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BRIEF REPORT

Fruit and vegetable consumption and sports participation among UK Youth

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Abstract
Objectives UK guidelines for youth recommend daily physical activity and five portions of fruit and vegetables per day. This study examined the prevalence and clustering of meeting recommendations among 10- to 15-year old.
Methods Data for 3,914 youth, from the first wave of Understanding Society: the UK Household Longitudinal Study, were analysed. Clustering was assessed using the observed/expected ratio method.
Results A minority of youth met both recommendations, and these behaviours were clustered. The odds of meeting both recommendations were lower for older youth and for Pakistani and Bangladeshi youth; boys in lower income households were less likely to meet both recommendations.
Conclusions Most youth met neither recommendation and the behaviours clustered with variations by ethnicity and socioeconomic conditions.

Keywords Fruit and vegetable consumption · Physical activity · Clustering

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Introduction

Physical activity and fruit and vegetable (F&V) consumption are important for health in adolescence, and adolescent health behaviours can set in train lifestyles that increase the risk of chronic disease in adulthood (Due et al. 2011). UK and international guidelines for this key life stage recommend a daily minimum of 60 min moderate to vigorous exercise and five portions of fruit and vegetables (European Union 2008; WHO 2003). However, few studies have examined the co-occurrence and social patterning of these behaviours in adolescence (Hardy et al. 2012). Fewer still have included multiple measures of social background, such as ethnic group and family socioeconomic circumstances. As societies become more socially and ethnically diverse, disentangling these interlocking influences is increasingly important (Karlson and Nazroo 2006). As yet, there are few population surveys with the sample size and range of measures needed for such analyses.

This study used a new UK survey to examine the proportion of young people meeting the daily recommendations for F&V consumption and, for physical activity, using a measure of frequency of sports participation, and to identify the sociodemographic factors associated with meeting both guidelines. Clustering of the two behaviours was also examined using the observed/expected ratio method (Hardy et al. 2012).

Methods

Participants

The study population was drawn from the first wave (2009/2010; $n = 30{,}169$) of the UK Household Longitudinal Study (UKHLS) (University of Essex 2012). The UKHLS is a nationally representative household survey of UK

households with an ethnic minority boost sample (EMB) of 5 ethnic minority groups: Pakistani, Bangladeshi, Indian, African and Caribbean. Household members aged 10–15 years were asked to complete a self-completion survey and 4,899 young people did so (response rates within eligible households: 77 % main sample, 63 % EMB sample). Participants were included in this analysis if they had complete data on variables of interest, resulting in an effective sample of 3,914 young people (51 % male), mean age 12.5 years. Comparison of those excluded with those participants in the analysis sample, revealed higher proportions of younger participants, Pakistani and Bangladeshi young people, and those from households in the lowest and second lowest income fifths in the excluded sample. There were no differences in gender, or participation in either behaviour across the two groups.

Measures

Health behaviours

Fruit and vegetable consumption was assessed with a single item 'How many portions of fresh fruit or vegetable do you eat on a typical day?' with categorical response options of five or more, 3–4 portions, 1–2 portions, 0 portions. Physical activity was assessed with a single item 'How many days in a usual week do you play sports, do aerobics or do some other keep fit activity?' with a categorical response scale: every day, 5–6, 3–4, 1–2 days; less often than once a week; never or hardly ever. It should be noted that duration and intensity were not directly measured by this item. No prompts were given to participants to assist in answering either item.

Both items were dichotomised to measure whether or not they indicated that the young person might meet the UK guidelines related to that health behaviour (≥5 portions of F&V a day; daily physical activity).

Socio-demographic measures

Gender, age and equivalised household income (grouped into fifths) were included in the study, together with the young person's self-reported ethnic group membership. Income was supplied, along with an equivalisation variable, as a derived variable in the UKHLS data set, computed from a number of items in the survey related to financial earnings, benefits and outgoings, asked of all adults within the household (for details see McFall 2012). Ethnic group was assessed across categories included in the UK Census, and collapsed to form seven categories for analysis (White, Indian, Pakistani and Bangladeshi, Caribbean, African, mixed ethnicity and other ethnic groups).

Procedure

Analyses were conducted for boys and girls separately in PASW v18.0, with survey commands to account for the sample design. All results presented are weighted using appropriate weights supplied with the data release. First, we examined the proportion meeting each recommendation separately, and combinations of both recommendations; and then explored the presence of clustering by comparing the observed prevalence of meeting both recommendations with that expected if the two behaviours were independent (Hardy et al. 2012). Second, we investigated the socio-demographic factors related to meeting both recommendations. Associations were examined separately to identify statistically significant variation across social groups; these socio-demographic factors were then included in a fully adjusted logistic regression model to identify their relative influence on the likelihood of young people meeting recommendations for both behaviours.

Results

Table 1 summarises the patterns of physical activity and F&V consumption for boys and girls. Around one-third of boys (35.8 %) and one-fifth of girls (21.8 %) met the government recommendation for physical activity, while approximately a sixth of boys and girls met the government recommendation for fruit and vegetable consumption (13.6

Table 1 Physical activity participation (days per week) and fruit and vegetable consumption (portions per day) among boys and girls, aged 10–15 (UK Household Longitudinal Study 2009/2010)

	% Boys (n = 2,000)	% Girls (n = 1,913)
Physical activity		
7	35.8	21.8
5–6	21.3	16.5
3–4	24.2	31.3
1–2	13.7	22.7
0	5.0	6.8
Fruit and vegetable consumption		
5 or more	13.6	16.1
3–4	38.8	44.0
1–2	41.5	36.1
0	6.1	3.8
Meeting recommendations		
Don't meet either	57.2	67.3
Meet PA only	29.1	16.6
Meet FV only	7.0	10.9
Meet both PA and FV	6.6	5.2

All % weighted, n unweighted

and 16.1 %, respectively). The majority of boys (57.2 %) and girls (67.3 %) met neither recommendation. A higher proportion of boys (29.1 %) than girls (16.6 %) met the physical activity guideline only; the patterns were reversed for F&V consumption only (boys 7.0 %, girls 10.9 %). Only a small minority (boys 6.6 %, girls 5.2 %) met both recommendations. There was strong evidence of clustering in meeting the recommendations for both behaviours; the observed/expected ratio was 1.36 (95 % CI: 1.13–1.59) for boys and 1.47 (95 % CI: 1.19–1.76) for girls (table available on request).

In bivariate analyses, age, household income and ethnic group were each significantly related to meeting both recommendations for boys and girls. A fully adjusted logistic regression model was then estimated for both boys and girls to explore the relative influence of each socio-demographic factor on meeting both recommendations (Table 2). Increasing age was associated with a lower likelihood of meeting both recommendations for both boys and girls. Compared to white young people, Pakistani and Bangladeshi boys and girls were significantly less likely to meet both recommendations. In addition for girls, those reporting a mixed ethnicity had a lower likelihood of meeting both recommendations; for boys, African ethnicity reduced the likelihood, and Indian ethnicity increased the likelihood, of meeting both recommendations. For boys only, living in households in all but the top fifth of incomes was associated with a decreased likelihood of meeting both recommendations when compared with those in households with the highest incomes.

Table 2 Logistic regression models of age, income and ethnicity on meeting both government recommendations for fruit and vegetable consumption and physical activity

	Boys ($n = 2000$) OR (95 % CI)	Girls ($n = 1913$) OR (95 % CI)
Age	0.86 (0.80–0.92)*	0.66 (0.92–0.71)*
Ethnicity		
White (ref)	1.00	1.00
Mixed	1.11 (0.81–1.53)	0.57 (0.36–0.89)*
Indian	1.75 (1.27–2.42)*	0.87 (0.37–2.07)
Pakistani and Bangladeshi	0.63 (0.50–0.80)*	0.33 (0.20–0.53)*
Caribbean	1.62 (0.88–3.56)	0.64 (0.32–1.29)
African	0.48 (0.23–0.95)*	1.43 (0.66–3.09)
Other	2.16 (1.32–3.53)*	1.56 (0.64–3.84)
Eq. household income		
Least affluent	0.66 (0.49–0.94)*	0.90 (0.54–1.52)
Second least affluent	0.47 (0.32–0.68)*	1.16 (0.69–1.94)
Middle	0.68 (0.50–0.92)*	0.66 (0.42–1.05)
Second most affluent	0.50 (0.34–0.74)*	0.61 (0.34–1.09)
Most affluent (ref)	1.00	1.00

UK Household Longitudinal Study 2009/2010

* Significant at $p < 0.05$

Discussion

The study examined the proportion of young people meeting the UK recommendations for physical activity and F&V consumption and the factors associated with meeting both. The proportions meeting the recommendations are comparable to those reported in other UK studies for physical activity but lower for F&V consumption (Craig et al. 2009; Janssen et al. 2009).

We found that a large majority of young people met neither recommendation, and only a small minority of boys (6.6 %) and girls (5.2 %) met both recommendations. In line with other studies, boys reported being more physically active than girls (Sallis et al. 2000) and girls reported higher levels of F&V consumption than boys (Rasmussen et al. 2006). The two health behaviours clustered (data not shown); the combined prevalence of meeting the two recommendations was, respectively, 1.36 (boys) and 1.47 (girls) higher than would be expected if the two behaviours occurred independently. Meeting both recommendations was more frequently reported by younger adolescents and less likely among Pakistani and Bangladeshi youth. For boys, but not girls, meeting both recommendations was less likely in lower income households. The pattern among Pakistani and Bangladeshi young people is of particular note. Parental education level, particularly that of the mother, has been consistently associated with both fruit and vegetable consumption and physical activity participation (Cooke et al. 2004; Ferreira et al. 2007; Rasmussen et al. 2006) and may offer a partial explanation for these findings. In separate analyses, we found that educational attainment was significantly lower among the parents of Pakistani and Bangladeshi young people; however, parental education did not add to the regression model (data not shown). We recommend further studies to investigate the socioeconomic and ethnic patterning of young people's health behaviours.

As a large, contemporary, UK-wide study with a range of socio-demographic measures, the UKHLS has important strengths. The UKHLS is a complex multi-stage random sample of UK households resulting in a nationally representative UK sample in which data are collected directly from both adults and young people. Its design, therefore, addresses a major limitation of adolescent lifestyle studies where young people are the sole data source; as is widely recognised, this limits the collection of reliable household-level data, for example, on household income (Currie et al. 2008). As well as incorporating information at both individual- and household-levels, the UKHLS oversamples of

ethnic minority groups, thus enabling analyses which incorporate both household income and individual ethnicity. Using information on young people's age, gender and self-identified ethnicity as well as family socioeconomic circumstances, we investigated how young people's health behaviour clusters and is related to multiple dimensions of their lives. Our analysis points, for example, to a link between greater social advantage (as measured by household income) and having behaviours in line with recommendations among boys but not girls; it suggests, too, that Pakistani and Bangladeshi young people have particular difficulties in achieving the recommended levels of F&V consumption and physical activity. As societies become more socially and culturally diverse, such fine-grained evidence will become increasingly important if interventions are to improve, and address inequalities in, young people's lifestyles.

A limitation of the UKHLS is its restricted measurement of F&V consumption and physical activity. It relies on single item measures that lack independent verification, for example, by nutrient analysis of food consumed and by the use of physical activity monitors; however, self-administered questions are generally found to be as reliable as interviewer-administered questions (Brener et al. 2003). In addition, as the question on physical activity did not specify either intensity or duration, it does not fully capture the UK recommendation for a daily minimum of 60 min moderate to vigorous exercise. While the selected forms of activity (sports, aerobics and other keep fit activity) imply moderate to vigorous exercise for periods that may total 60 min, the measure is likely to overestimate the proportion of young people meeting the recommendation. Studies using more comprehensive measurements of both fruit and vegetable consumption and physical activity are required to develop a greater understanding of the clustering and social patterning of the two behaviours.

Despite these limitations, the analysis provides a useful snapshot of the scale of the challenges of improving young people's lifestyles with respect to F&V consumption and physical activity. It indicates that the majority of UK youth (boys 57.2 %, girls 67.3 %) met neither recommendation. Poor diet and physical inactivity are known risk factors for chronic diseases that cause nearly 90 % of deaths in high-income countries (WHO 2008) and patterns established in adolescence can continue into adulthood (Due et al. 2011). Establishing health-promoting behaviours at this key life stage is, therefore, a major priority (Department of Health 2010; WHO 2003, 2008).

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Conflict of interest The authors declare that there are no conflicts of interest.

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