!       | 33.6±                  | 20.5!!       |
| Family activities        |                |                |                           |                |                        |              |                         |              |                         |              |
| Lower activities tertile | 35.7           | 65.3!!         | 25.6¥                    | 46.9!!         | 26.6                    | 43.2!!       | 30.8                    | 57.2!!       | 31.0±                  | 57.4!!       |
| Higher activities tertile| 43.1           | 13.7!!         | 44.6                      | 20.5!!         | 53.5†                   | 33.8!!!      | 47.6                    | 18.5!!       | 44.8±                  | 16.0!!       |
| Total difficulties score (95% confidence intervals) | 11.13 (10.61, 11.97) | 13.11 (10.82, 14.61) | 9.5 ± (8.75, 10.25) | 6.3 ± (8.68, 10.39) | 11.35 ± (10.49, 11.81) | 11.01 ± (10.20, 11.81) | 11.45 ± (10.94, 11.96) | 11.01 ± (11.23, 11.56) | 10.98 ± (11.21, 11.50) | 10.78 ± (11.06, 11.50) |
| School variables         |                |                |                           |                |                        |              |                         |              |                         |              |
| Free meals eligibility   |                |                |                           |                |                        |              |                         |              |                         |              |
| Lower deprived tertile   | 37.8           | 39.1           | 45.1                      | 35.7!!         | 16.4±                   | 11.4!!       | 25.5±                   | 23.7±        | 44.0                    | 44.0         |
| Higher deprived tertile  | 23.9           | 23.6           | 35.7†                     | 27.5!!         | 57.9±                   | 52.9±        | 40.9±                   | 28.5!!       | 32.2†                   | 22.2!!       |
| Ethnic density           |                |                |                           |                |                        |              |                         |              |                         |              |
| Lower dense tertile      | 26.3           | 37.5!!         | 50 ±                      | 46.4†          | 47.9±                   | 46.4         | 37.0†                   | 50.6!!       | 16.1†                   | 12.4!!       |
| Higher dense tertile     | 53.0           | 47.0!!         | 26.9                      | 20.9!!         | 27.9±                   | 52.1!!       | 16.5±                   | 11.3!!       | 30.9±                   | 57.4!!       |
| Ethnic diversity         |                |                |                           |                |                        |              |                         |              |                         |              |
| Higher diverse tertile   | 27.0           | 26.8           | 52.2                      | 70.9!!         | 55.7                    | 61.4!!       | 32.7                    | 28.8±        | 28.9                    | 10.7!!       |
| Lower diverse tertile    | 48.0           | 46.5           | 13.2                      | 12.6           | 15.7                    | 13.7         | 26.2±                   | 24.2±        | 34.2±                   | 38.5†        |
| Neighbourhood variables  |                |                |                           |                |                        |              |                         |              |                         |              |
| Deprivation              |                |                |                           |                |                        |              |                         |              |                         |              |
| Lower deprived tertile   | 54.3           | 54.8           | 37.7±                     | 40.9†          | 27.1±                   | 26.4±        | 29.1±                   | 29.5±        | 18.2±                   | 24.2!!       |
| Higher deprived tertile  | 18.4           | 17.7           | 26.0†                     | 23.1           | 39.3                    | 40.4         | 31.0±                   | 31.7±        | 51.9±                   | 46.8!!       |
| Ethnic density           |                |                |                           |                |                        |              |                         |              |                         |              |
| Lower dense tertile      | 0.8            | 0.5            | 45.7±                     | 49.5±          | 60±                     | 60±          | 60.4±                   | 61.2±        | 41.1±                   | 47.8!!       |
| Higher dense tertile     | 96.8           | 97.1           | 27.1±                     | 27.1±          | 14.3±                   | 15.7±        | 4.4±                    | 3.4±         | 19.9±                   | 17.9!!       |
| Ethnic diversity         |                |                |                           |                |                        |              |                         |              |                         |              |
| Higher diverse tertile   | 16.6           | 15.6           | 59.5±                     | 53.4±          | 59.3±                   | 58.6±        | 31.6±                   | 29.8!!       | 34.0±                   | 29.6±        |
| Lower diverse tertile    | 60.7           | 61.7           | 11.2±                     | 15.5±          | 15.7±                   | 15.7±        | 30.2±                   | 32.5±        | 27.7±                   | 30.7±        |

|                          |                |                |                           |                |                        |              |                         |              |                         |              |
| a Percentages unless otherwise indicated;  
| b Ethnic specific prevalence significantly different from the White UK prevalence category p < 0.05,  
| † p < 0.01, ± p < 0.001;  
| * Prevalence significantly different from the corresponding prevalence measured at 11–13 years p < 0.05,  
| ‡ p < 0.01, ‡‡ p < 0.001
age 16 years for girls. This effect was constant across ethnic groups. Additionally the psychological well-being advantage for the ethnic minority groups detailed above remained with the adjustment for racism.

Figure 1. The influence of racism on mean total difficulties scores (TDS) for age 12–16 years. Separate linear mixed models for boys and girls: models adjusted for: ethnicity, racism, age, racism x age, migrant generational status, family type, individual socio-economic circumstance, parental care, parental control and family activities.

Ethnicity & Health 79
Table 2 shows the proportions that reported racism within each ethnic group by school and neighbourhood deprivation/ethnic density measures. Among Whites, more racism was reported in more deprived schools and neighbourhoods. A similar pattern was seen for Pakistanis/Bangladeshis, and Nigerians/Ghanaians in relation to neighbourhood deprivation. There was a broad pattern of more racism reported in schools and neighbourhoods with low than high own-group density. For Other Africans there was no difference by either school or neighbourhood own densities, and for Indians and Black Caribbeans, there was no difference by neighbourhood own density. Only for Whites did the prevalence of racism significantly vary according to the level of ethnic diversity, with more racism reported in more diverse schools and neighbourhoods.

Table 3 shows the effect of school deprivation and ethnic density measures, adjusted for all individual-level variables, on psychological well-being. School contextual measures were not associated with TDS. There was one exception – Other Africans in schools with high own-group density now showed a higher TDS than those in low own group density.

Table 4 shows the corresponding results for neighbourhood deprivation and density measures, adjusted for all individual level variables. Neighbourhood deprivation was associated with increased mean TDS for Whites, but not for the ethnic minority groups, remaining after controlling for own-group density and diversity \((p \leq 0.05)\). Neither own-group density nor ethnic diversity was associated with TDS. After controlling for diversity, the effect of deprivation on psychological well-being among Black Caribbeans became significant. No interaction was found between deprivation and the effect of racism on mean TDS among Whites or Nigerians and Ghanaians. The simultaneous adjustment of all school and neighbourhood characteristics within each model did not materially alter these results.

To check the sensitivity of our results to definition, we re-ran all analyses using neighbourhood variables measured for lower super output areas (LSOA), which contain a mean of 1500 individuals, and also for separated responses for the racism variable (i.e., racism experienced ‘at home’, ‘at school’ and ‘where you live’). These sensitivity checks did not change the overall findings.

**Discussion**

**Principal findings**

After taking into account individual characteristics, psychological well-being improved over time for all adolescents irrespective of ethnicity. Ethnic minority boys (except Indian boys), and Indian girls reported better psychological well-being throughout adolescence compared to their White peers, consistent with findings from previous cross-sectional research which indicated an advantage in psychological well-being among ethnic minority adolescents (Fagg et al. 2006, Maynard et al. 2007, Goodman et al. 2010, Maynard and Harding 2010a, Maynard and Harding 2010b). The significant psychological well-being advantage reported for Indian girls, but not for Indian boys, may be explained by potentially fewer externalising problems among girls. Further longitudinal research to investigate ethnic and gender differences in TDS subscales is warranted.
Table 2. The prevalence of racism by deprivation and ethnic density, for each ethnic group.

| Ethnicity & Health | White UK | Indian | Pakistani and Bangladeshi | Black Caribbean | Nigerian and Ghanaian | Other African |
|--------------------|----------|--------|---------------------------|----------------|-----------------------|--------------|
| **School**         |          |        | Percentage (95% confidence intervals) |
| Free meals eligibility | Lower 13.4 (10.39, 16.39) | 27.8 (22.12, 33.43) | 35.0 (29.50, 40.59) | 29.6 (25.42, 33.69) | 30.9 (25.46, 36.37) | 29.3 (23.06, 35.44) |
|                    | Higher 22.9** (19.20, 26.69) | 34.0 (27.67, 40.29) | 27.3 (21.87, 32.78) | 24.2 (19.97, 28.41) | 29.7 (24.31, 34.99) | 27.0 (20.60, 33.41) |
| Ethnic density     | Lower 23.7 (20.13, 27.34) | 36.1 (30.22, 41.97) | 39.0 (33.21, 44.79) | 31.7 (27.59, 35.86) | 36.9 (31.37, 42.46) | 30.4 (24.10, 36.61) |
|                    | Higher 11.1** (8.48, 13.81) | 26.09† (20.54, 31.65) | 26.9* (21.58, 32.11) | 23.4* (19.31, 27.45) | 27.6† (22.32, 32.93) | 30.9 (24.57, 37.26) |
| Ethnic diversity   | Higher 18.4 (15.16, 21.71) | 28.9 (22.41, 35.34) | 28.8 (22.19, 35.49) | 26.3 (22.30, 30.23) | 31.5 (26.39, 36.68) | 30.0 (23.54, 36.37) |
|                    | Lower 11.5* (8.71, 14.29) | 28.1 (22.16, 33.94) | 33.7 (28.18, 39.30) | 25.9 (21.77, 29.99) | 29.5 (24.12, 34.95) | 27.5 (21.72, 33.36) |
| **Neighbourhood**  |          |        | Percentage (95% confidence intervals) |
| Deprivation        | Lower 14.1 (11.15, 16.94) | 30.2 (24.42, 35.93) | 39.3 (33.48, 45.11) | 26.6 (22.65, 30.63) | 36.3 (30.94, 41.69) | 30.6 (24.40, 36.79) |
|                    | Higher 21.5* (17.90, 25.15) | 31.9 (25.70, 38.06) | 23.2** (17.99, 28.42) | 27.2 (22.99, 31.48) | 26.2† (21.05, 31.35) | 33.0 (26.48, 39.45) |
| Ethnic density     | Lower 22.8 (19.17, 26.42) | 34.4 (28.58, 40.28) | 38.7 (33.05, 44.39) | 26.9 (22.70, 31.09) | 35.5 (30.11, 40.94) | 28.1 (22.06, 34.22) |
|                    | Higher 11.1** (8.42, 13.69) | 27.0 (21.19, 32.72) | 24.7* (19.23, 30.06) | 22.3 (18.44, 26.11) | 25.0* (19.98, 29.98) | 30.9 (24.56, 37.27) |
| Ethnic diversity   | Higher 23.5 (19.83, 27.09) | 29.0 (22.90, 35.01) | 29.1 (23.46, 34.65) | 26.2 (22.03, 30.27) | 31.4 (26.03, 36.70) | 32.9 (26.54, 39.16) |
|                    | Lower 11.3** (8.64, 13.90) | 33.9 (28.11, 39.75) | 35.5 (29.99, 41.08) | 28.4 (24.31, 32.56) | 33.7 (28.26, 39.08) | 28.9 (22.74, 35.01) |

*Ethnic-specific logit models were used to estimate significance levels for each ethnic group, using the Huber White sandwich estimator to adjust for repeated observations through time. Tertiles 1 and 3 of each contextual variable are reported.

†Significantly different from the reference category. p < 0.05; *p < 0.01; **p < 0.001.
Table 3. The effect of racism and school characteristics on mean total difficulties scores, by ethnic group.

|                  | White UK | Indian | Pakistani and Bangladeshi | Black Caribbean | Nigerian and Ghanaian | Other African |
|------------------|----------|--------|---------------------------|----------------|-----------------------|--------------|
|                  | Mean total difficulties score (95% confidence intervals) |
| **Baseline model** |          |        |                           |                |                       |              |
| **Racism**       |          |        |                           |                |                       |              |
| No               | 10.73 (10.45, 11.01) | 9.29 (8.85, 9.72) | 9.65 (9.23, 10.07) | 10.42 (10.11, 10.73) | 9.85 (9.46, 10.24) | 9.81 (9.37, 10.25) |
| Yes              | 12.37** (11.86, 12.89) | 11.44** (10.83, 12.04) | 11.40** (10.82, 11.99) | 11.76** (11.30, 12.23) | 10.96** (10.41, 11.50) | 11.72** (11.12, 12.33) |
| **Baseline + free meals eligibility** |          |        |                           |                |                       |              |
| **Racism**       |          |        |                           |                |                       |              |
| No               | 10.73 (10.45, 11.01) | 9.29 (8.85, 9.73) | 9.65 (9.23, 10.08) | 10.42 (10.11, 10.73) | 9.84 (9.45, 10.23) | 9.81 (9.37, 10.25) |
| Yes              | 12.38** (11.86, 12.91) | 11.43** (10.82, 12.04) | 11.40** (10.81, 11.98) | 11.76** (11.29, 12.22) | 10.97** (10.42, 11.52) | 11.72** (11.12, 12.33) |
| **Free meals eligibility** |          |        |                           |                |                       |              |
| Lower            | 11.23 (10.77, 11.69) | 9.77 (9.11, 10.43) | 10.27 (9.64, 10.89) | 10.89 (10.43, 11.35) | 10.11 (9.49, 10.74) | 10.75 (10.07, 11.44) |
| Higher           | 11.04 (10.58, 11.51) | 10.55 (9.86, 11.24) | 10.14 (9.57, 10.71) | 10.79 (10.30, 11.28) | 10.56 (9.98, 11.14) | 10.23 (9.60, 10.87) |
| **Baseline + free meals eligibility + ethnic density** |          |        |                           |                |                       |              |
| **Racism**       |          |        |                           |                |                       |              |
| No               | 10.73 (10.45, 11.01) | 9.30 (8.86, 9.74) | 9.66 (9.24, 10.08) | 10.42 (10.11, 10.73) | 9.85 (9.45, 10.24) | 9.81 (9.38, 10.25) |
| Yes              | 12.39** (11.87, 12.92) | 11.40** (10.79, 12.01) | 11.39** (10.81, 11.98) | 11.75** (11.29, 12.22) | 10.96** (10.42, 11.51) | 11.71** (11.12, 12.31) |
| **Free meals eligibility** |          |        |                           |                |                       |              |
| Lower            | 11.20 (10.73, 11.67) | 9.85 (9.18, 10.51) | 10.23 (9.60, 10.87) | 10.84 (10.38, 11.31) | 10.16 (9.53, 10.79) | 10.59 (9.89, 11.29) |
| Higher           | 11.11 (10.60, 11.62) | 10.58 (9.89, 11.28) | 10.17 (9.59, 10.75) | 10.84 (10.35, 11.34) | 10.57 (9.98, 11.15) | 10.33 (9.69, 10.97) |
| **Ethnic density** |          |        |                           |                |                       |              |
| Lower            | 10.97 (10.52, 11.43) | 10.22 (9.54, 10.91) | 10.25 (9.59, 10.91) | 10.68 (10.21, 11.15) | 10.38 (9.77, 10.98) | 9.93 (9.31, 10.55) |
| Higher           | 11.27 (10.79, 11.75) | 9.78 (9.16, 10.39) | 10.30 (9.64, 10.96) | 10.70 (10.22, 11.17) | 9.84 (9.27, 10.42) | 11.11* (10.52, 11.70) |
| **Baseline + free meals eligibility + ethnic diversity** |          |        |                           |                |                       |              |
| **Racism**       |          |        |                           |                |                       |              |
| No               | 10.72 (10.44, 11.00) | 9.30 (8.86, 9.74) | 9.65 (9.23, 10.08) | 10.42 (10.11, 10.73) | 9.84 (9.45, 10.23) | 9.81 (9.37, 10.25) |
| Yes              | 12.42** (11.90, 12.94) | 11.40** (10.79, 12.01) | 11.40** (10.81, 11.99) | 11.75** (11.28, 12.22) | 10.97** (10.43, 11.52) | 11.72** (11.12, 12.33) |
| **Free meals eligibility** |          |        |                           |                |                       |              |
| Lower            | 11.01 (10.51, 11.51) | 9.59 (8.89, 10.29) | 10.31 (9.68, 10.95) | 10.95 (10.49, 11.42) | 10.06 (9.42, 10.69) | 10.77 (10.07, 11.46) |
| Higher           | 11.14 (10.66, 11.63) | 10.59† (9.87, 11.26) | 10.11 (9.52, 10.69) | 10.78 (10.29, 11.27) | 10.65 (10.04, 11.26) | 10.24 (9.60, 10.89) |
| **Ethnic diversity** |          |        |                           |                |                       |              |
| Lower            | 11.01 (10.57, 11.45) | 9.66 (8.97, 10.36) | 10.53 (9.89, 11.18) | 11.07 (10.62, 11.52) | 10.13 (9.58, 10.69) | 10.58 (9.94, 11.23) |
| Higher           | 11.37 (10.88, 11.86) | 10.10 (9.46, 10.75) | 10.30 (9.68, 10.91) | 10.42 (9.96, 10.89) | 10.38 (9.78, 10.97) | 10.23 (9.57, 10.88) |

*Baseline adjusted for: racism, age, gender, age × gender, migrant generational status, family type, socio-economic circumstance, parental care, parental control and family activities.
†Significantly different from the reference category $p < 0.05$; *$p < 0.01$; **$p < 0.001$. 

T. Astell-Burt et al.
Table 4. The effect of racism and neighbourhood characteristics on mean total difficulties scores, by ethnic group.

|                          | White UK | Indian | Pakistani and Bangladeshi | Black Caribbean | Nigerian and Ghanaian | Other African |
|--------------------------|----------|--------|---------------------------|----------------|-----------------------|--------------|
|                          | Mean total difficulties score (95% confidence intervals) |
| **Baseline model**       |          |        |                           |                |                       |              |
| Racism                   |          |        |                           |                |                       |              |
| No                       | 10.73    | (10.45–11.01) | 9.29 (8.85–9.73) | 9.65 (9.23–10.07) | 10.42 (10.11–10.73) | 9.85 (9.46–10.24) | 9.81 (9.37–10.25) |
| Yes                      | 12.37**  | (11.86–12.89) | 11.44** (10.83–12.04) | 11.40** (10.82–11.99) | 11.76** (11.30–12.23) | 10.96** (10.41–11.50) | 11.72** (11.12–12.33) |
| **Baseline + deprivation** |          |        |                           |                |                       |              |
| Racism                   |          |        |                           |                |                       |              |
| No                       | 10.74    | (10.46–11.02) | 9.29 (8.85–9.73) | 9.66 (9.24–10.08) | 10.42 (10.11–10.73) | 9.85 (9.46–10.25) | 9.81 (9.37–10.25) |
| Yes                      | 12.35**  | (11.84–12.87) | 11.44** (10.83–12.04) | 11.38** (10.79–11.97) | 11.76** (11.30–12.23) | 10.94** (10.4 to 11.49) | 11.72** (11.12–12.33) |
| Deprivation              |          |        |                           |                |                       |              |
| Lower                    | 10.66    | (10.20–11.11) | 9.64 (8.97–10.31) | 10.42 (9.79–11.05) | 10.48 (10.01–10.95) | 10.32 (9.74–10.90) | 10.56 (9.92–11.21) |
| Higher                   | 11.37**  | (10.91–11.83) | 10.40 (9.73–11.06) | 10.05 (9.41–10.69) | 11.10 (10.63–11.57) | 9.98 (9.41–10.55) | 10.34 (9.69–10.99) |
| **Baseline + deprivation + ethnic density** |          |        |                           |                |                       |              |
| Racism                   |          |        |                           |                |                       |              |
| No                       | 10.74    | (10.45–11.02) | 9.29 (8.86–9.73) | 9.65 (9.23–10.07) | 10.42 (10.11–10.73) | 9.86 (9.47–10.26) | 9.81 (9.36–10.25) |
| Yes                      | 12.36**  | (11.84–12.89) | 11.42** (10.81–12.03) | 11.42** (10.83–12.00) | 11.77** (11.30–12.23) | 10.92** (10.38–11.47) | 11.72** (11.11–12.33) |
| Deprivation              |          |        |                           |                |                       |              |
| Lower                    | 10.58    | (10.05–11.12) | 9.62 (8.95–10.29) | 10.56 (9.90–11.22) | 10.45 (9.98–10.93) | 10.03 (9.33–10.73) | 10.61 (9.89–11.34) |
| Higher                   | 11.51†   | (10.98–12.04) | 10.42 (9.75–11.09) | 9.96 (9.29–10.62) | 11.11 (10.64–11.58) | 10.25 (9.61–10.90) | 10.30 (9.57–11.02) |
| Ethnic density           |          |        |                           |                |                       |              |
| Lower                    | 10.72    | (10.20–11.25) | 10.40 (9.74–11.07) | 9.43 (8.78–10.09) | 10.85 (10.38–11.33) | 10.49 (9.80–11.18) | 10.26 (9.55–10.97) |
| Higher                   | 11.05    | (10.51–11.59) | 9.89 (9.22–10.56) | 10.29 (9.62–10.96) | 10.81 (10.34–11.27) | 9.64 (8.98–10.30) | 10.49 (9.75–11.22) |
| **Baseline + deprivation + ethnic diversity** |          |        |                           |                |                       |              |
| Racism                   |          |        |                           |                |                       |              |
| No                       | 10.73    | (10.45–11.02) | 9.29 (8.85–9.73) | 9.66 (9.24–10.08) | 10.42 (10.11–10.73) | 9.86 (9.46–10.25) | 9.80 (9.37–10.24) |
| Yes                      | 12.37**  | (11.85–12.89) | 11.43** (10.82–12.04) | 11.39** (10.80–11.97) | 11.76** (11.30–12.23) | 10.94** (10.39–11.48) | 11.73** (11.12–12.34) |
| Deprivation              |          |        |                           |                |                       |              |
| Lower                    | 10.57    | (10.03–11.11) | 9.58 (8.89–10.27) | 10.62 (9.94–11.30) | 10.37 (9.88–10.87) | 10.47 (9.85–11.09) | 10.41 (9.73–11.10) |
| Higher                   | 11.49†   | (10.96–12.01) | 10.44 (9.76–11.12) | 9.93 (9.27–10.59) | 11.17† (10.69–11.66) | 9.85 (9.25–10.46) | 10.45 (9.78–11.13) |
| Ethnic diversity         |          |        |                           |                |                       |              |
| Higher                   | 10.82    | (10.30–11.34) | 9.84 (9.16–10.51) | 10.49 (9.83–11.14) | 10.43 (9.95–10.91) | 10.57 (9.96–11.18) | 10.09 (9.43–10.75) |
| Lower                    | 11.12    | (10.58–11.67) | 10.05 (9.39–10.72) | 9.74 (9.06–10.41) | 10.93 (10.44–11.43) | 9.90 (9.28–10.51) | 10.70 (10.02–11.38) |

aBaseline adjusted for: racism, age, gender, age × gender, migrant generational status, family type, socio-economic circumstance, parental care, parental control and family activities.

bSignificantly different from the reference category $p < 0.05$; *$p < 0.01$; **$p < 0.001$. 
In line with a systematic review of the effect of racism on health by Paradies (2006), we found that racism was associated with poorer psychological well-being throughout adolescence for all ethnic groups. The effect was constant across ethnic groups despite greater reporting of racism among minority groups. We also found a decrease in the size of the effect of racism on psychological well-being with age, which has not previously been reported. This increasing resilience with age may potentially be explained by coping strategies developed through experience and increasing maturity (Brondolo et al. 2009).

The reporting of racism varied by context and ethnic group and, consistent with the conflict (Blumer 1958) and constrict (Putnam 2007) hypotheses, Whites in more ethnically diverse contexts were more likely to report racism. The reporting of racism was generally lower in neighbourhoods and schools with higher than lower own-group ethnic densities. However, we found little evidence of an effect of own group ethnic density or diversity on adolescent psychological well-being, in contrast to previous studies among adult populations (e.g., Bécares et al. 2009, Das-Munshi et al. 2010). Previous studies have reported increasing ethnic density associated with externalising problems among Dutch minority youth (Gieling et al. 2010), and high neighbourhood own-group ethnic density associated with attenuation of the psychological well-being advantage among UK ‘South Asian’ adolescents (Fagg et al. 2006). Thus, to date, there is little support for the ethnic density hypothesis (i.e., that increasing own-ethnic group density is associated with better health (Pickett and Wilkinson 2008) in relation to adolescent psychological well-being. Xue et al. (2005) found that neighbourhood deprivation was associated with increased mental health problems among US children in different ethnic groups. We found neighbourhood deprivation was associated with poorer psychological well-being among Whites, and for Black Caribbeans after adjustments for neighbourhood density or diversity. All other ethnic minority groups appeared resilient to the influence of neighbourhood deprivation on psychological well-being.

Overall, we report little evidence of contextual effects on psychological well-being in these analyses. Two definitions of neighbourhood of contrasting sizes were compared and similar results were found for both. Nevertheless, we acknowledge the possibility that each of these definitions may mask real neighbourhood effects (Flowerdew et al. 2008) and may poorly reflect what ‘neighbourhood’ really means for individuals (Galster 2001).

**Strengths and weaknesses**

The key strength of the DASH study is that it is longitudinal with large samples of the main ethnic groups in the UK. For adolescents, both the neighbourhood and school contexts may be simultaneously important for their psychological well-being. We took into account the cross-classification of contextual exposure in neighbourhoods and schools. We used both own-group ethnic density and ethnic diversity, in recognition of the contemporary context of children straddling different symbolic worlds. Most of the DASH respondents were born in the UK, but their parents are likely to have been born in home countries. Children may return home to fairly culturally concentrated environments but they attend schools with diverse ethnic populations.
There are limitations to the study that warrant mentioning. Missing data was a significant issue for the measure of racism at 11–13 years, however, we found no material difference in the effect sizes, their direction or significance, between imputed and non-imputed data. Additionally, although longitudinal, the follow-up period of our study may not be long enough to observe the effects of neighbourhood and school characteristics on psychological well-being, which could manifest later in the life course. Arguably, the temporal mismatch between the ethnic density data and the DASH data could have contributed to a non-effect but the extent of ethnic clustering is not thought to have changed substantially (Simpson and Finney 2009). As in all observational studies, reverse causality cannot be discounted, since it is plausible that adolescents with poorer well-being may report more racism. As DASH is a London-based study, it is possible that our findings are contextually specific and contrasting results may be found among studies set in different geographical areas. Some suggest that the UK housing allocation system promoted the concentration of ethnic minorities in some of the poorest neighbourhoods (Phillips 1998). Whether by choice or discriminatory forces, a failure to account for the non-random nature of neighbourhood or school exposure limits the validity of any observational study inferring contextual effects (Jencks and Mayer 1990).

Conclusion

Racism adversely influenced psychological well-being throughout adolescence, while the ethnic density of schools and neighbourhoods had little significant impact. The effect of racism on psychological well-being was significantly greater in early compared to late adolescence. White adolescents in more deprived neighbourhoods had poorer psychological well-being, while their ethnic minority counterparts appeared resilient to a potential effect of neighbourhood deprivation. Despite being more likely to experience racism, the psychological well-being of ethnic minorities was not significantly poorer than their White peers. Additional longitudinal studies are required to monitor trajectories in psychological well-being through adolescence into young adulthood, at which time in the life course any ethnic minority advantage may be eroded by prolonged exposure to racism in neighbourhoods and places of study and work.

Key messages

(1) What is known:

- Racism adversely affects mental health in adult populations.
- There is a paucity of longitudinal research, exploring relationships between contextual factors and psychological well-being among adolescents from different ethnic groups.

(2) What this study adds:

- Racism was significantly associated with psychological well-being throughout adolescence and the effect was greater in early adolescence.
- Despite minority groups being more likely to report racism than their White peers, the effect of racism on psychological well-being was similar across ethnic groups.
Own-group density, ethnic diversity and deprivation of schools and
neighbourhoods were generally not associated with the psychological
well-being of ethnic minority groups.

(3) Policy/wider implications:
- Efforts to reduce exposure to racism will benefit the psychological well-
  being of all adolescents, regardless of their ethnic group.
- Further longitudinal studies are required to investigate the role of context
  and racism on ethnic differences in psychological well-being during the
  transition from late adolescence to young adulthood.

Acknowledgements
We acknowledge all of the schools and pupils who participated in the DASH Study, the survey
assistants involved with data collection, and the civic leaders whose help was invaluable in
achieving high response rates. We thank Alastair Leyland for his support in the modelling of
cross-classified hierarchical data in MLwiN. We also thank the anonymous referees for their
comments on the manuscript. Census output is Crown Copyright and is reproduced with the
permission of the Controller of HMSO and the Queen’s Printer for Scotland. Thomas Astell-
Burt formulated the research questions, conducted the analyses and produced the first and
final drafts of the article. All authors contributed to the study design and to the redrafting of
the article. Seeromanie Harding is the Principal Investigator of DASH. This study was funded
by a Career Development Fellowship held by Thomas Astell-Burt at the Medical Research
Council (MRC) Social and Public Health Sciences Unit (UK) between 2009 and 2012.

References
Achenbach, T., et al., 2008. Multicultural assessment of child and adolescent psychopathology
with ASEBA and SDQ instruments: research findings, applications, and future directions.
Journal of Child Psychology and Psychiatry, 49 (3), 251–275.
Allport, G., 1954. The nature of prejudice. Reading, MA: Addison-Wesley.
Bécares, L., Nazroo, J., and Stafford, M., 2009. The buffering effects of ethnic density on
experienced racism and health. Health and Place, 15 (3), 670–678.
Blumer, H., 1958. Race prejudice as a sense of group position. Pacific Sociological Review,
1 (1), 3–7.
Boydell, J., et al., 2001. Incidence of schizophrenia in ethnic minorities in London: ecological
study into interactions with environment. British Medical Journal, 323 (7325), 1336.
Brondolo, E., et al., 2009. Coping with racism: a selective review of the literature and a
theoretical and methodological critique. Journal of Behavioral Medicine, 32 (1), 64–88.
Carstairs, V. and Morris, R., 1989. Deprivation and mortality: an alternative to social class?
Journal of Public Health, 11 (3), 210–219.
Das-Munshi, J., et al., 2010. Understanding the effect of ethnic density on mental health:
multi-level investigation of survey data from England. British Medical Journal, 341 (c5367).
Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2962884/pdf/bmj.c5367.pdf
Fagg, J., et al., 2006. Psychological distress among adolescents, and its relationship to
individual, family and area characteristics in East London. Social Science & Medicine,
63 (3), 636–648.
Flowerdew, R., Manley, D.J., and Sabel, C.E., 2008. Neighbourhood effects on health: does it
matter where you draw the boundaries? Social Science & Medicine, 66 (6), 1241–1255.
Galster, G., 2001. On the nature of neighbourhood. Urban Studies, 38 (12), 2111–2124.
Gieling, M., Vollebergh, W., and Van Dorsselaer, S., 2010. Ethnic density in school classes and
adolescent mental health. Social Psychiatry and Psychiatric Epidemiology, 45, 639–646.
Goodman, R., 1997. The Strengths and Difficulties Questionnaire: a research note. Journal of
Child Psychology and Psychiatry, 38 (5), 581–586.
Goodman, A. and Goodman, R., 2009. Strengths and Difficulties Questionnaire as a dimensional measure of child mental health. Journal of the American Academy of Child & Adolescent Psychiatry, 48 (4), 400–403.

Goodman, A., Patel, V., and Leon, D., 2008. Child mental health differences amongst ethnic groups in Britain: a systematic review. BMC Public Health, 8 (1), 258.

Goodman, A., Patel, V., and Leon, D., 2010. Why do British Indian children have an apparent mental health advantage? Journal of Child Psychology and Psychiatry, 51 (10), 1171–1183.

Halpern, D. and Nazroo, J., 1999. The ethnic density effect: results from a national community survey of England and Wales. International Journal of Social Psychiatry, 46 (1), 34–46.

Harding, S., et al., 2007. Cohort profile: the DASH (Determinants of Adolescent Social wellbeing and Health) Study, an ethnically diverse cohort. International Journal of Epidemiology, 36 (3), 512–517.

Jencks, C. and Mayer, S., 1990. The social consequences of growing up in a poor neighborhood. In: L.E. Lynn and M.F.H. Mcgeary, eds. Inner-city poverty in the United States. Washington, DC: National Academy Press, 111–186.

Krieger, N., 1990. Racial and gender discrimination: risk factors for high blood pressure? Social Science & Medicine, 30 (12), 1273–1281.

Krieger, N. and Sidney, S., 1996. Racial discrimination and blood pressure: the CARDIA Study of young black and white adults. American Journal of Public Health, 86 (10), 1370–1378.

Maynard, M. and Harding, S., 2010a. Perceived parenting and psychological well being in UK ethnic minority adolescents. Child: Care, Health and Development, 36 (5), 630–638.

Maynard, M.J. and Harding, S., 2010b. Ethnic differences in psychological wellbeing in adolescence in the context of time spent in family activities. Social Psychiatry and Psychiatric Epidemiology, 45, 115–123.

Maynard, M.J., Harding, S., and Minnis, H., 2007. Psychological wellbeing in Black Caribbean, Black African, and white adolescents in the UK Medical Research Council DASH study. Social Psychiatry and Psychiatric Epidemiology, 42 (9), 759–769.

Paradies, Y., 2006. A systematic review of empirical research on self-reported racism and health. International Journal of Epidemiology, 35 (4), 888–901.

Peach, C., 2009. Slippery segregation: discovering or manufacturing ghettos? Journal of Ethnic and Migration Studies, 35 (9), 1381–1395.

Phillips, D., 1998. Black minority ethnic concentration, segregation and dispersal in Britain. Urban Studies, 35 (10), 1681–1702.

Pickett, K. and Wilkinson, R., 2008. People like us: ethnic group density effects on health. Ethnicity and Health, 13 (4), 321–334.

Pickett, K.E., et al., 2009. Ethnic density effects on maternal and infant health in the Millennium Cohort Study. Social Science & Medicine, 69 (10), 1476–1483.

Putnam, R.D., 2007. E Pluribus Unum: diversity and community in the twenty-first century—the 2006 Johan Skytte prize lecture. Scandinavian Political Studies, 30 (2), 137–174.

Simpson, L. and Finney, N., 2009. Ethnic ghettos in Britain: a fact or a myth? Significance, 6 (2), 72–75.

Veling, W., et al., 2008. Ethnic density of neighborhoods and incidence of psychotic disorders among immigrants. American Journal of Psychiatry, 165 (1), 66–73.

Vickers, D. and Rees, P., 2007. Creating the UK National Statistics 2001 output area classification. Journal of the Royal Statistical Society: Series A (Statistics in Society), 170 (2), 379–403.

White, I.R., Royston, P., and Wood, A.M., 2010. Multiple imputation using chained equations: issues and guidance for practice. Statistics in Medicine, 30, 377–399.

Xue, Y., et al., 2005. Neighborhood residence and mental health problems of 5-to 11-year-olds. Archives of General Psychiatry, 62 (5), 554–563.