DETERMINANTS OF HEALTH RELATED LIFESTYLES AMONG UNIVERSITY STUDENTS

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Source of support: The study was funded by the Department of Mental Health and Social Work under the small grants scheme 2014/5.

Abstract

AIMS: To investigate students' health-related lifestyles and to identify barriers and social determinants of healthier lifestyles. METHODS: An online survey, two focus groups, and three in-depth interviews across 2014/15. A stratified by School size and random sample [n=468] of university students answered a 67-item questionnaire comprising six scales: RAPA, REAP-S, CAGE, FTND, SWEMWBS and a*d hoc* scale for drug use/misuse. Stratified by gender X^2 tests were run to test associations/estimate risks and three multivariate Logistic Regression models were adjusted. A thematic approach guided the analysis of qualitative data. RESULTS: 60% of the respondents were insufficiently physically active, 47% had an unbalanced diet and 30% had low mental wellbeing. Alcohol drinkers vs. abstinent were almost equally distributed. 42% of alcohol drinkers reported getting drunk at least once a month. Smokers accounted for 16% of the respondents. Identified risk factors for suboptimal physical activity were: Being a woman, not using the university gym and smoking. For unbalanced diet: low mental wellbeing and drugs use. Poor mental wellbeing was predicted by unbalanced diet, not feeling like shopping and cooking frequently, and a lack of help-seeking behaviour in case of distress. Qualitative analysis revealed seven thematic categories: transition to new life, university environment and systems, finances, academic pressure, health promotion in campus and recommendations. CONCLUSIONS: This study provides robust evidence that the health-related lifestyles of the student population are worrying and suggests that the trend in chronic diseases

associated with unhealthy lifestyles sustained over years might be unlikely to change in future generations. University students' health-related lifestyle is a concern. Nine out of the identified ten predictors of problematic physical activity, nutrition and mental wellbeing, were environmental/societal or institutional barriers. Universities must expand corporate responsibilities to include the promotion of health as part of their core values.

Key words: healthy lifestyles, surveys, students, public health

Introduction

The importance of lifestyle related non-communicable diseases (NCDs) in explaining the health of populations cannot be overstated. Approximately two thirds of the global mortality is caused by NCDs, mainly due to cardiovascular diseases (CVDs), diabetes, cancers and chronic respiratory diseases.[1] Unhealthy lifestyles characterised by physical inactivity, poor diet, tobacco smoking and excessive alcohol use, as well as mental ill health are seen as the main risk factors for chronic diseases and premature deaths.[1–3] In combination they account for a significant amount of preventable deaths worldwide, with tobacco smoking alone claiming 6 million annual deaths, physical inactivity 3.2 million, harmful alcohol use 2.3 million, overweight and obesity 2.8 million, [1] and dietary risks 11.3 million.[4] Furthermore, mental health and substance use disorders are the leading cause of disability worldwide, accounting for 22.9% of years lived with disability (YLDs) and 7.4% of all disability-adjusted life years (DALYs).[5]

The impact of these individual issues is exacerbated by the interactions between major risk factors, which further endanger the populations' health. For instance, overweight/obesity, poor diet, and physical inactivity are linked to increased risk for CVDs, type-2 diabetes, cancer and depression.[6] Mental illness raises the risk for CVD, diabetes, cancer and obesity,[3] and is also associated with higher rates of substance use.[7] The reduction of risk factors by adoption of healthy lifestyles, including regular physical activity, reduced alcohol

use and balanced diet could save many of lives and prevent large proportions of NCDs.[1]

WHO guidelines for adults recommend ≥150 minutes of moderate-intensity physical activity or 75 minutes of vigorous-intensity physical activity per week.[8] Moreover, an appropriate and balanced intake of nutrients supports weight management, decreases the risk of chronic diseases, and improves mental wellbeing.[9] Smoking cessation, reducing alcohol use to a low-to-moderate level, and not using drugs can prevent physical harm, dependence, premature mortality and social harm.[10–12] In the light of the abundant and robust evidence it makes sense to position student health on the top of public health agendas.

Several studies suggest that the transition to higher education makes students susceptible to adopting unhealthy routines.[13] For instance, weight gain in the student population is markedly higher than in equivalent population not attending colleges or universities,[14] and the prevalence of obesity and overweight is increasing.[14-16] Root causes seem to be insufficient physical activity as well as poor diet.[17] UK based research suggests students spend up to eight hours a day on sedentary activities.[13] Additionally, students' dietary patterns deteriorate with increases in sugar, fat and sodium intake and suboptimal consumption of fruits, vegetables and whole grains.[18] Some suggest that while knowledge on what constitutes balanced diets exists, the problem is the translation into cooking and eating practices.[19] Stress exposure negatively encourages deleterious eating habits with increasing tendencies to snack, skip breakfast, and consume larger portions.[14,18] Research in alcohol use and binge

drinking among UK undergraduate (UG) students has found significant numbers of students drinking over the recommended weekly upper limit.[20]

The negative behaviour changes occurring during the first years of higher education are not solely individual decisions but environmentally driven too.[13,21] Students are influenced by university facilities (including their food, alcohol, and leisure activities offers), their social environment and especially peers' attitudes and behaviours,[7,21,22] their financial resources,[23,24] time availability, stress,[18,21,22] academic pressure and competition.[25]

This study aimed at strengthening the evidence on health-related lifestyles, in main areas directly connected to major NCDs: physical activity, nutrition, mental health, smoking, drugs and alcohol use, among UK UG university students. It provides baseline data, identifies personal, social and university-linked barriers as well as wider social determinants to healthy lives and suggests feasible recommendations for the transformation of universities into health hubs.

Methods

Mixed methods study comprising a cross-sectional online survey, two focus groups and three in-depth interviews with stakeholders in managerial positions, implemented across the two academic years 2014/5 and 2015/6. The surveyed population comprised UG students of Middlesex University London (N=13,272). To secure School size representativeness at sample level, a proportionate to Schools' size stratified random sampling strategy was used (minimum n = 359) and sample units were randomly selected within each School (stratum).

A 67-item questionnaire comprising a socio-demographic information section (11 items), six scales (five formally validated/clinically tested), and 14 *ad hoc* items was used. Scales were: a) Rapid Assessment of Physical Activity (RAPA),[26] b) Rapid Eating and Activity Assessment for Patients-Short Version (REAP-S), [27] c) CAGE screening test, a clinical tool for screening alcohol misuse/alcoholism risk,[28] d) Fagerström Test for Nicotine Dependence (FTND),[29] e) Warwick-Edinburgh Mental Wellbeing Scale short version (SWEMWBS),[30] and f) an a*d hoc* 3-items scale to screen drug use/misuse. The questionnaire was piloted on a convenience sample [n=20] and the final version was launched on 4/04/2015. Automated weekly reminders were sent until 15/01/16 when the survey closed. Qualitative data was gathered via two 45-minutes focus groups attended by 15 UGs and three 45-minutes in-depth interviews with university key stakeholders in health-related roles.

Stratified by gender X^2 tests were run to test associations and estimate risks of unhealthy lifestyles in the three main outcome variables: physical activity, nutrition and mental health. If more than one gender-strata resulted as significant, only the one showing the strongest association with the highest significance level (smaller *p* value and/or the more precise OR estimate) was reported.

For the multivariate analysis, all variables found significant at bivariate level ($p < 0.05$) plus gender (as stratification variable) were included in the three logistic regression (LR) models. Physical activity, nutrition and mental wellbeing were also included in the models to obtain OR values adjusted by these variables.

The likelihood ratio test and specificity and sensitivity classification values were used to adjust a series of LR models for each of the main outcome variables. Insignificant variables were dropped to identify the more parsimonious models with the lowest -2log likelihood and the highest overall cases classification while maintaining theoretical coherence. All analyses were performed with SPSS 21.0 and run at 95%CI.

Focus groups and interviews were transcribed and data was thematically analysed[31] with NVivo 10. Two researchers analysed and coded independently and then collaborated to collate the themes and interpret the findings. Coding was done in two stages: 1st and the 2nd cycle of coding. A descriptive node for items supported by healthy lifestyle was added and the second cycle of coding established the relationships, involving strategy for comparison, reorganisation, appraisal of properties and dimensions, focus and synthesis of categories[32]. Interview guides for both semi-structured interviews and focus groups were developed to allow participants to respond in their own words. This gave the research team insight into their perspectives, values and the context in which participants worked and made decisions. In both data collection types (interviews and focus groups) open questions on the nature of health, student wellbeing, the role of universities in this area, alongside perceived barriers and opportunities, enabled the establishment of a shared understanding and were followed by more specific probes around the main topic areas of mental health, smoking, food, alcohol and exercise. To close, the main points were

summarised and there was space given for participants to ask questions or raise pertinent issues that had not been addressed.

Ethical considerations: Ethical approval was obtained from the NSS ethics committee, School of Science and Technology, Middlesex university (ref: 1675). Informed consent from respondents of the online survey was included in first survey field as a condition to continue. Participants in the focus groups and interviews also signed informed consent prior to taking part in the study.

Results

Four hundred and sixty eight valid questionnaires were received with School distribution as follows: Art and Design 50 (10.9%), Business School 91 (19.8%), Health and Education 108 (23.5%), Media and Performing Arts 38 (8.3%), Science and Technology 133 (28.9%), School of Law 40 (8.7%) and four questionnaires did not include the School of study. Seventy percent of respondents were women, half of the sample was 18-21 years old (x=23.6; SD=7). Close to half of respondents were white (45%) followed by black (23%), Asian (23%) and mixed ethnicity respondents (9%). Nine percent suffered from some form of disability. During term time almost half of the sample lived in their own accommodation and 40% lived with parents/guardians. Only 10% were hosted in students' halls. Over half of students judged their financial status as limited with 58% reporting having to think twice before buying something. The most prevalent religion was Christianity (44%). Islam accounted for 20% and 10% had another religion with none of them reaching 4% of the sample. Over a

quarter of the sample followed no religion. Over 90% of the sample identified themselves as heterosexual.

Almost 60% of the respondents were not sufficiently physically active with 16% reporting that they rarely/never did any physical activity. This is coherent with the response distribution to specific items: 53% did not do ≥30 minutes of moderate physical activity ≥5 days per week and only a 19% did ≥20 minutes of vigorous physical activity ≥3 days per week. Furthermore, 89% of respondents did not use the university gym with 30% saying their main reason was the price and 40% because they lacked time to use it. Nutrition patterns suggested problems with dietary balance with 46% of respondents identified as having unbalanced diets. For instance, 37% of students reported that they skipped breakfast regularly, 26% ate <2 pieces of fruit and 24% <2 pieces of vegetables per day on a regular basis.

In our sample, 30% of students experienced suboptimal mental wellbeing and when asked whom they would approach for help if feeling mental distress 60% identified their families/friends as the first contact, 24% would contact their GPs/other medical professional, only 1% would choose a university resource and 15% would not contact any resource.

Alcohol drinkers vs. abstinent were almost equally distributed. When asking drinkers how often they got drunk, 42% (94/226) said that this occurred at least once a month. Additionally, 16% (n=35) of drinkers might have a drinking problem. Smokers accounted for 16% of the respondents (72/446). All respondents, regardless of smoking status, were asked if they would agree with

a smoke-free campus and 53% agreed. The last set of questions referred to the use of illegal drugs, and only 7% (29/445) reported use of illegal drugs (table 1).

Table 1: Physical Activity, Nutrition, Mental Wellbeing, Alcohol, Nicotine and Illegal Drugs Use by Gender among University Students. London 2015

Variables	Men		Women		Totals	
	n	%	n	%	n	%
Physical Activity (n = 427)						
Suboptimal	58	46.8	189	62.4	247	57.8
Active	66	53.2	114	37.6	180	42.2
Nutrition (n = 448)						
Diet OK	63	47.7	177	56.0	240	53.6
Problematic diet	69	52.3	139	44.0	208	46.4
Mental Wellbeing (n = 427)						
OK	94	72.3	203	68.4	297	69.6
Low	36	27.7	94	31.6	130	30.4
Alcohol Use (n = 443)						
Yes	62	47.7	160	51.1	222	50.1
No	68	52.3	153	48.9	221	49.9
Alcohol Problem (n = 220)						
No	57	89.1	128	82.1	185	84.1
Yes	7	10.9	28	17.9	35	15.9
Smoker (n = 446)						
Yes	25	18.9	45	14.3	70	15.7
No	107	81.1	269	85.7	376	84.3
Drug Use (n = 445)						
Yes	12	9.2	17	5.4	29	6.5
No	119	90.8	297	94.6	416	93.5

Gender was strongly associated with physical activity with women having almost twice the risk of insufficient physical activity compared to men (OR=1.9 95% CI=1.2 – 2.9; *p*=0.00). The stratified by gender bivariate analysis revealed five variables significantly associated (*p*<0.05) with physical activity (table A, online supplement): Body mass index (BMI), ethnicity, disability, gym use, and accommodation during academic term. BMI was associated with physical activity only among women (*p*=0.02) with both underweight and obese categories saturating over 80% of the cases in the suboptimal physical activity category. For men only, suffering from some disability (OR=5.1; 95%CI=1.03 – 24.92; *p*=0.04) and living away from parental/guardian houses (*p*=0.03) were both associated with poor physical activity.

Ethnicity was also associated with physical activity: all ethnicities except from mixed ethnicity students had 50% of respondents insufficiently active (*p*=0.04). Not using the campus gym was significantly associated with poorer levels of physical activity among women (OR=2.5; 95%CI=1.2 – 5.2; *p*=0.01) and both genders together (OR=2.6; 95%CI=1.4 – 4.9 *p*=0.00).

In the stratified by gender bivariate analysis eight variables emerged as significantly associated with problematic nutrition patterns (table B, supplement). Among women, smoking, ethnicity, religion, and specific School were associated with an unbalanced diet: Women smokers had almost three times the risk of unbalanced diet (OR=2.7; 95%CI=1.4 – 5.1; *p*=0.00). In the ethnic groups of black and Asian women $\geq$50% showed problems with balanced

diet (p=0.00). Over 60% of Muslim women exhibited dietary imbalance (p=0.03) and over half of the female students in either Business School, Science & Technology or the School of Law described problematic diet patterns (p=0.01). Among men, students with low scores in mental wellbeing were three times more likely to have a problematic diet (OR=3.2; 95%CI=1.4-7.4; p=0.01). Financial problems (p = 0.04), and drug use was associated with poor diet also among males (OR=<1; p=0.00). For both genders together, negative attitudes towards nutrition related activities (shopping and cooking frequently) had almost twice the risk of having a diet problem (OR=1.9; 95%CI=1.0-3.6; p=0.04).

The stratified by gender bivariate analysis, identified four variables as significantly associated with poor mental wellbeing (table C, supplement). The association between nutrition and mental wellbeing was confined to men while the others were associated with both genders: Lack of help-seeking behavior in the event of distress, negative attitudes towards nutrition-related activities and financial struggles. Lack of help-seeking behavior in the event of distress was associated with low mental wellbeing in each gender and across the whole sample, with those students saying they would not reach out for help having four times the odds of scoring lower in the mental wellbeing scale (OR=4.1; 95%CI=2.3–7.1; p=0.00). Negative attitudes towards activities related to nutrition also showed association with mental wellbeing among men (p=0.03) and for both genders with poorer mental wellbeing scores associated with not feeling like shopping for/and cooking frequently (OR=2.2; 95%CI= 1.2 – 4.2;

p=0.01). Across both genders together, those in difficult financial status had a higher risk of low mental wellbeing (OR=0.5; 95%CI= 0.4 – 0.9; *p*=0.01)

The final multivariate model for physical activity model (table 2) (-2log likelihood = 376.545; overall correct classification = 66.9%; Hosmer and Lemeshow *p*=0.69; Cox & Snell R^2=0.104; Negelkerke R^2=0.140) withheld three variables as significant predictors of physical activity: Gender, gym use and smoking. Women had over twice the risk of not been sufficiently active compared to male students (OR=2.3; 95%CI=1.4–3.9; *p*=0.00). Not using the university gym carried almost three times the risk of suboptimal physical activity than using it (OR=2.8; 95%CI=1.2–6.2, *p*=0.01), and smoking doubled the risk of below the bar physical activity (OR=2.1; 95%CI=1.0–4.3, *p*=0.04).

Table 2: Adjusted ORs* of Demographic and Lifestyle Factors Associated with Physical Activity among University Students. London 2015

Variables	n (%)	OR**	95%CI**	*p***
Gender				
Men	136 (29.6)	Ref		
Women	324 (70.4)	2.3	1.4 – 3.9	0.00
University Gym Use				
Yes	49 (10.7)	Ref		
No	408 (89.3)	2.8	1.2 – 6.3	0.01
Smoking				
No	378 (84.0)	Ref		
Yes	72 (16.0)	2.1	1.0 – 4.3	0.04
Ethnicity				
White	199 (45.2)	Ref		
Black	102 (23.0)	3.3	1.1 – 10.4	0.52
Asian	101 (23.0)	0.8	0.4 – 1.5	0.12
Mixed ethnicity	38 (8.6)	1.9	0.8 – 4.3	0.52
Disability				
No	417 (91.2)	Ref		
Yes	40 (8.8)	1.4	0.5 – 3.4	0.52
Nutrition				
Diet OK	243 (53.6)	Ref		
Problematic diet	210 (46.4)	1.3	0.8 – 2.1	0.37
Mental Wellbeing				
OK	300 (69.6)	Ref		
Low	131 (30.4)	1.1	0.6 – 1.8	0.83

*Adjusted by all variables in the model. ** OR and CI values rounded up to 1 decimal point. *** *p* values rounded up to 2 decimal points except when rounding up resulted in reaching >0.05.

The adjusted multivariate model for nutrition (Table 3) (-2log likelihood=481.282; overall correct classification=60.9%; Hosmer and Lemeshow *p*=0.325; Cox & Snell R^2=0.091; Negelkerke R^2=0.121) includes three of the variables previously identified as associated with unbalanced nutrition: School, poor mental wellbeing, and drug use. Students in the Schools of Science & Technology and Business School had 3.5 and 2.8 times the risk of having an unbalanced diet respectively compared to students in Art & Design (ref category) (Science & Technology : OR=3.5; 95%CI=1.5–8.2; p=0.01. Business School: OR=2.8; 95%CI=1.1–6.9; *p*=0.03). Students scoring lower in mental wellbeing had almost twice the risk of unbalanced diet (OR=1.7; 95%CI=1.1–2.7; *p*=0.03) and users of drugs had a marginal but statistically significant risk of dietary problems (OR=0.4; 95%CI=0.1–0.9; *p*=0.03).

Table 3: Adjusted ORs* of Demographic and Lifestyle Factors Associated with Nutrition among University Students. London 2015

Variables	n (%)	OR**	95%CI**	*p***
School**				
A&D	50 (10.9)	Ref		
BS	91 (19.8)	2.8	1.1 – 6.9	0.03
H&E	108 (23.5)	1.7	0.7 – 4.1	0.26
M&PA	38 (8.3)	1.5	0.5 – 4.3	0.44
S&T	133 (28.9)	3.5	1.5 – 8.2	0.01
SL	40 (8.7)	2.3	0.8 – 6.7	0.12
Mental Wellbeing				
OK	300 (69.6)	Ref		
Low	131 (30.4)	1.7	1.1 – 2.7	0.03
Drug Use				
No	419 (93.3)	Ref		
Yes	30 (6.7)	0.4	0.1 – 0.9	0.03
Smoking				
No	378 (84.0)	Ref		
Yes	72 (16.0)	1.6	0.9 – 3.1	0.14
Ethnicity				
White	199 (45.2)	Ref		
Black	102 (23.3)	1.4	0.8 – 2.5	0.25
Asian	101 (23.0)	1.3	0.7 – 2.4	0.35
Mixed	38 (8.6)	0.6	0.2 – 1.4	0.21
Attitude towards nutrition related activities				
Positive	398 (89.4)	Ref		
Negative	47 (10.6)	1.2	0.6 – 2.6	0.61
Physical Activity				
Active	181 (41.9)	Ref		
Suboptimal	251 (58.1)	0.8	0.5 – 1.3	0.33
Gender				
Men	136 (29.6)	Ref		
Women	324 (70.4)	0.8	0.5 – 1.3	0.40

* Adjusted by all variables in the model. ** OR and CI values rounded up to 1 decimal point. *** *p* values rounded up to 2 decimal points except when rounding up resulted in reaching >0.05. ****Schools acronyms: A&D =Art and Design; BS= Business School; H&E = Health and Education M&PA = Media and Performing Arts; S&T = Science and Technology; SL =School of Law

In the adjusted multivariate model for mental wellbeing (table 4) (-2log likelihood = 410.8; overall correct classification = 73.9%; Hosmer and Lemeshow *p*=0.41; Cox & Snell R^2=0.1; Negelkerke R^2 = 0.1) four variables retained statistically significant risk values. A lack of help-seeking behaviour in case of distress predicted an almost fourfold increase in the risk of low mental wellbeing (OR=3.7; 95%CI=2.0–6.9; *p*=0.00); unbalanced diet almost doubled the risk of low mental wellbeing (OR=1.7; 95%CI=1.0–2.7; *p*=0.04), negative attitudes towards nutrition related activities doubled the risk of low mental wellbeing too (OR=2.3; 95%CI=1.1– 4.8 *p*=0.02), and financial difficulties carried a marginal but statistically significant risk of poor mental wellbeing.

Table 4: Adjusted ORs* of Demographic and Lifestyle Factors Associated with Mental Wellbeing among University Students. London 2015

Variables	n (%)	OR**	95%CI**	*p***
Whom would approach for help				
Someone****	373 (85.2)	Ref		
No one	65 (14.8)	3.7	2.0 – 6.9	0.00
Attitude towards nutrition related activities				
Positive	398 (89.4)	Ref		
Negative	47 (10.6)	2.3	1.1 – 4.8	0.02
Nutrition				
Diet OK	243 (53.6)	Ref		
Problematic diet	210 (45.2)	1.7	1.0 – 2.7	0.04
Financial Status				
OK	255 (58.1)	Ref		
Struggling	184 (41.9)	0.6	0.4 – 0.9	0.04
Gender				
Men	136 (29.6)	Ref		
Women	324 (70.4)	1.5	0.8 – 2.6	0.18
Physical Activity				
Active	181 (41.9)	Ref		
Suboptimal	251 (58.1)	1.4	0.8 – 2.2	0.22

*Adjusted by all variables in the model. ** OR and CI values rounded up to 1 decimal point. *** *p* values rounded up to 2 decimal points except when rounding up resulted in reaching >0.05. ***GPs, other health professionals, family, friends, academic staff.

Qualitative analysis developed seven thematic categories: 1) Transition to New Life: students learning to take responsibility for their health in balance with studying, social life, and often outside work which negatively affected their lifestyle choices; 2) University Environment: Students felt their health was negatively impacted by food facilities on campus (unhealthy food with a few limited and costly healthier choices) and by the culture in the University living residences. Poor compliance with designated smoking areas increasing the risk of passive smoking was noted, and the wellbeing service on site was perceived as hard to access; 3) University Systems: Changes made to consolidate the time students often entail long days and short breaks for students which encourages the intake of caffeine and high sugar snacks. Additionally a lack of time hindered participation in sports activities; 4) Finances: Economic hardship makes healthy living a challenge with the University gym's annual fee, for instance, decreasing its use, and high food prices on campus competing with the broad range of cheap fast food restaurants off-site; 5) Academic pressure: Smoking and alcohol use were perceived as stress-relieving strategies which increased students' vulnerability to poorer health. Links between alcohol and academia were entrenched across both the focus groups: "*I think people socialise better when they are under the influence of something!"* as well as the interviews: *"people expect to go to university and do those things, to drink for three years, it's the attraction for some people".* Some students, however, were troubled by the association: *"To be honest I've never understood why there has to be a bar on the university campus […] having a bar in a learning*

environment". Smoking on campus was an equally disputed topic with vehement anti-smoking statements: *"Wherever you are going you just pass from one place to another, you just go a few steps you know and you inhale a lot of chemicals you know, passive smoking you know. It's really unhealthy".* By contrast: *"We shouldn't be smoke free, people should have the choice to smoke or not"*; 6) Health Promotion on Campus*:* Health promoting events were offered, however they can be poorly timed resulting in a lack of awareness and reduced student engagement and; 7) Recommendations*:* Students were interested and thoughtful about how the current situation could be improved with suggestions ranging from lowering prices of healthy food and gym-fees, targeted health events and awareness campaigns and centralising health services to increase accessibility. The stakeholder interviewees' attitudes and concerns mirrored those of the student focus groups, though the interviewees were more strategic in their consideration of resources. For instance, regarding physical activity they highlighted that the provision of sports facilities is impacted by issues of space, finances and corporate planning. Interviews with staff showed acute awareness of student distress during examination periods. They also noted a rise in mental distress more generally: *"I've noticed a big increase in students who genuinely can't cope and why that is I don't know […] a lot of anxiety, a lot of depression".*

Discussion

The results of this study provide robust evidence that the health-related lifestyles of the student population are a cause for concern and suggest that the trend in chronic diseases associated with unhealthy lifestyles sustained over years might not change in future generations. Our findings are important as "*health patterns in young adults form a roadmap to health prediction in later life"*.[33] In our sample about half of the students were engaging in health damaging behaviours: insufficient physical activity, unbalanced diet, excessive alcohol consumption and smoking. Their levels of self-reported low mental wellbeing were also concerning.

The strong link of these patterns to gender differences, suggest that gender-specific interventions are needed to tackle those problems.

Previous studies on university students have shown complex and multiple issues associated with the transition to fully adult life with impact on the protection of life through adequate lifestyles.[14–16,18,34,35] Mental wellbeing among university students has also been consistently identified as a primary concern in previous research.[36]

Our findings are consistent with previous studies identifying outcomes of compromised dietary balance such as increased obesity levels,[18] poor levels of physical activity,[37] and alcohol abuse.[38] However we acknowledge these are the findings from a single university and there may be some variations at universities in other parts of the country.

Our multivariate models identified being a woman, not using the university gym,

and smoking as predictors of suboptimal physical activity. Low mental wellbeing, using drugs and studying in specific university schools were predictors of an unbalanced diet.

Poor mental wellbeing was predicted, besides problematic nutrition patterns and negative attitudes towards activities related to nutrition such as shopping and cooking, by a lack of help-seeking-behaviour - “I would not talk to anyone” - and financial difficulties. Alcohol misuse among the student populations is a familiar subject in public health research, with college years being identified as a risk period to develop substance use disorders.[34] In our sample over 40% of drinkers said they get drunk at least once a month and 16% smoke. This finding alone is more than alarming.

This study, despite its significant findings, does not provide the in-depth knowledge provided by surveys with targeted at-risk populations, or use of diagnosis rather than the screening tools used here.

As a cross-sectional survey, our study did not allow for the identification of trends and variations across university years; however it provides a comprehensive picture of students’ health-related lifestyle and informs on major risk factors. The majority of these can be tackled within the university context, as out of the ten predictors of problematic physical activity, nutrition and mental wellbeing, only one was purely biological/personal (gender as predictor of physical activity). The rest were environmental/societal barriers (smoking, drug use, financial struggles, poor mental wellbeing and lack of seeking-help behavior in case of mental distress) or institutional barriers (lack of gym use,

studying in specific university Schools, unbalanced diet and poor attitudes towards nutrition-related activities). Institutional barriers are created by logistic and financial considerations that take priority. For instance, while universities know that the academic calendar creates peaks in students' anxieties and distress, no counterbalance measure is systematically implemented (e.g.: stress managing educational activities prior and during examination periods). Another example of an institutional barrier is the low use of the campus gym, attributable to an upfront yearly membership fee. Alcohol abuse is not tackled for purely financial reasons. In our university, the situation is further complicated by the fact that university bar is not managed by the Student Union, as is common elsewhere, but by a private company which supplies the catering onsite.

The Student Union, rather than dealing with the complexity of a corporate structure, has developed a partnership with a more accommodating local public house, thus circumventing any campus regulations.

The environmental/societal barriers to health identified in this study are part of the social determinants of health (i.e. collective conditions where people are born, grow, live and work) that are widely accepted as responsible for significant health inequalities[39]. The need of action to correct social determinants of ill health has been rightly identified not only as a means to improve health but to work towards societies focused on meeting human needs[40] and social justice.[41]

Several recommendations emerge from this study. For instance, changing the gym membership to monthly payments without contractual bounds and creating outside-of-gym, diverse and gender-based opportunities would increase

physical activity. Nutrition could be improved by re-designing in-campus food outlets offer to include inexpensive, healthy options. Academic demands need to be addressed; long hours of teaching activities with short breaks prompting fast-food seeking behaviours are an intrinsic part of the problem. Alcohol use needs to be tackled and Student Unions have a very important role to play in this respect with their frequent alcohol-based fundraising events.

These results could be considered alongside the stereotypical student lifestyle - that of takeaway food, alcohol, late nights and television - and how that might factor into the findings. It could be postulated that students expect their lifestyle to be unhealthy in this respect and align themselves with the cultural stereotype. The results from the quantitative part of the study might corroborate this, but the results from the focus groups indicate that students do consider their lifestyles and would like a more health-focused university environment.

The qualitative data substantiated the findings of the quantitative survey and added depth to its understanding. It also uncovered disparity between assumptions by staff suggesting students lacked insight into their long-term health - *"They don't necessarily recognise when they need help because they're young and they're bulletproof".* – and the thoughtful reflections of focus groups participants: *"my family tend to be like diabetic, so like I know that if I eat too much sugar now (…). So I think it's very important to think about".*

Conclusion

To conclude, our findings demonstrate higher education students health-related lifestyles are a concern and both staff and students recognise the problem and feel passionate about improving them. Our university is in the process of implementing different measures to help students maintain healthy lifestyles.

Modern universities host large numbers of students and public health monitoring systems and interventions need to be part of the structure and services provided. With over 20 million students in the European Union, alone universities should be health promotion settings.[31] Universities are hubs of student life and they need to expand their corporate responsibilities to include the protection and promotion of health in their core values. There is questionable value in awarding academic degrees if the health of students is part of the university fee.

Highlights

- This study provides evidence that the health related lifestyles of university students is a concern.
- Almost 60% of the respondents were not sufficiently physically active, 46% were identified as having unbalanced diets, 30% experienced suboptimal mental wellbeing. Smokers accounted for 16% of the respondents and although alcohol drinkers vs. abstinent were almost equally distributed, 42% of those who drank reported getting drunk at least once a month.
- In identifying predictors of unhealthy behaviours, gender differences were clear in all areas considered but for the whole sample, risk factors for suboptimal physical activity included gender [women], no use of the university gym and smoking. Risk factors for imbalanced nutrition were School of study, poor mental wellbeing and drug use. Low mental wellbeing was predicted by a lack of help-seeking behavior in case of distress, unbalanced diet, negative attitudes regarding nutrition activities such as shopping and cooking and financial difficulties.
- The qualitative part of the study corroborated findings from the survey with both staff and students demonstrating both awareness of the existing issues and sensitivity regarding the importance of healthy lifestyles.
- Universities are hubs of student life and they need to expand their corporate responsibilities to include the protection and promotion of health in their core values.

Acknowledgments: The research team is rightfully thankful to the funding bodies of this project: the Department of Mental Health, Social Work and Integrative Medicine [small grant scheme 2014/15] and Middlesex University Wellbeing Service, to our departments' colleagues for support and technical advice, and lastly but not less felt, to the Middlesex students and stakeholders interviewed who generously gave us some of their time to participate in this study.

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SUPPLEMENTAL MATERIALS

Table A: Risk Factors for Suboptimal Physical Activity by Gender among University Students. London 2015

Variables	Active n (%)	Suboptimal n (%)	p value*
BMI (women only, n = 216)			
Normal	56 (41.2)	80 (58.8)	
Underweight	3 (14.3)	18 (85.7)	0.02
Overweight	15 (41.7)	21 (58.3)	
Obese	4 (17.4)	19 (82.6)	
Disability (men only, n = 121)			
No	62 (55.9)	49 (44.1)	0.045**
Yes	2 (20.0)	8 (80.0)	
Accommodation (men only, n =119)			
Students' hall	5 (50.0)	5 (50.0)	0.03
Parents/guardians	35 (66.0)	18 (34.0)	
Own/rented/shared accommodation	23 (41.1)	33 (58.9)	
Ethnicity (both genders, n = 407)			
White	75 (39.7)	114 (60.3)	
Black	32 (34.4)	61 (65.6)	0.045
Asian	44 (48.4)	47 (51.6)	
Mixed	20 (58.8)	14 (41.2)	
Campus gym use (both genders, n = 307)			
Yes	29 (63.0)	17 (37.0)	0.00
No	151 (39.6)	230 (60.4)	

* *p* values rounded up to 2 decimal points except when rounding up resulted in reaching $\geq$0.05. ** 1 cell (25%) had an expected count, less <5. The minimum expected count was 4.71. Fisher's exact test *p* value reported instead.

Table B: Risk Factors for Problematic Dietary Balance by Gender among University Students. London 2015

Variables	Diet OK n (%*)	Problem diet n (%*)	p value**
Ethnicity (women only, n = 299)			
White	93 (64.1)	52 (35.9)	
Black	36 (49.3)	37 (50.7)	0.00
Asian	21 (38.2)	34 (61.8)	
Mixed	18 (69.2)	8 (30.8)	
Religion (women only, n = 304)			
Christianity	92 (61.3)	58 (38.7)	
Islam	21 (38.9)	33 (61.1)	0.03
Other***	10 (50.0)	10 (50.0)	
None	48 (60.0)	32 (40.0)	
School* (women only, n = 313)**			
A&D	33 (78.6)	9 (21.4)	
BS	23 (46.9)	26 (53.1)	
H&E	52 (59.8)	35 (40.2)	0.01
M&PA	19 (16.3)	10 (12.7)	
S&T	34 (45.9)	40 (54.1)	
SL	15 (46.9)	17 (53.1)	
Smoking (women only, n = 314)			
No	160 (59.5)	109 (40.5)	0.00
Yes	16 (35.6)	29 (64.4)	
Financial status (men only, n = 125)			
Problematic	26 (39.4)	40 (60.6)	0.04
Sufficient	34 (57.6)	25 (42.4)	
Mental Wellbeing (men only, n = 130)			
OK	52 (53.3)	42 (44.7)	0.01
Low	10 (27.8)	26 (72.2)	
Use of illegal drugs (men only, n =131)			
Yes	1 (8.3)	11 (91.7)	0.00
No	62 (52.1)	57 (47.9)	
Attitude towards nutrition related activities (both genders, n = 442)			
Positive	219 (55.3)	177 (44.7)	0.04
Negative	18 (39.1)	28 (60.9)	

* rounded up to 1 decimal point. ** *p* values rounded up to 2 decimal points except when rounding up resulted in reaching $\geq$0.05. ***: Other religions <4% of valid % each. ***Schools acronyms: A&D =Art and Design; BS= Business School; H&E = Health and Education M&PA = Media and Performing Arts; S&T = Science and Technology; SL =School of Law

Table C: Risk Factors for Low Mental Wellbeing by Gender among University Students. London 2015

Variables	Mental Wellbeing OK n (%*)	Low Mental Wellbeing n (%*)	*p* value**
Nutrition (men only, n = 130)			
Diet OK	52 (83.9)	10 (16.1)	0.01
Problematic diet	125 (64.4)	69 (35.6)	
Financial status (both genders, n = 408)			
Struggling	154 (65.0)	83 (35.0)	0.01
OK	132 (77.2)	39 (22.8)	
Attitude towards nutrition related activities (both genders, n = 423)			
Positive	273 (71.8)	107 (28.2)	0.01
Negative	23 (53.5)	20 (46.5)	
Whom would approach for help (both genders, n = 416)			
Someone***	264 (74.6)	90 (25.4)	0.00
No one	26 (41.9)	36 (58.1)	

* rounded up to 1 decimal point. ** *p* values rounded up to 2 decimal points except when rounding up resulted in reaching $\geq$0.05. ***GPs, family, friends, academic resources