



Public Health
Research Consortium

ADULTS WHO ENGAGE IN LITTLE PHYSICAL ACTIVITY AND EAT LITTLE FRUIT AND VEGETABLES: A BRIEF REPORT

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Summary

The report focuses on adults who engage in little physical activity and eat little F&V, but who may be able to achieve improvements in these behaviours over time. We analysed two waves of Understanding Society, the UK Household Longitudinal Study, which included questions about physical activity and fruit and vegetable consumption.

We found that:

- One in five adults in England engaged in little physical activity: in the average month, they had not engaged in a sporting activity of moderate or high intensity or in walks totalling 30 minutes on at least one day. Those who were older, more disadvantaged and in the poorest health were more likely to be inactive. Indian and Pakistani men and women were more likely than white British to engage in little physical activity; among women, little physical activity was also more common for Bangladeshi and Black African groups.*
- One in five adults in England ate little fruit and vegetables (F&V): they did not eat them every day and, on days when they did, ate only one or two portions. Those who were younger, more disadvantaged and in the poorest health were more likely to eat little F&V. Compared to those who were married, those who were single or cohabiting were more likely to be in the low F&V group. Risk was also patterned by ethnic background; compared with the white British group, South Asian and Black groups were more likely to eat little F&V.*
- The majority of those who engaged in little physical activity in 2010/11 engaged in little physical activity three years later (in 2013/2014). However, over 40% increased their activity levels sufficiently to no longer fall into the low activity group. Older adults and those in the poorest health were less likely to move out of this group.*
- Over half (55%) of those with low F&V intake in 2010/11 were no longer in this group three years later (in 2013/2014). Among men, only higher levels of education attainment was associated with increased F&V intake; among women, none of the factors we considered was significantly linked to such changes in consumption.*
- Low physical activity and low F&V consumption were associated with each other. However, an improvement in one was not associated with an improvement in the other.*

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1. Why focus on adults who engage in very little physical activity and eat very little fruit and vegetables?

Encouraging healthy lifestyles is central to improving public health. Key among these lifestyle factors are 'being physically active' and 'eating a good diet' [1]. Guidelines have been produced for both behaviours: adults are recommended to take at least 150 minutes of moderate-intensity physical activity a week in bouts of 10 minutes or more [2] and to eat at least 5 portions of fruit and/or vegetables (F&V) a week [3]. However:

- A significant proportion of adults in England do not meet the guidelines. Nearly 4 in 10 (38%) do not meet the physical activity guidelines [4] and 7 in 10 (71%) do not meet the F&V guidelines [5].
- For those who engage in little physical activity and eat little F&V, small improvements yield significant health benefits. These gains are evident even for those with very low levels of physical activity [6-8] and very limited F&V intake [9]. As this suggests, 'some is good, more is better'.
- Consistent with this evidence, England's public health strategy is placing more emphasis on tackling physical inactivity by encouraging those with activity levels well below the recommended minimum to be more active [10, 11]; in line with this greater emphasis, physical inactivity is included in England's *Public Health Outcomes Framework* [12, 13]. While not yet formally incorporated into England's public health strategy, a similar emphasis could be given to those eating little F&V.

Work undertaken for a larger PHRC project on adult health behaviours [14] provides the opportunity to focus on adults who engage in little physical activity and eat little F&V. Our measures are described in section 2 – but in broad terms, the low activity group did not engage in either a moderate-intensity sports activity nor in walks totalling 30 minutes on at least one day in the average month; the low F&V group did not eat F&V every day and, on days when they did, ate very few portions.

Low physical activity and low F&V intake occurred together more frequently than the prevalence of each behaviour would predict ($p < 0.1$). However, positive changes in the two behaviours were not associated. Among those engaging in little physical activity and eating little F&V, increasing their levels of physical activity sufficiently to move out of the low activity group was not associated with also moving out of the low F&V group; similarly, moving out of the low F&V group was not associated with moving out of the low PA group.

The main sections of the report look in turn at the low activity group ([sections 3 and 4](#)) and low F&V group ([sections 5 and 6](#)). For each, the sections:

- (i) describe the social and health profile of the group and identify the factors that increase the probability of being in it ([sections 3 and 5](#))
- (ii) describe the social and health profile of those who improve their lifestyles sufficiently to move out of the group and identify the factors that increase the probability of doing so ([sections 4 and 6](#))

2. Methods

Which dataset do we use? The analysis is based on *Understanding Society*, the UK Household Longitudinal Study (UKHLS), a nationally-representative household panel survey [15]. We focus on adults aged 16 and over living in England and use data from two waves of the survey where survey participants were asked about their health behaviour. We use data from 2010/2011 (wave 2) of the UKHLS to describe the profile of those in the low activity and low F&V groups (37,300 in our sample). We use data from 2010/11 and 2013/14 (wave 5) to identify factors associated with becoming more active and increasing F&V intake (23,900 in our sample).

What measures of low physical activity and low F&V do we use? Measures were based on questions available in the UKHLS; these are less detailed than those used in surveys like the *Health Survey for England* (HSE) and in the *Active Lives* survey. For physical activity, we used questions on sports activity (including fitness, gym and conditioning activities) and on walking. For F&V, we used questions on frequency (days per week) and consumption (portions per day) of F&V.

Low physical activity group: did not do a moderate or high intensity sports activity at least once a month and had not completed at least 30 minutes of walking on one or more days in the past four weeks (a walk was one that lasted at least 10 minutes).¹ On this measure, 20% of adults engaged in little physical activity.

Low F&V group: did not eat F&V every day and ate only one or two portions on the days when they did eat them. On this measure, 21% of adults ate little F&V.²

What factors do we include in our analyses?

Because *Understanding Society* asks study participants about many aspects of their lives, it provides a rich array of measures of people's background, circumstances and health status. Our analyses examined the patterning of low physical activity and low F&V consumption using measures of:

- individual socio-demographic factors (gender, age, ethnic group, economic activity, marital and cohabitation status)
- socio-economic disadvantage at individual, household and area level (educational attainment, equivalised household income, IMD quintile)
- health-related status (self-reported health status, BMI, life satisfaction and GHQ-12)

¹Different levels of physical activity intensity (mild, moderate or vigorous) are not accounted for in our measure; however, the measure is based on taking part in moderate or high-intensity activities. Note: intensity is included in the CMO's definition of physical inactivity and in the measures used by the Health Survey for England and Sports England to identify adults who are 'inactive'.

² Over a third (37% of study participants did not eat F&V every day, and less-than-daily consumption was strongly associated with eating fewer portions on those days when F&V were consumed.

All these measures were those that applied at the first measurement point (2010/11; wave 2).

We followed the same analysis strategy for investigating the social profile of low physical activity and low F&V intake *and* the social profile of ‘improvers’ (those who improved their lifestyles sufficiently to move out of the low engagement group). We began with bivariate analyses to identify factors significantly associated with the behaviour (summarised in the linked tables). We then estimated multivariate logistic regression models to adjust concurrently for all factors that were significantly associated with these behaviours. In the linked tables, we present estimates as odds ratios and as Average Marginal Effects (AMEs). AMEs are estimates of the effect of a change in an explanatory factor (e.g. being in the lowest educational group compared to being in the highest educational group) on the overall predicted prevalence of a behaviour (e.g. having low physical activity or low F&V consumption), holding other factors constant.³ Based on the AMEs, we illustrate our findings as the predicted prevalence of low activity or low F&V activity for each characteristic compared to the prevalence in the baseline category and adjusted for the other characteristics.

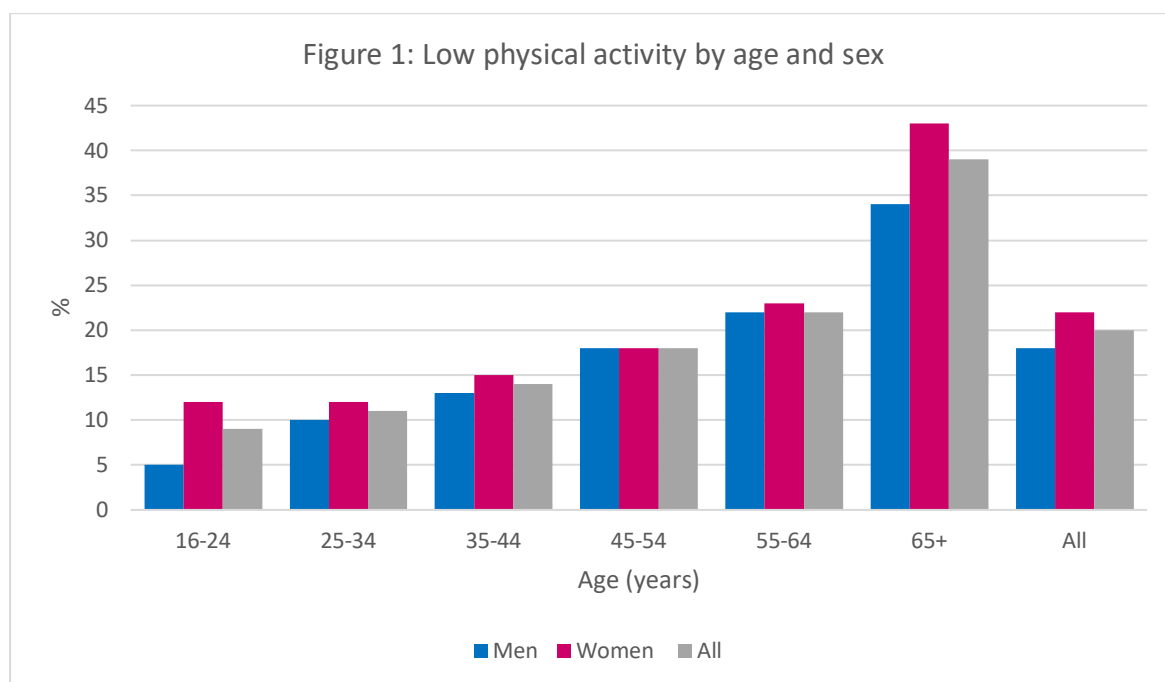
³Like odds ratios, AMEs are estimates derived from non-linear multivariate analysis (e.g. logistic regression) and, again like odds ratios, are evaluated relative to a reference category and show the direction of the association with the outcome variable. They additionally provide a direct estimate of the size of the association. More information on AMEs is provided in the project Final Report to which this brief report is linked (see page 26 of ref. 14: http://eprints.whiterose.ac.uk/144112/1/DHSC_PHRC_Health_behaviour_and_health_behaviour_change_Final_Report.pdf).

3. Who is at risk of low physical activity?

3.1. Findings from the bivariate analyses

One in five (20%) of adults engaged in little physical activity: 18% of men and 22% of women (Table PA1). Low activity was significantly associated with a range of socio-demographic factors, summarised below.⁴

Low physical activity is associated with being older. The proportion increases for men from 5% among the 16-24 age group to 34% among those aged 65 and older; for women, the proportion increases from 12% to 43%. Figure 1 and Table PA2.

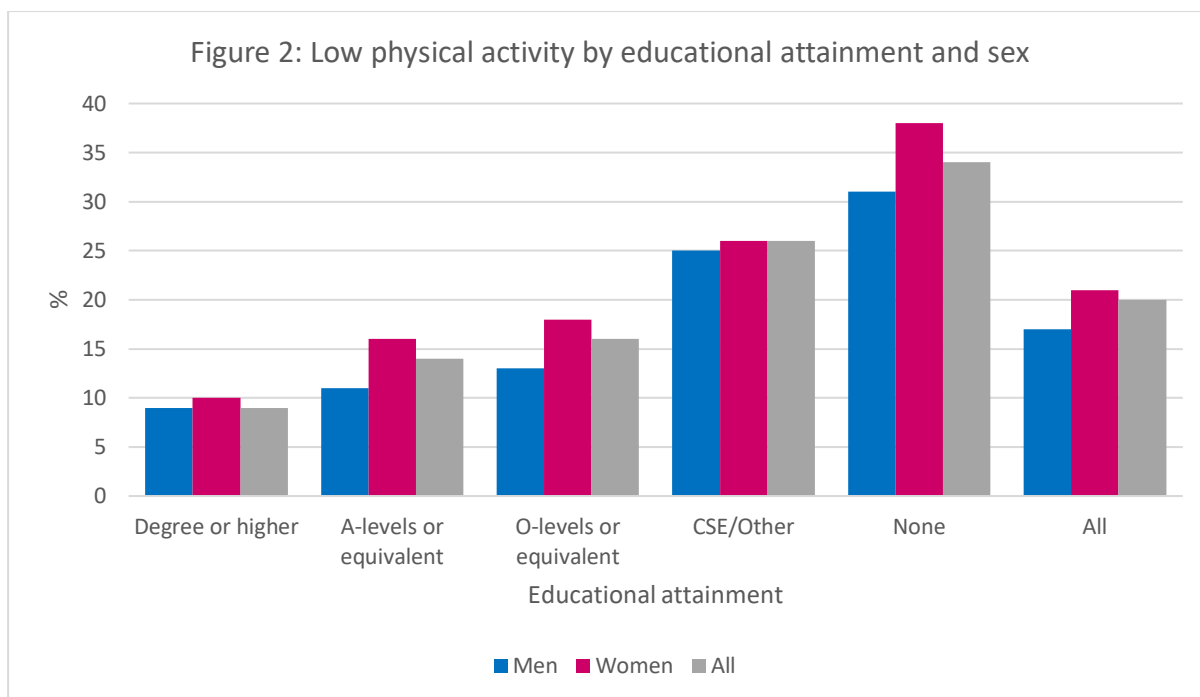


Low physical activity varies by economic activity status. Among both men and women, the proportion is lowest among students (4% men, 8% women) and highest among those who are retired (32% men, 40% women) or long-term sick (56% men, 57% women). Table PA3.

Low physical activity is associated with being married, currently or in the past. Men and women who are married or separated/divorced/widowed are more likely to engage in little physical activity than those who are single or cohabiting. Table PA4.

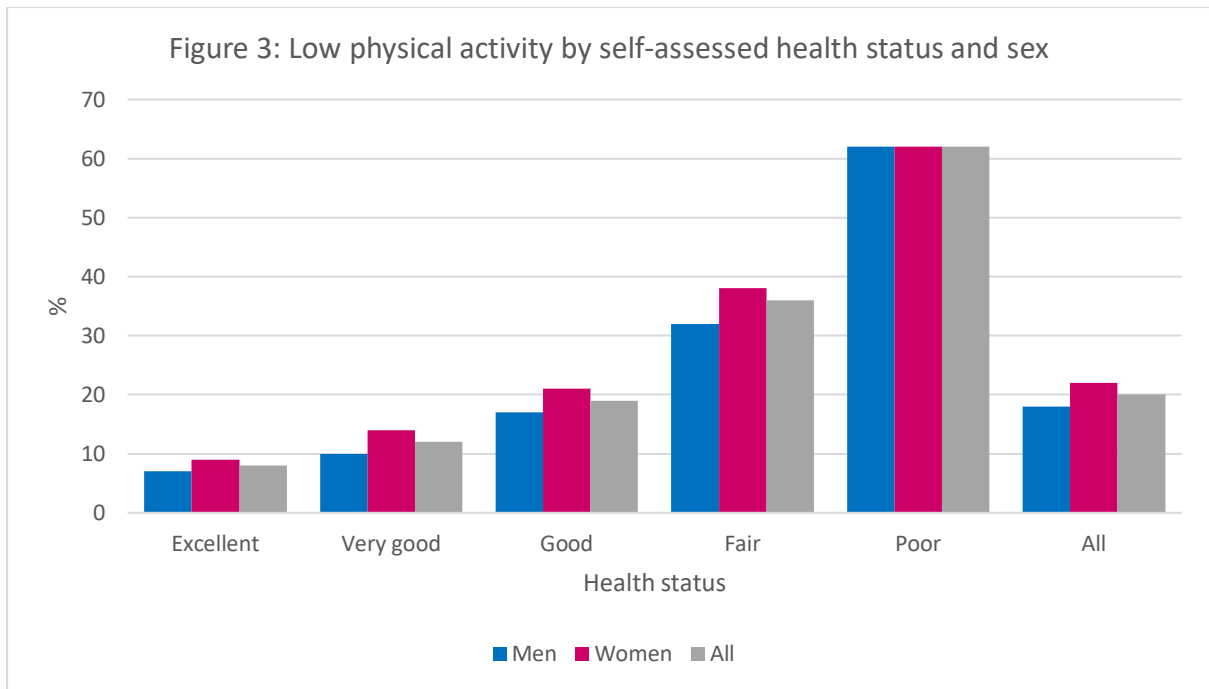
Low physical activity is associated with socio-economic disadvantage. There is a marked social gradient in low physical activity as measured by educational attainment (Figure 2, Table PA5). Similarly, low physical activity is more common among those on lower incomes and in more deprived quintiles. Tables PA6 and PA7.

⁴ As noted in section 2, all measures (e.g. health status, life satisfaction, household income, economic activity) were those that applied in 2010/11 (wave 2)



There are ethnic group differences in low physical activity. Among men, the proportions are higher among Pakistani, Bangladeshi and Black Caribbean groups than among the white British group. Among women, proportions are higher among Indian, Pakistani and Bangladeshi groups than among the White British group. Table PA8.

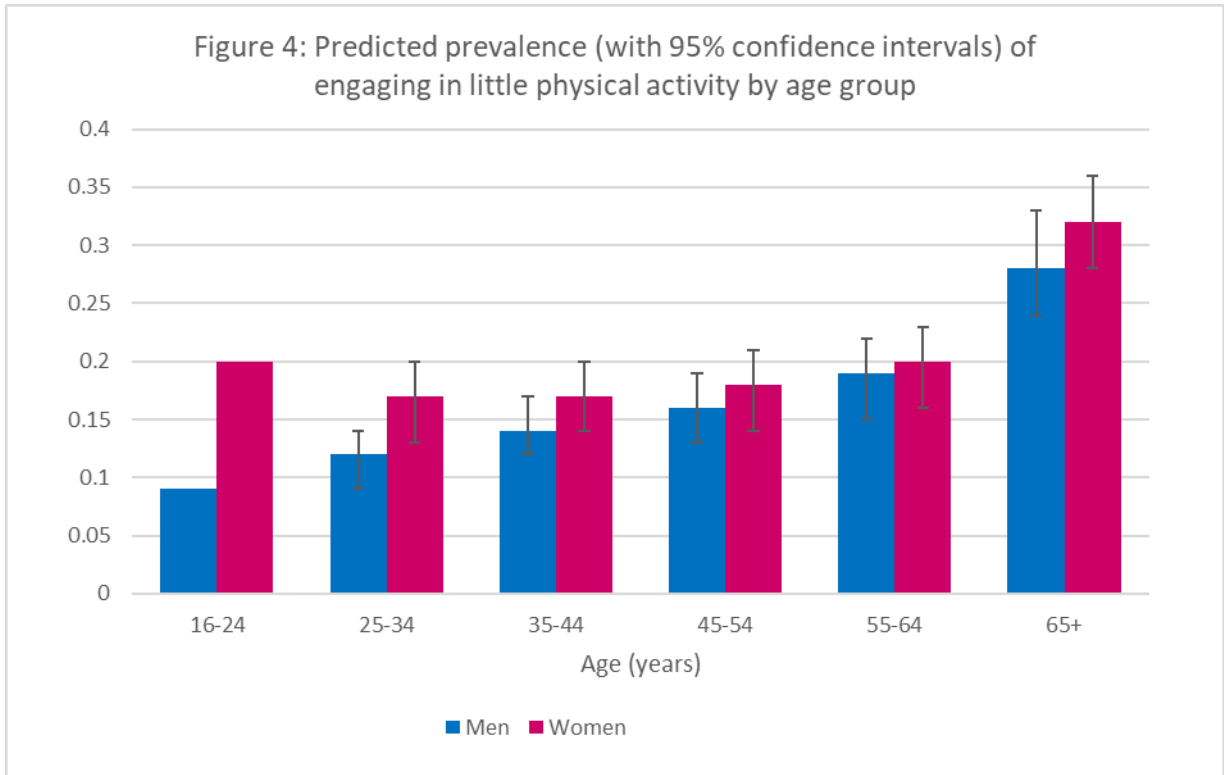
Low physical activity is associated with poorer health and lower life satisfaction. There is a strong association between health status and low physical activity for both men and women (Figure 3, Table PA9). The proportion with low activity increases from 8% among adults in excellent health to 62% among those in poor health. Compared with those in good mental health (GHQ-12 score of 0), those whose mental health was poor (GHQ-12 score of ≥ 4) were twice as likely to be in the low activity group. Life satisfaction showed a similar but less pronounced pattern: adults with higher levels of satisfaction were less likely to be in the low activity group. With respect to BMI, low activity was most prevalent among adults who were obese (26%) and least common among those who were underweight (13%). Tables PA10-12.



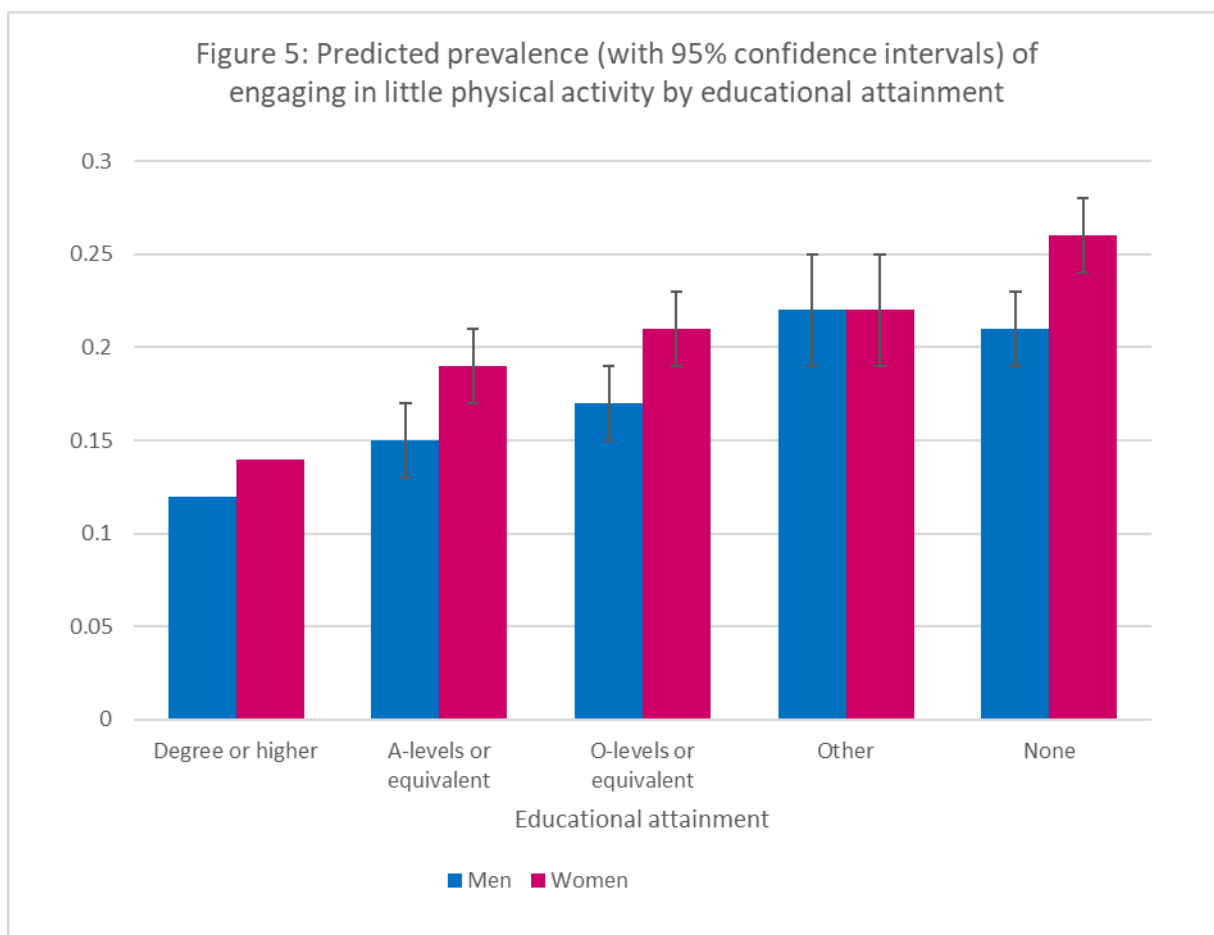
3.2. Findings from the multivariate analysis

Factors associated with low levels of physical activity were broadly similar for men and women. Low physical activity was associated with a range of individual-level factors: age, ethnic group, education and health status. Findings are summarised in Tables PA13 (men) and PA14 (women). We report below only statistically significant associations.

Adults aged 65 and over had the highest probability of engaging in little physical activity (Figure 4; Tables PA13-14). For men, the association with age was linear; for women, there was only a significant increase for those aged 65 and over. Figure 4 illustrates that the prevalence of engaging in little physical activity for the reference category of 16-24-year olds was nine per cent for men and 20 per cent for women. These estimates take account of other characteristics included in the model. For men, the probability increased steadily across the age bands and then more steeply for those aged 65+ (to 28 per cent of the age cohort). For women, the predicted prevalence hovered between 17 and 20 per cent for all ages up to 64, with no statistically significant differences between the age bands. Among those aged 65 plus, there was a significant increase of 12 percentage points to 32 per cent of the age group, or nearly 1 in 3 older women.



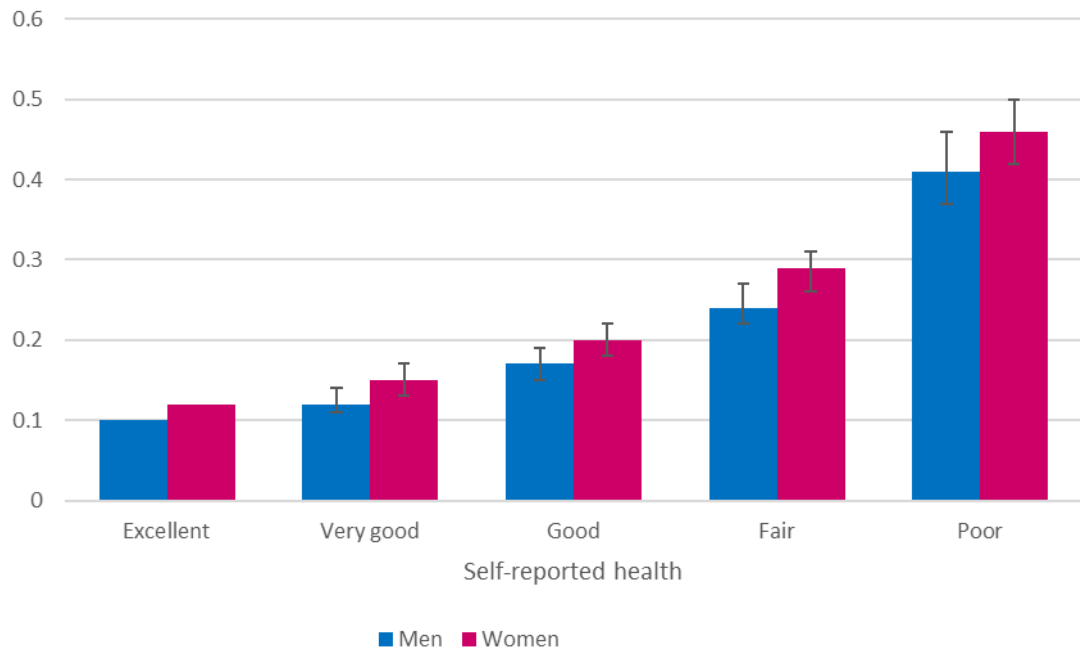
There was an educational gradient in low physical activity (Figure 5). Compared to those with higher educational qualifications, men and women with no educational qualifications had a higher probability of engaging in little physical activity. Figure 5 illustrates that the estimated prevalence was 21 per cent for men and 26 per cent for women with no qualifications compared to only 14 per cent of degree-educated women and 12 per cent of degree educated men. In addition, women in lower income households were more likely to have low physical activity. Tables PA13-14.



There were ethnic group differences in low physical activity. Among both men and women, Indian and Pakistani groups were more likely to engage in little physical activity; among women, the odds were also higher for Bangladeshi and Black African groups. Tables PA13-14.

Adults in the poorest health had the highest probability of low physical activity (Figure 6). Compared to those in excellent health, the probability of little physical activity was approximately four times higher for men and women in poor health (41 per cent versus 10 per cent for men and 46 per cent versus 12 per cent for women). Tables PA13-14

Figure 6: Predicted prevalence (with 95% confidence intervals) of engaging in little physical activity by self-reported health status



4. Who moves out of the low physical activity group?

The longitudinal structure of Understanding Society enabled us to examine patterns of physical activity over time for the same individuals. The majority of adults who engage in little physical activity in 2010/11 were in this group three years later (in 2013/2014).

However as Table A below indicates, over 40% had increased their activity levels sufficiently to no longer fall into this group, for example by engaging in a moderate intensity sports activity at least once a month or by completing a total of least 30 minutes walking on at least one day in the previous four weeks. Table PA15.

Table A: Moving out of the low physical activity group: change over time			
	Men	Women	All
	%	%	%
% low activity at both waves	57	57	57
% with low PA at wave 2 and non-low PA at wave 5	43	43	43
Bases			
<i>Weighted - all</i>	2125	2833	4957
<i>Unweighted - all</i>	1805	2659	4464

4.1. Findings from the bivariate analyses

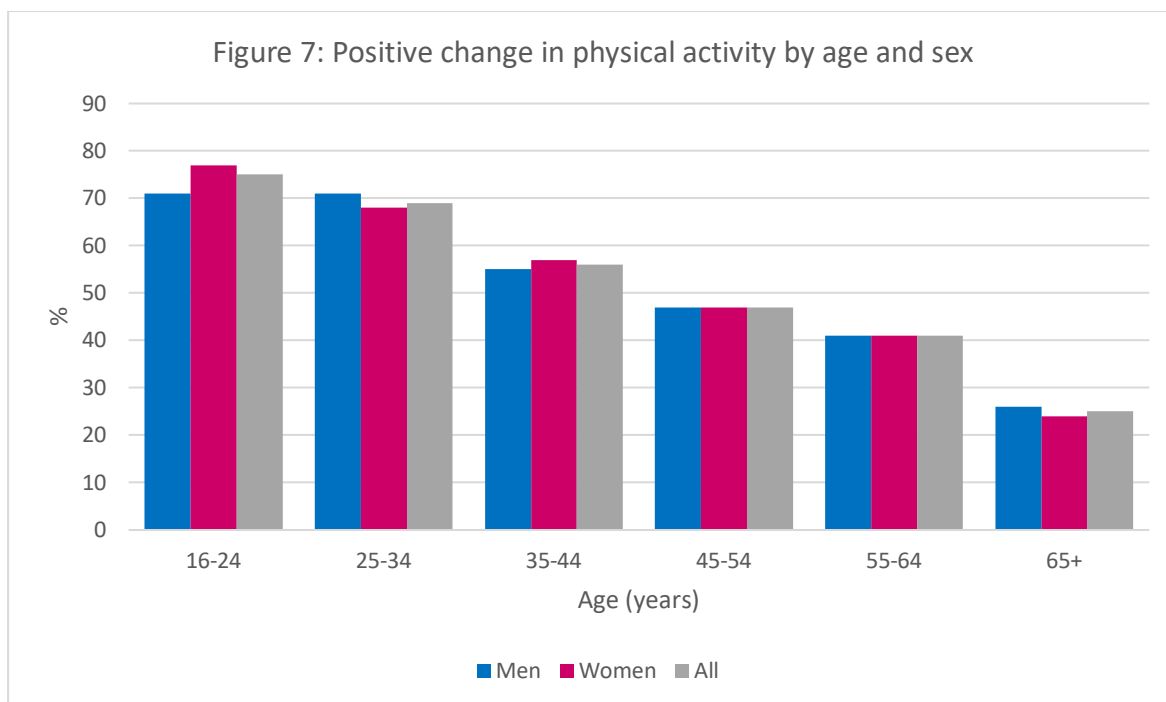
*A range of socio-demographic and health factors were significantly associated with moving out of the low physical activity group; these are summarised below.*⁵

Younger age groups were more likely to move out of the low physical activity group. As Figure 7 indicates, there is an age gradient in improving levels of PA. Table PA16.

Economic activity was associated with moving out of the low physical activity group. The proportion was at its lowest among retired people (25%) and highest among students (80%). Table PA16.

Marital and cohabitation status was associated with moving out of the low physical activity group. The proportion (29%) among those who were separated/divorced/widowed was lower than among other groups (for example, among those in cohabiting relationships, the proportion was 56%). Table PA16.

⁵ As noted in section 2, all measures (e.g. health status, life satisfaction, household income, economic activity) were those that applied in 2010/11 (wave 2)



Socio-economic advantage was positively associated with moving out of the low physical activity group. For example, the majority (63%) of those with higher educational qualifications had moved out of the low activity group compared with a minority (33%) of those with low/no qualifications. Similarly, the proportions no longer in the low activity group were higher in higher income groups and among those living in less deprived areas. Table PA16.

There were ethnic group differences in moving out the low physical activity group. The proportion was highest among those from Black African/Caribbean backgrounds (57%) and lowest among the White British group (42%). Table PA16.

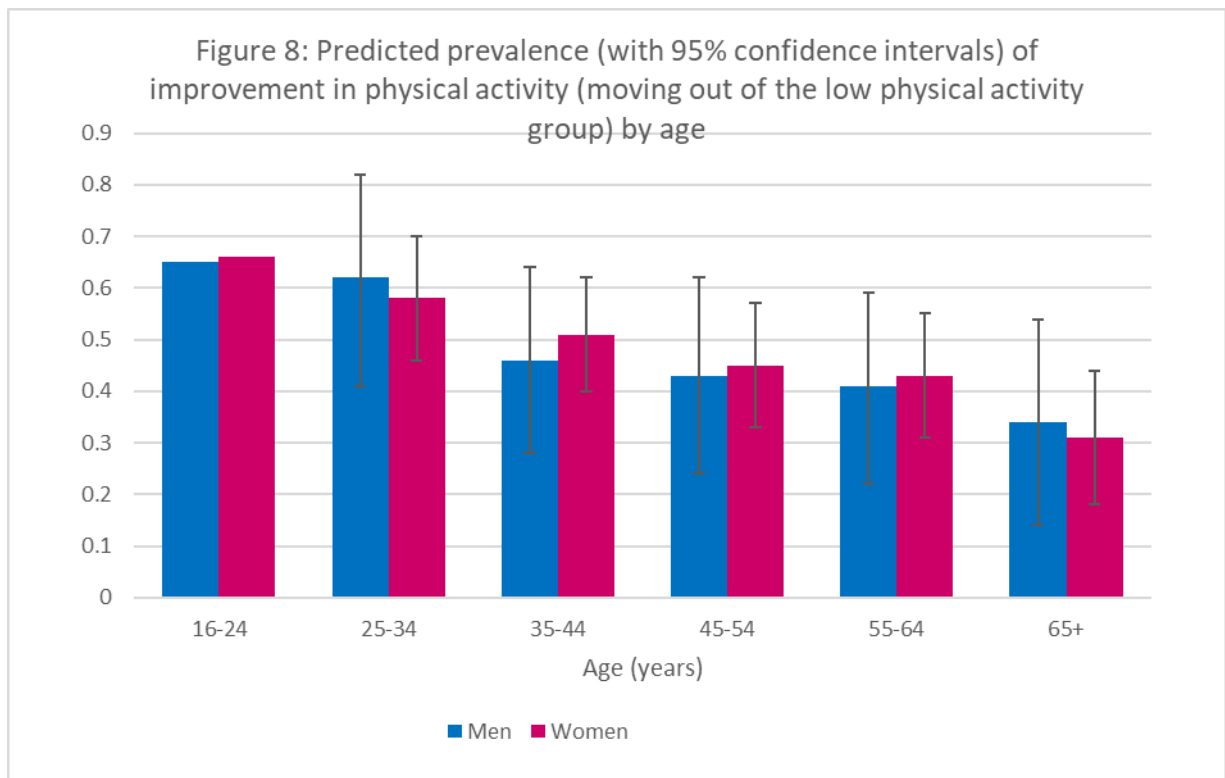
Good health and high life satisfaction were associated with moving out of the low physical activity group. Among those in poor health, 21% moved out of the low activity group compared with 52% of those in excellent/very good/good health. Those who were completely dissatisfied with their lives were less likely to move out of the low activity group as were those with poor mental health (GHQ-12 ≥ 4). With respect to BMI, those who were underweight and obese were less likely to move out of the low activity group than those who had a healthy weight or were overweight. Table PA16.

4.2. Findings from the multivariate analyses

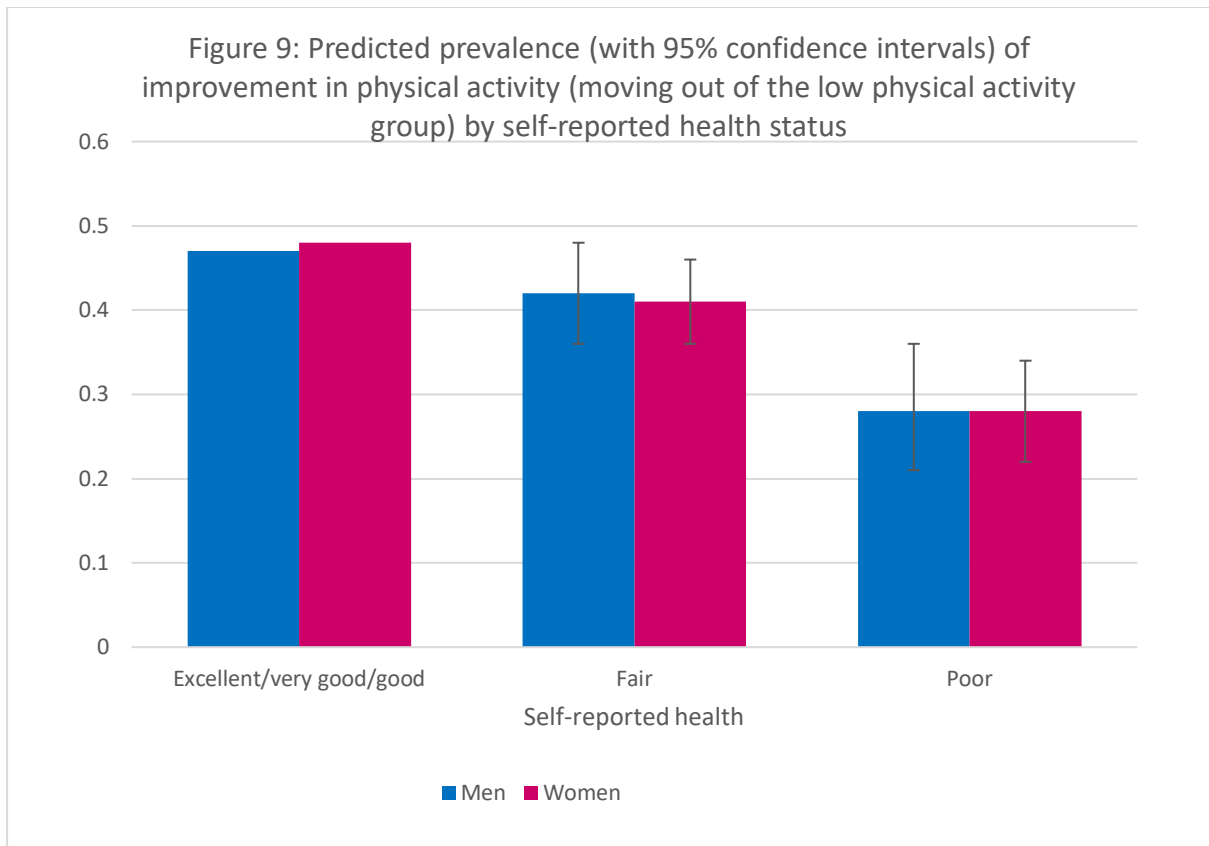
Age and health status were the only factors significantly associated with moving out of the low physical activity group for both men and women. Tables PA17 (men) and PA18 (women).

Compared with the 16-24 age group, those aged 65 and over were less likely to move out of the low physical activity group than the youngest age group. Tables PA17 and PA18. Figure

8 shows that only around one-third of the older age group moved out (34 per cent men and 31 per cent women) compared with around two-thirds of the youngest age group (65 per cent men and 66 per cent women), adjusting for other characteristics.



For both men and women, those in the poorest health were less likely to move out of the low activity group. Tables PA17 and PA18. For example, Figure 9 shows that the gap in moving out between those in poor and excellent/very good/good health was statistically significant and amounted to around 20 percentage points for both men and women.



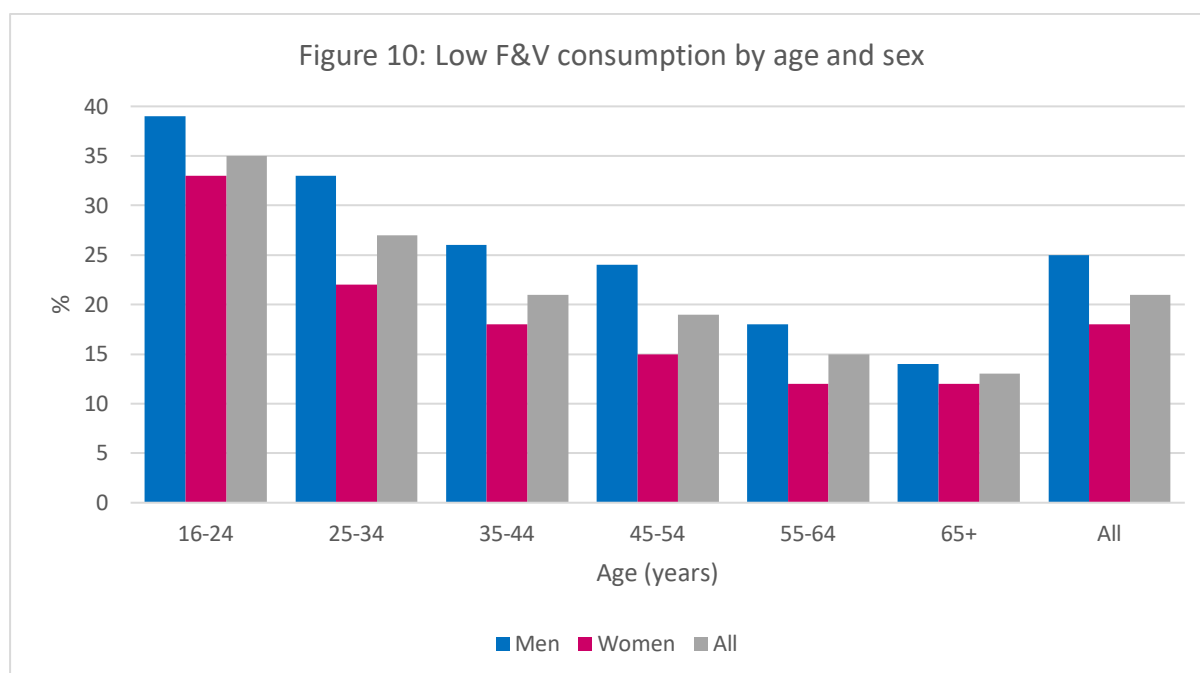
For women only, those with the lowest levels of educational attainment were less likely to move out of the low activity group. For men only, those who were retired were less likely to increase their activity levels sufficiently to lift them out of the low activity group. Tables PA17 and PA18.

5. Who is at risk of low F&V consumption?

5.1 Findings from the bivariate analyses

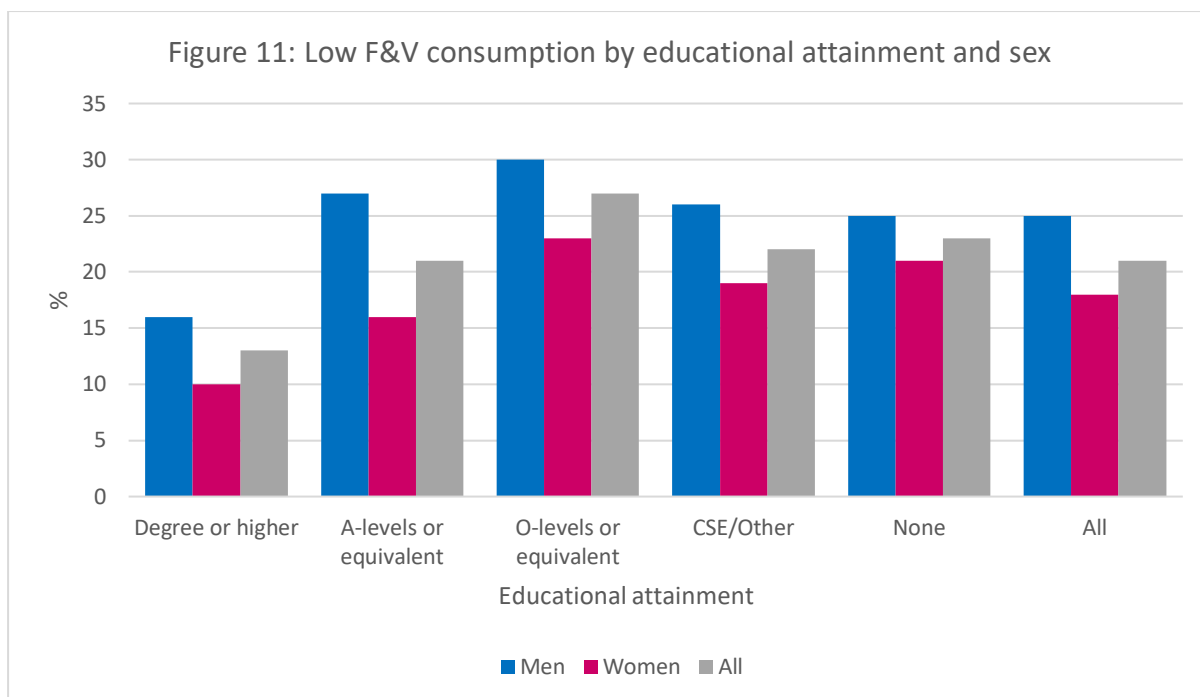
One in five (21%) adults consumed little F&V: 25% of men and 18% of women (Table FV1). A range of socio-demographic and health-related factors were significantly associated with low F&V consumption; these are summarised below.⁶

Low F&V was associated with being younger (Figure 10). The proportion eating little F&V declined from 35% in the 16-24 age group to 13% among those aged 65 and older. Table FV2.



Low F&V was associated with associated with socio-economic disadvantage. Among both men and women, the proportion was lowest among those with high levels of educational attainment (degree or higher) and higher among those with lower levels of educational attainment, including those with A-levels or equivalent (Figure 11, Table FV5). There was also a marked income gradient in low F&V, increasing from 11% in the highest income quintile (10% men, 11% women) to 27% in the lowest income quintile (25% men, 28% women). The proportions with low F&V consumption also increased in line with increasing area deprivation, from 15% in the least deprived quintile to 31% in the most deprived quintile. Tables FV6 and FV7.

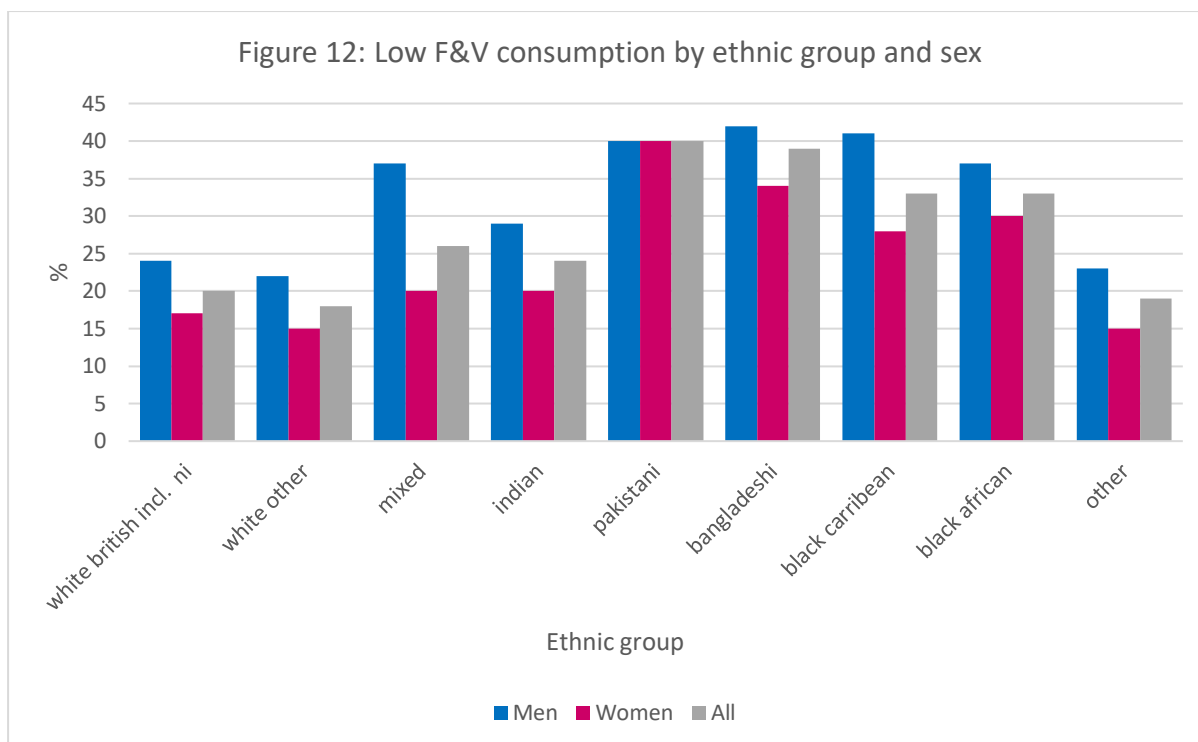
⁶ As noted in section 2, all measures (e.g. health status, life satisfaction, household income, economic activity) were those that applied in 2010/11 (wave 2)



Low F&V varied by economic activity. It was lowest among those who were retired (13%) and highest among those who were unemployed (38%). Proportions were also higher among those who were long-term sick (33%), students (30%) and, for men, looking after the family (35%). Table FV3.

Low F&V varied by marital status. The proportion in the low F&V group was at its lowest among those who were married or in a civil partnership (15%) and, at 32%, was highest among those who were single (never married). Table FV4.

There were ethnic group differences in low F&V consumption (Figure 12). Low F&V consumption was associated with being Pakistani (40% for both men and women) and Bangladeshi (42% men, 34% women); additionally for men, the proportion was higher in the Black Caribbean group (41%). In contrast, proportions were lowest among white British (24% men, 17% women) and white-other groups (22%, 15%). Table FV8.



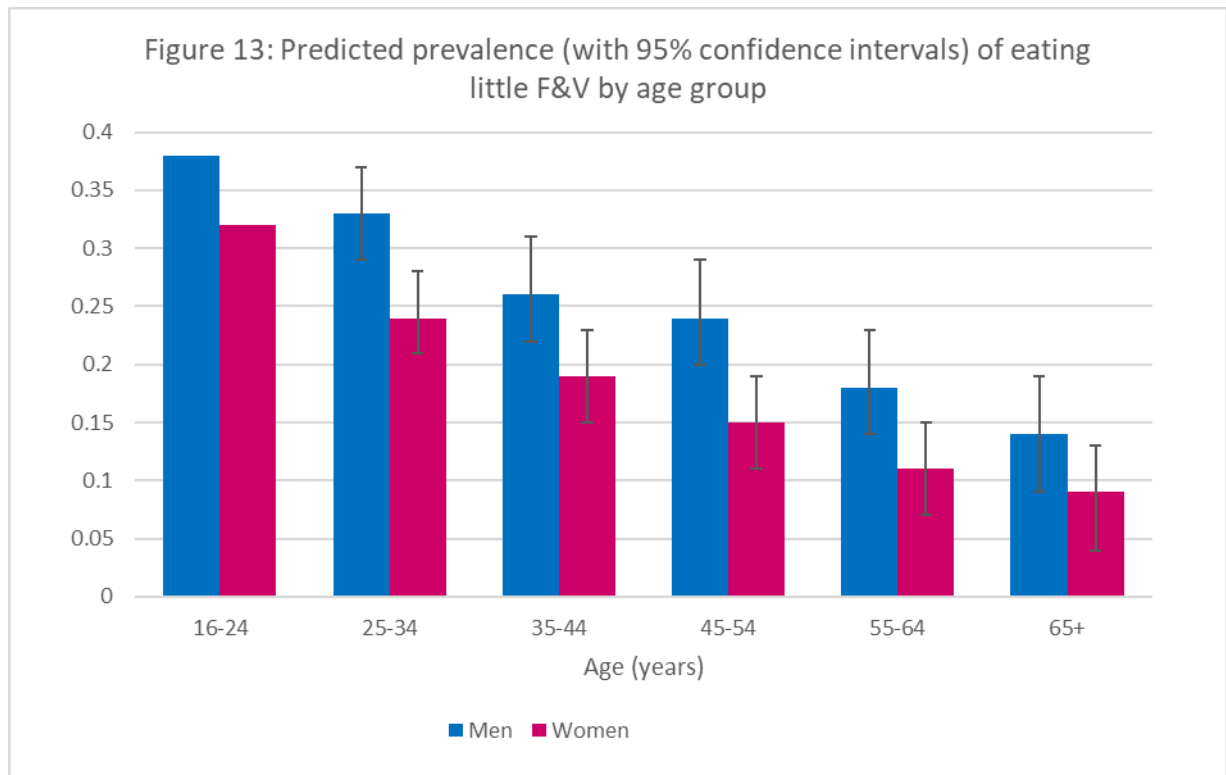
Low F&V was associated with poorer health and lower life satisfaction. The proportion with low F&V consumption was lowest among those in excellent health (20% men, 13% women) and highest among those in the poorest health (28%, 25%), with the differences more pronounced for men. The proportion was also higher among those with poor mental health. Patterns for life satisfaction were less linear; however, men and women who were completely dissatisfied with their lives were more likely to eat little F&V than those who were completely satisfied. Low consumption was most prevalent among those who are underweight and was less common among those who were overweight or obese. Tables FV9-FV12.

5.2. Findings from the multivariate analyses

Factors associated with low F&V were broadly similar for men and women. Low F&V was linked to a range of factors at individual, household and area level.⁷ Of the range of factors included in the analysis, education had the strongest effect. It is noteworthy that area deprivation remained an independent predictor of low F&V, suggesting that area-level factors have an effect over and above factors at the individual and household level. Tables FV13 (men) and FV14 (women).

⁷ As noted in section 2, all measures (e.g. health status, life satisfaction, household income, economic activity) were those that applied in 2010/11 (wave 2)

Young adults (aged 16-24) had the highest probability of eating little F&V (Figure 13). For both men and women, the probability of eating little F&V declined with age. After adjusting for other factors, those aged 65 plus were more than 20 percentage points less likely to be in the low F&V group than their counterparts aged 16-24. Tables FV13 and FV14.



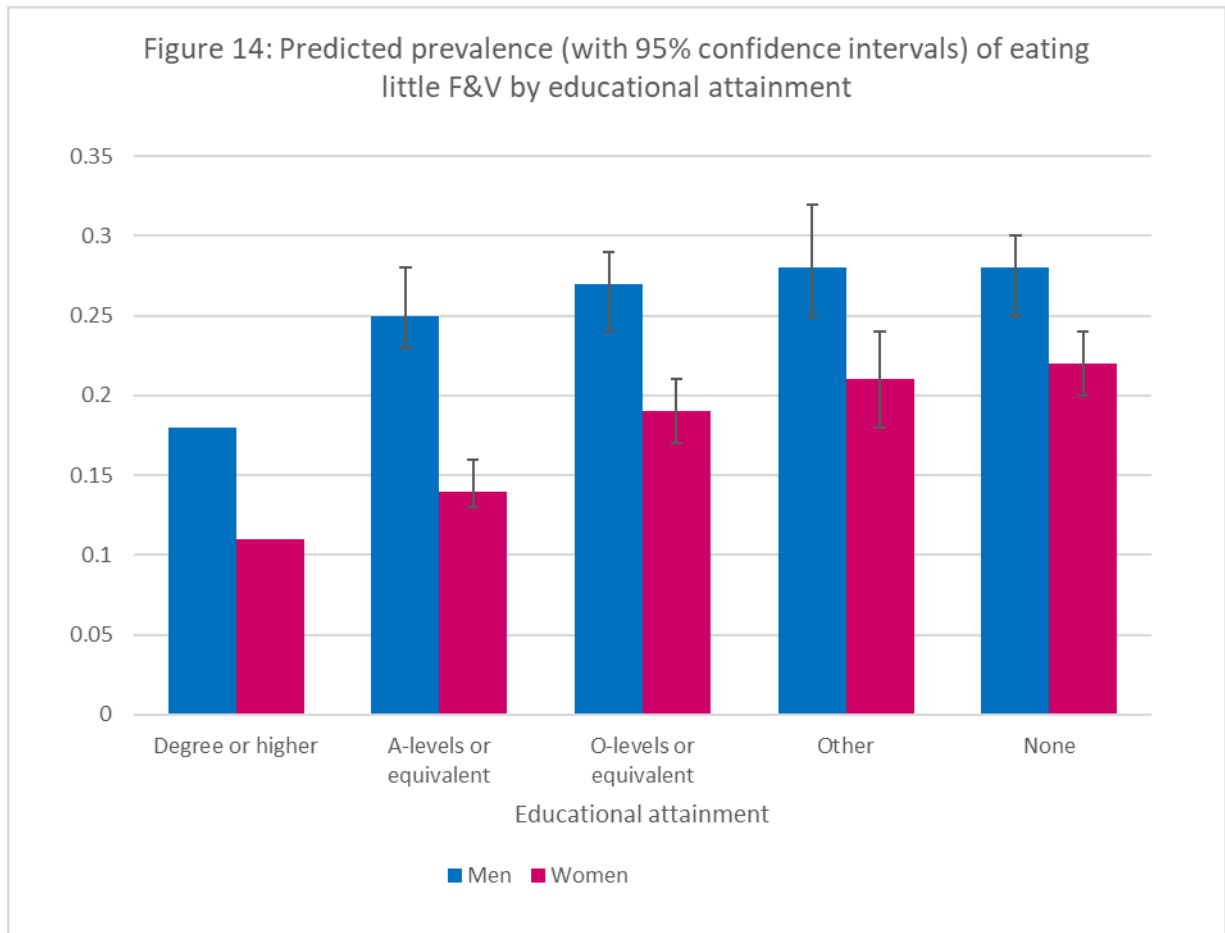
Marital status was a predictor of low F&V consumption. Compared to those who were married, adults who single (never married or separated/divorced/widowed) were more likely to eat little F&V. Tables FV13 and FV14.

Economic activity was a predictor of low F&V consumption, with different patterns among men and women. For men, the probability of being in the low F&V group was higher for those who were unemployed and lower for employed men, retirees and students. For women, compared to those in employment, those who were looking after the family home or were students were less likely to have low F&V. Tables FV13 and FV14.

Low household income increased the odds of low F&V consumption. Men and women in lower income groups were most likely to eat little F&V, with the highest prevalence among those in the lowest income quintile. Tables FV13 and FV14.

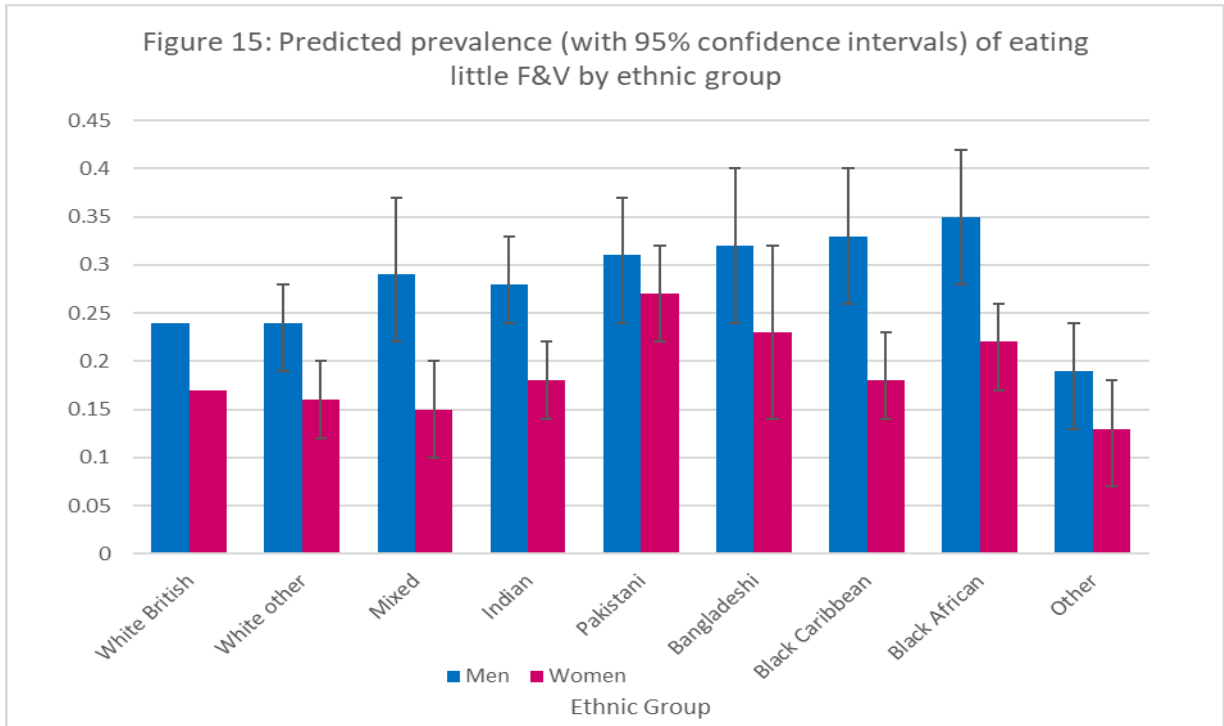
There was an educational gradient in low F&V consumption (Figure 14). This was particularly marked for women: compared to women with higher educational qualifications, their counterparts with no educational qualifications had double the chances of low F&V

intake (22 per cent compared to 11 per cent). The gap for men was similar at 10 percentage points (28 per cent compared to 18 per cent). Tables FV13 and FV14.

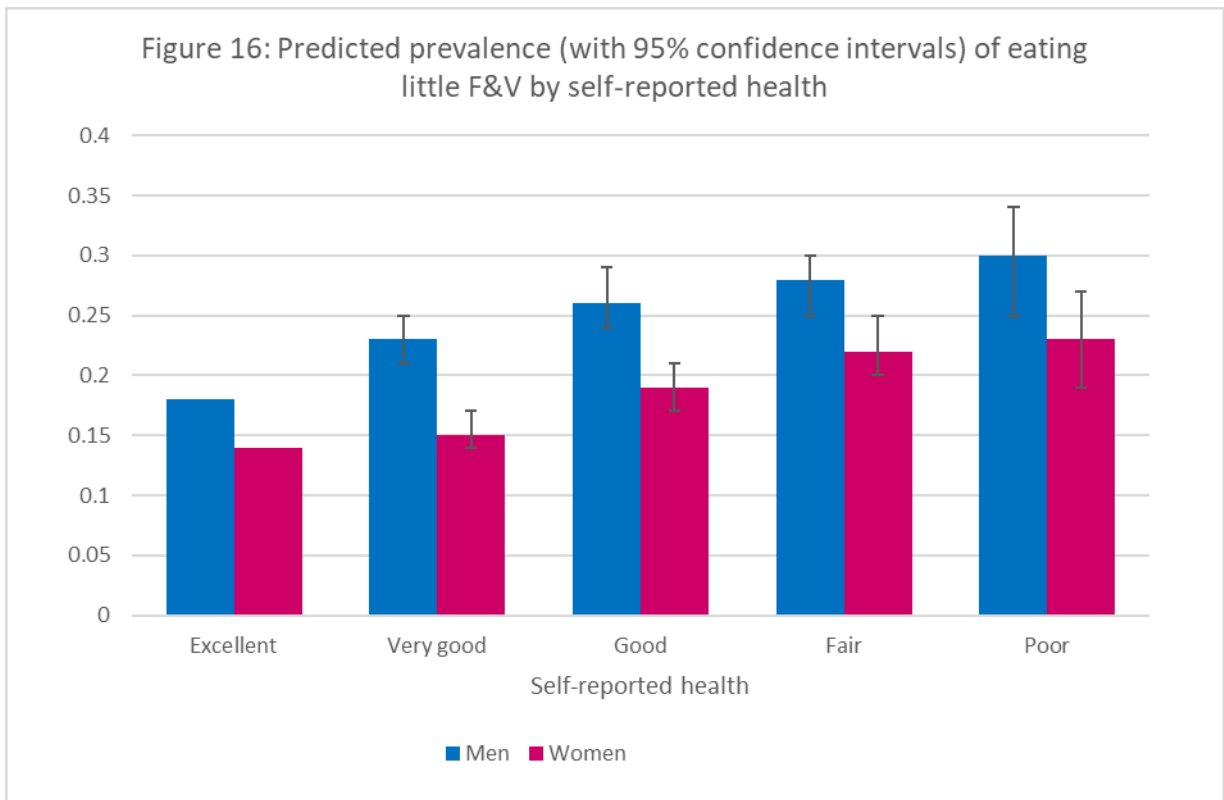


Area deprivation increased the odds of low F&V consumption. Men and women living in a less deprived area were less likely to be in the low F&V group. Tables FV13 and FV14.

There were ethnic group differences in low F&V consumption (Figure 15). Compared with white British men, Pakistani, Black Caribbean and Black African men had higher probabilities of low F&V consumption (by seven, nine and 11 percentage points respectively); while among women the chances were 10 percentage points higher for Pakistani women and five percentage points higher for Black African women compared to their white British comparators. Tables FV13 and FV14.



Those in the poorest health had the highest probability of eating little F&V (Figure 16). Compared to their counterparts in excellent health, men in poor health had a 12 percentage points higher chance and women in poor health a nine percentage points higher chance of eating little F&V. With respect to life satisfaction, patterns were less consistent; for both men and women, only those who were ‘mostly dissatisfied’ were significantly more likely to be eat little F&V than those who were ‘completely satisfied’. Tables FV13 and FV 14.



6. Who moves out of the low F&V group?

The longitudinal structure of Understanding Society enabled us to examine F&V consumption over time for the same individuals. Over half (55%) of those with low F&V intake in 2010/11 were no longer in this group three years later (in 2013/2014).

As Table B below indicates, 54% of men and 56% of women had increased their F&V intake sufficiently to no longer fall into this group: they now ate more than two portions on the days they ate F&V and/or ate them every day. Table FV15.

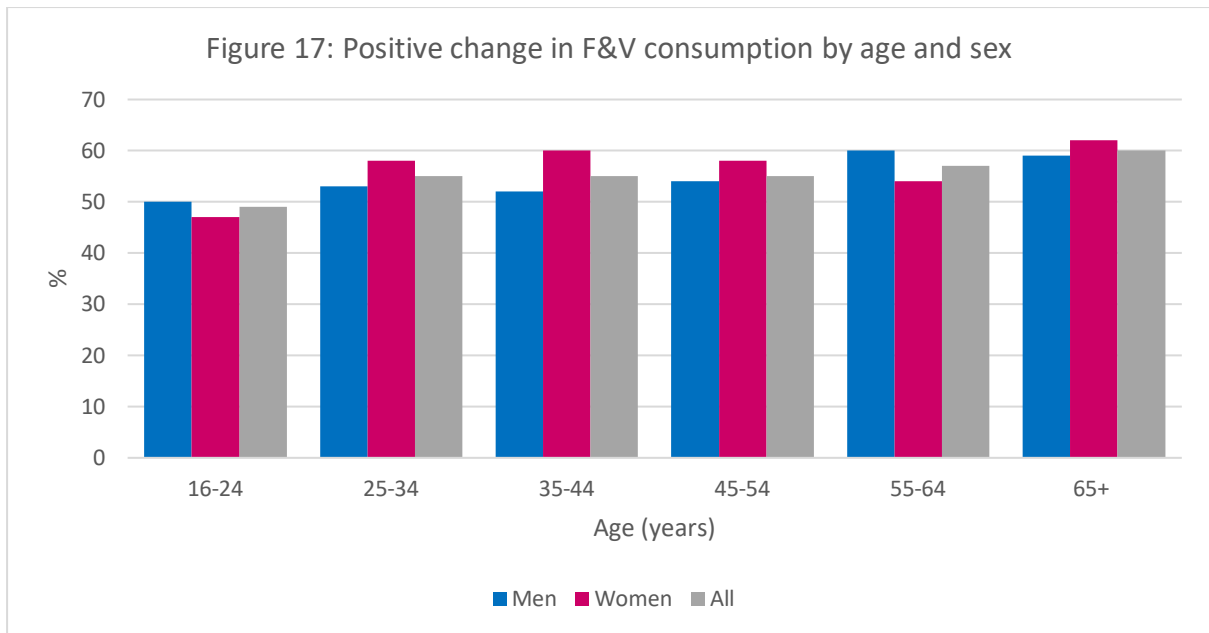
Table B: Moving out of the low consumption group by sex			
	Men	Women	All
	%	%	%
% with low consumption at both waves	46	44	45
% with low F&V at wave 2 and non-low F&V at wave 5	54	56	55
Bases			
<i>Weighted - all</i>	2992	2314	5307
<i>Unweighted - all</i>	2423	2192	4615

6.1 Findings from the bivariate analyses

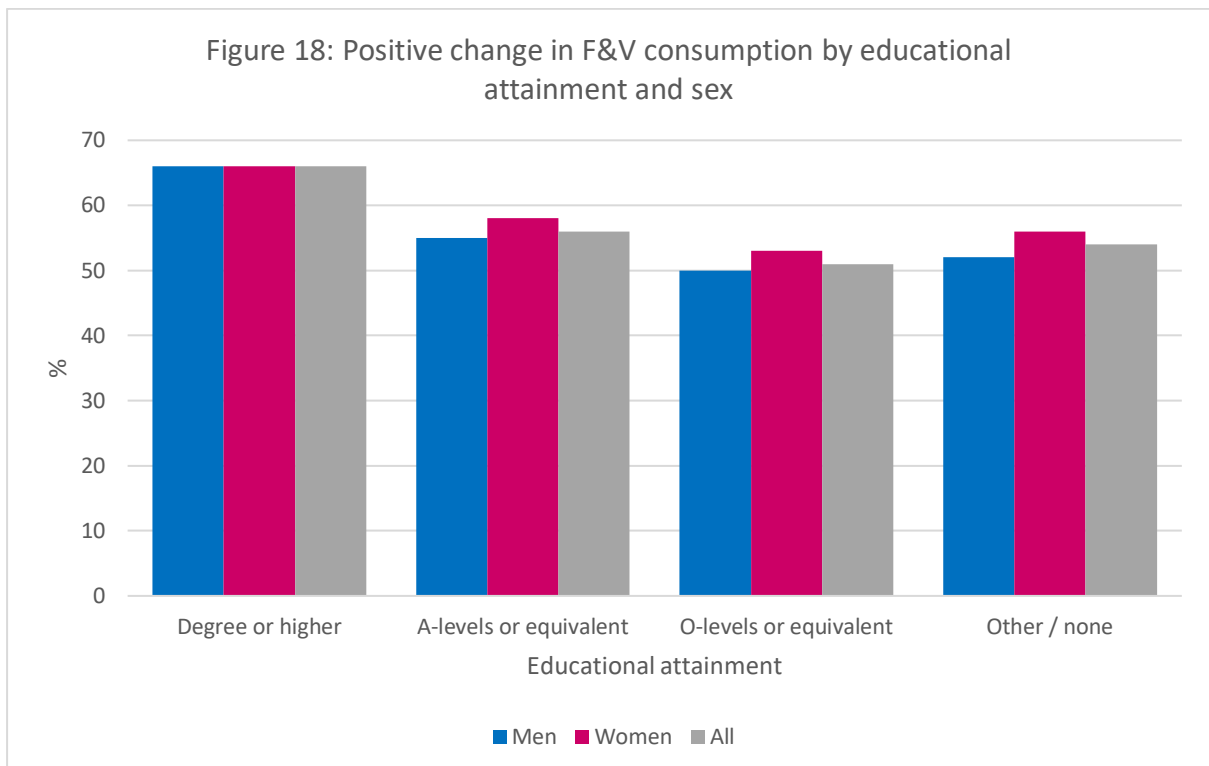
A range of socio-demographic and health factors were significantly associated with moving out of the low F&V group; these are summarised below.⁸

Older adults were more likely to move out of the low F&V group (Figure 17; Table FV16).

⁸ As noted in section 2, all measures (e.g. health status, life satisfaction, household income, economic activity) were those that applied in 2010/11 (wave 2)



Social advantage was positively associated with moving out of the low F&V group. A higher proportion of those with higher educational qualifications moved out of this group than those with lower levels of educational attainment (Figure 18). Similarly, low F&V consumers in higher income groups and in less disadvantaged areas were more likely to increase their intake sufficiently to move out of the low F&V group. Table FV16.



Marital status was associated with moving out of the low F&V group. A smaller proportion of single people moved out the low consumers group than those who were married, cohabiting or separated/divorced/widowed. Table FV16.

Economic activity was associated with moving out of the low F&V group. The proportion moving out was highest among retired people and lowest among those who were unemployed. Table FV16.

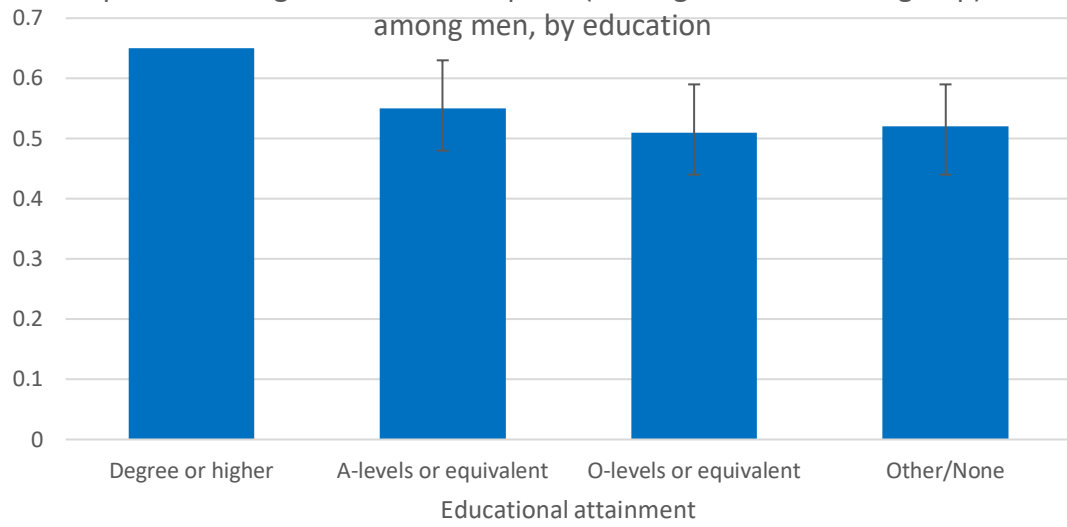
Being in very good health was associated with moving out of the low F&V group. The proportion moving out of the low F&V group was higher among those who reported their health as excellent/very good/good rather than fair or poor. There was no clear linear association with life satisfaction; however, those who were completely dissatisfied with their lives were more likely to move out of the low F&V group than those more satisfied. With respect to BMI, the rate of positive change was highest among those who were obese and lower among those with a healthy weight or who were underweight. Table FV16

6.2 Findings from the multivariate analyses

Among men, only education was significantly associated with moving out of the low F&V group (Figure 19). For women, no factor remained significant.⁹ Table FV17 (men) and Table FV18 (women)

⁹ As noted in section 2, all measures (e.g. health status, life satisfaction, household income, economic activity) were those that applied in 2010/11 (wave 2)

Figure 19: Predicted prevalence (with 95% confidence intervals) of positive change in F&V consumption (moving out of low F&V group) among men, by education



7. Conclusions

7.1 Study features

As the UK's largest longitudinal study, *Understanding Society* contains a large sample of adults engaging in little physical activity and eating little F&V. Its rich social and health measures enabled us to include a wide range of factors in our analyses. We focused survey years (2010/11 and 2013/14) when information on physical activity and F&V consumption was collected; we know from national surveys that, between these years, the proportion of adults meeting the recommendations for the two health behaviours changed little [16, 17].

Understanding Society uses self-reported measures of health behaviours; while less reliable than objective measures [18, 19], self-reported data provide the primary source of population evidence on lifestyles. *Understanding Society's* questions are sourced from other established studies, including the HSE [20]. However, bespoke lifestyle surveys like the HSE and the *Active Lives* survey collect more detailed information, including on activity.¹⁰ In line with the CMO's definition, they measure weekly low activity (not achieving a total of 30 minutes physical activity of moderate-equivalent intensity). Our measure of low activity related to longer time-periods (month for sports, 4 weeks for walking) and did not include a measure of intensity. However, the proportion of adults in the low activity group in *Understanding Society* is not out of line with the proportions recorded as inactive in the HSE and *Active Lives* survey. In *Understanding Society*, 20% of adults were identified as engaging in little PA; in the 2012 HSE and the 2016/17 *Active Lives* survey, 23% and 26% of adults respectively were defined as inactive. This suggests that many of those in the HSE and the *Active Lives* survey who report doing less than the equivalent of 30 minutes moderate-intensity activity a week may also not be achieving this level of exercise across a month.

While the HSE collects detailed information on F&V consumption, the measures are not directly comparable with those used in *Understanding Society*. The HSE asks about consumption 'over the last 24 hours'; *Understanding Society* asks about the number of days per week in which F&V are consumed and on the number of portions usually eaten on these days.¹¹ In *Understanding Society*, we identified 21% of adults who did not eat F&V every day and ate only one or two portions on the days they ate F&V; in the HSE, 25% of adults consumed two portions of F&V or less in the previous 24 hours (none, one portion or two portions) [21].

¹⁰ for example, the HSE includes housework, gardening, DIY and occupational physical activity and both surveys 'double weight' vigorous activity (1 minute of vigorous activity is equivalent to 2 minutes of moderate activity)

¹¹ For example, 7% of adults in the 2017 HSE reported that they had eaten no fruit or vegetables in the last 24 hours (see tables on 'Adult health-related behaviours' at <https://digital.nhs.uk/data-and-information/publications/statistical/health-survey-for-england/2017>); in *Understanding Society*, 37% of adults reported that they did not eat fruit and vegetables every day.

Like studies using recommendation-based measures of PA (≥ 150 minutes of moderate intensity PA per week) and F&V consumption (≥ 5 portions a day), our study used a threshold measure of the two health behaviours. All those who did not achieve the thresholds were defined as engaging in little PA and eating little F&V respectively. To measure change over time, we therefore relied on allocating people to or out of the little PA and low F&V categories at the two points of time on the basis of their self-report. A caveat for the measurement of change is therefore that some of it may be due to reporting error rather than 'true' change.

7.2 Conclusions

Two conclusions can be drawn from our analyses of *Understanding Society*.

- a substantial minority of adults in England have lifestyles that fall well short of government recommendations for physical activity and diet.
- these groups are at heightened risk of social and health disadvantage.

A substantial minority of adults in England have lifestyles that fall well short of government recommendations for physical activity and diet.

England's public health strategy seeks to increase the proportion of the population meeting government recommendations for physical activity and F&V consumption, with national surveys and the *Public Health Outcomes Framework* monitoring these proportions over time.

However, our analysis points to a substantial minority of adults whose activity patterns and dietary habits fall well below the recommendations. One in five adults were taking little physical activity; they were neither engaging in regular sports activity nor in walks lasting 30 minutes or more. Similarly for diet, one in five adults were eating little F&V; they were not eating F&V every day and, on the days they did consume F&V, they had only one or two portions.

These groups are at heightened risk of social and health disadvantage.

While the age profile of those engaging in little physical activity and eating little F&V differs, (older adults are more likely to engage in little physical activity and younger adults are more likely to eat little F&V), the groups share a set of common factors. Both behaviours are associated with socio-economic disadvantage, minority ethnic group status and poor health. Taken together, the three factors highlight the need to focus on the health-related lifestyles of groups already at heightened vulnerability of poverty and poor health, groups within society whose health behaviours may be relatively unaffected by lifestyle improvements at population level [22].

Our analysis points to considerable stability in these two behaviours. However, when followed up three years later, a large minority (43%) reported that they were engaging in sports activity and/or 30 minute walks on an at-least monthly basis. For those previously not eating at least one portion of F&V every day or not eating at least three portions on days eaten, over half (55%) reported that they were now doing so. However, as noted in section 1 of our report, changes in the two behaviours were not associated; among adults who engaged in little physical activity and ate little F&V, positive changes in one behaviour did not make them more likely to achieve positive changes in the other.

This lack of association between improvement in activity levels and F&V intake can be set in the context of wider evidence on interventions to improve people's lifestyles. The fact that risk behaviours cluster (engaging in one risk behaviour increases the probability of engaging in another) has informed interventions that seek to tackle multiple, rather than single, risk behaviours. A recent systematic review of multiple risk behaviour interventions [23] noted that they most frequently target physical activity and diet, and the dominant intervention mode is education and skills training. It concluded that, as currently structured, multiple risk behaviour interventions achieve, at best, small changes in behaviour that are unlikely to translate into meaningful reductions in mortality. In line with other evidence, it concluded that addressing the wider determinants of risk behaviours is integral to securing improvements in individual and population health [23, 24].

Epidemiological studies have described the monotonic relationship between physical inactivity, poor diet and disease risk [25-27], and pointed to the wider economic and social costs of these lifestyle factors [28, 29]. Epidemiological studies have also established that, even for those who are very inactive and eat very little F&V, small increases in physical activity and F&V consumption are associated with improvements in health [7-9]. This points to the scope for health gain at both individual and population level for policies that take account of the needs and perspectives of disadvantaged groups, particularly disadvantaged ethnic minority groups and those in poor health.

8. Tables

Tables listed in the report are contained in the embedded document here:

9. References

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