THE WESTERN SYDNEY ADOLESCENT HEALTH STUDY: A PILOT STUDY OF BEHAVIOURAL FACTORS ASSOCIATED WITH OVERWEIGHT AND OBESITY

WESTERN SYDNEY UNIVERSITY

The Australian Prevention Partnership Centre

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Executive Summary

This study aimed to test the feasibility of recruiting adolescents in the population catchment of Western Sydney via social media, using mobile phone software to collect health and wellbeing measures in (near) real-time, and to investigate patterns of dietary behaviour, physical activity and other health and wellbeing factors over a 16-week follow-up period.

Participants
A total of 1,298 participants completed the baseline questionnaire, ranging from 13-19 years of age. Participants were more likely to be recruited via Instagram than Facebook, and were predominantly female (80.8% of participants), and aged between 17 and 19 years. The study consisted of a total of 348 EMAs over the 16-week follow-up period (29 EMAs per week). Forty-five percent (45%) percent of participants completed at least one EMA, with rates of completion declining over the study period (from approximately 25% to 10%). Less than 1% of participants completed all EMAs over the follow-up period.

Overweight and obesity
Overall, 62.6% of participants were classified as a normal weight. Every fourth participant was either overweight (17.9%) or obese (9.2%), and 10.3% were underweight. The proportions of males and females in each BMI category were similar.

Sleep duration, physical activity and small screen recreation at baseline
Overall, 5.3% of participants (10.7% of males, 4.3% of females) reported to have engaged in a physical activity for at least 60 minutes every day in the previous week. The median time spent on sedentary activities was 15 hours per day and included doing homework, reading, tutoring, hobbies, sitting around, playing an instrument, and small screen recreation. Seventy-four percent of all adolescents indicated spending, on average, more than 4 hours per day on watching TV, playing video games or using a computer for fun. Fifty-six percent (56%) of participants reported sleeping ≥8 hours the previous night, which was similar among both males and females.

Diet at baseline
Only 7.5% of all participants reported consuming the recommended daily amount of three serves or more of fruits, and 4.9% reported four serves or more of vegetables in the previous week. Forty-two percent of adolescents reported consuming fast food including burgers, pizza, chips, or French fries at least once a day.

Psychological distress, wellbeing, and social connectedness
Overall, 32% of participants (18.9% for males, 34.4% for females) had Kessler 6 (K6) scores indicative of probable mental illness (K6 score >18) (Table 6). Over seventy-five percent of males and females reported three or more important contacts in the previous 6-months, including friends and family.

Trends in wellbeing, dietary behaviours, and physical activity
Over the 16-week follow-up period, males were more likely to have engaged in a physical activity for at least 60 minutes over the past 24 hours than females. Half of the participants spent at least 1 hour watching TV in the previous 24 hours, and 3 hours using the internet/social

media in the previous 24 hours. Half of participants reported 3 serves of fruit and 3 serves of vegetables in the previous 24 hours. Fifty percent reported sleeping 8 hours or more.

Individual and aggregate trajectories in EMA responses were reasonably consistent over the follow-up period, with the exception of hours in class and studying reflecting the school holiday period in December 2019 and January 2020.

Determinants of dietary behaviours and physical activity over follow-up
Obesity at baseline was associated with a lower likelihood of eating 3 or more fruit serves, 4 or more vegetable serves, and 60+ minutes of physical activity over the follow-up period; and a higher likelihood of eating fast food in the previous 24 hours.

Similarly, a higher level of sedentary hours and screen time at baseline was associated with a lower likelihood of eating 3 or more fruit serves, 4 or more vegetable serves, 60+ minutes of physical exercise, and a higher likelihood of eating fast food in the previous 24 hours.

Overall, higher levels of social connection and psychological wellbeing at baseline were also associated with a higher likelihood of fruit and vegetable consumption, higher levels of physical activity, and lower likelihood of fast food consumption at follow-up.

Implications
The unbalanced sample in this study in terms of sex and age may be reflective of the type of social media use between males and females, and future studies should consider disseminating more targeted social media ads as well as using other channels (e.g. Snapchat) in addition to Facebook and Instagram. While the present study established a Youth Advisory Group to seek feedback on the design and implementation of project materials, more integrated strategies to embed co-design of these materials earlier on in the study is something to consider for future research. Additionally, improvements in retention and adherence to the study could perhaps include smaller, but more regular incentives, feedback of tailored information to participants, as well as the application of gamification elements in follow-up surveys.

Conclusion
This pilot study has demonstrated the feasibility of conducting an adolescent health cohort study recruited via social media with detailed trajectories of health behaviours and wellbeing collected via mobile phone. The imbalance in participants by sex and age recruited via social media indicates a more targeted approach involving more explicit co-design with adolescents, and modifications to participant incentives, is needed to achieve a more representative sample.

However, findings from the study are broadly consistent with other cross-sectional prevalence surveys of adolescents, and the longitudinal nature of the current study comprising weekly EMA trajectories will allow for more in-depth investigation of temporal relationships between the related adolescent health priorities of overweight and obesity, diet, physical activity, and wellbeing. These more detailed investigations will form the basis of subsequent analyses.

Introduction

The prevalence of childhood overweight and obesity has risen substantially over the past three decades, and has emerged as a global health priority (1). Prevalence of overweight and obesity among those <20 years (based on BMI) among developed countries in 2013 was 24% for boys and 23% for girls, increasing from ~17% in 1980, but with increasing trends attenuating in the last decade (1). In the Australian context over a quarter of children aged 5-17 years were overweight or obese in 2014-2015 (28% for boys, and 27% for girls) (2), with rapid increases evident in the 1980s (3). While there has been an indication of a plateau in overweight and obesity at the population level, particular sub-populations including those of lower SES and in rural areas (2), particular ethnic groups (4-6), and Indigenous children (2) continue to experience a higher prevalence of overweight and obesity than the general population. This reflects socio-demographic differentials in the key determinants of overweight and obesity, relating to dietary behaviours, physical activity, and obesogenic environments (associated with schools, workplaces, and neighbourhoods) (2, 7).

These social, economic, and cultural differences are also likely to be important determinants of dietary behaviours and physical activity among adolescent groups, occurring contemporaneously with a period of the life-course involving significant social, emotional and biological development. However, less information on dietary behaviour and physical activity is available among this age group. This is important as health behaviours during adolescents are likely associated with subsequent behaviours and health outcomes as adolescents' transition to adulthood (8).

Additionally, objective measures of key determinants of dietary behaviour and physical activity - and how these change over time - are also not well documented. Previous research among adolescents often is cross-sectional, based on self-reported exposure measures, or restricted to school-based settings. While broader socio-cultural factors associated with obesogenic environments are important distal determinants, understanding those more proximate factors that may modify or facilitate health behaviours, such as mental wellbeing (9), sleep patterns (10), and screen-time (11, 12), may also provide insights to inform interventions for behavioural change and health promotion among adolescent populations. Disentangling temporal relationships between these exposures and outcomes is limited by predominantly cross-sectional designs, and the role of broader socio-economic and cultural determinants in modifying dietary behaviours and physical activities among adolescents is not clear. The use of mobile phones to follow-up study participants over time and conduct so-called ecological momentary assessments (EMAs) in (near) real time (13) have the potential to capture more detailed information on trajectories of behaviour relating to overweight and obesity in adolescent cohorts.

The main aim of the pilot Western Sydney Adolescent Health Study was to investigate some of these factors and use mobile phone data to collect temporal information to identify specific trajectories of behaviour. Specifically, the objectives of the pilot study were to (i) test the feasibility of recruiting young people via social media; (ii) test the feasibility of using innovative mobile phone software to collect health and wellbeing measures in (near) real-time; and (iii) evaluate the acceptability of the proposed questionnaire and follow-up procedures in terms of face validity, wording, and participation rates. A combination of phone sensor data and ecological momentary assessments (EMAs) of health and wellbeing was used. It was

proposed that young people may engage more readily via mobile app and social media contact than more traditional approaches to the collection of epidemiological data (14). Information from this study can be used to inform the design of a wider adolescent cohort study to investigate associations between sleep, screen-time, and stress and dietary and physical activity outcomes, and will also provide detailed information on behavioural trajectories of these measures over a 3-month period. A series of secondary objectives are also proposed for a wider cohort study to investigate the modifying role of socio-economic status, ethnicity, the role of family, and social networks on associations between sleep, screen-time, and stress and health behaviours in adolescents.

Method

Design
A prospective cohort study design was employed and convenience sampling was used via social media (Instagram and Facebook) to recruit young people from the general population aged 13-19 years from the Western Sydney population catchment. Participants were followed prospectively over a period of 16 weeks from 8 October 2019 to 8 April 2020. Institutional ethics approval for the pilot study was obtained from the Western Sydney University Human Research Ethics Committee (HREC Approval Number: H13302).

Recruitment
Potential participants aged 13-19 years with a smartphone (Android or iPhone) were approached via (i) direct targeted promotion of the pilot study on Instagram and Facebook, and (ii) participants (e.g. friends) who had already enrolled in the study (who were directed to the pilot study webpage). Promotional and recruitment materials were developed and modified by members of a Youth Advisory Group (Appendix 1) which was established for this project through a contact network identified by *headspace* Parramatta's Youth Advisory Council. The study advisory group comprised young people from Western Sydney in the target age range, and also young people with experience in youth advocacy. The social media campaign targeted the Western Sydney population catchment, however participants from areas outside of this catchment were not excluded if they enrolled in the study. Participants who remained in the study for its duration and answered the questionnaires and EMAs over that time received a $30 GiftPay voucher.

Data collection
Data were collected through the Ethica Data mobile phone app (https://ethicadata.com/product) which collected data from questionnaires, ecological momentary assessments (EMAs), and mobile phone sensors. Mobile sensor data were collected automatically through the Ethica app only from those participants who provided consent, and included geo-location information (via GPS, Wifi, Bluetooth), accelerometry data, and screen state (whether the screen is on or off). A baseline questionnaire (Appendix 2) and schedule of follow-up EMAs (Appendix 3) were triggered when participants enrolled in the study, with questions sent directly to each participant's mobile phone. There were 9 EMAs (as described below), each of which were administered weekly, but on different days. Thus, participants received daily EMAs, but received a different EMA on each day. EMAs were sent to participants at random times between 8am and 10am or between 3pm and 8pm, to avoid notifications during school hours and periods when participants may have been sleeping. This resulted in weekly measures for each domain over the 16-week follow-up period.

Study factors
The primary outcome variables for this pilot study were physical activity and dietary behaviour. Physical activity was assessed via self-report based using the the PACE+ Adolescent Physical Activity Measure (15), and the Adolescent Sedentary Activities Questionnaire (ASAQ) (16) (Table 1). Dietary information was collected using the short dietary questions developed by the NSW Centre for Public Health Nutrition (17). Using these questionnaires allowed direct comparison with Australia's Physical Activity Recommendations (18), and the Dietary Guidelines for Children and Adolescents in Australia (19) . Both outcomes were assessed at baseline and over the follow-up period through short weekly EMAs. EMA responses can be

combined with other mobile phone sensor data (eg. accelerometer, pedometer, screen-state) among those participants who consented to provide mobile phone sensor information. However, analyses of sensor data are not straightforward, and at the time of writing this report, mobile phone sensor data are being collated in preparation for analysis.

The main exposure variables included sleep patterns, screen-time and wellbeing measured through self-reported information and augmented with mobile phone sensor data. The Kessler Psychological Distress 6-item scale (K6) was used to assess psychological distress (20). Response options for each K6 item included "none of the time", "a little of the time", "some of the time", most of the time", and "all of the time", and were scored in the range of 0 to 4 respectively. The EPOCH (Engagement, Perseverance, Optimism, Connectedness, and Happiness) measure of wellbeing was also included in the study to capture information on positive psychological characteristics (21) using a five-point scale from "almost never" to "almost always". The K6 and EPOCH questionnaires were sent at baseline with follow-ups every month, and short EMAs relating to selected EPOCH items were sent weekly (22).

Other baseline questions included participants' self-reported weight, height, and socio-demographics relating to sex, age, educational achievement, employment, and language spoken at home. These questionnaire items were were drawn from the National Mental Health and Wellbeing Study (23) and the NSW Case-Control Study of Suicidal Behaviour in Young Adults (24). Measures of height and weight were used to calculate Body Mass Index (BMI), and participants were classified as normal weight, overweight or obese according to the thresholds developed for adolescents by the World Health Organisation (WHO) (25). Information on social networks was collected at baseline and through EMAs, and was generated using US General Social Survey Name Generator and presented as number of friends and social activities (26).

Table 1. Summary of study factors, data collection methods and follow-up periods

Study factors	Measures	Data collection method (instruments)	Follow-up interval
Outcome variables			
Dietary behaviour	Food intake including frequency: Fruit and vegetables, milk, meats, snack foods, fast food and sugar sweetened beverages	Questionnaire (short questions NSW Health Survey)	Baseline; weekly EMAs (prompted at specific time and location)
Physical activity	Sedentary, light, moderate and vigorous physical activity	Questionnaire (Sixty-minute activity measure PACE+; ASAQ); mobile phone sensor (eg. accelerometer, pedometer, screen-state and gyroscope)	Baseline; weekly EMAs
Exposure variables			
Sleep	Hours of sleep	Questionnaire; mobile phone sensor (e.g. accelerometer, screen-state, gyroscope)	Baseline; weekly EMAs
Screen-time	Time watching TV, using computers and other devices	Questionnaire (ASAQ); mobile phone sensor (screen-state)	Baseline; weekly EMAs
Stress	Psychological distress (Nervous, Hopeless, Restless, Depressed, Effort, Worthless)	Questionnaire (Kessler-6)	Baseline; monthly follow-up
Wellbeing	Positive psychological characteristics (Engagement, Perseverance, Optimism, Connectedness, Happiness)	Questionnaire (EPOCH measure)	Baseline; monthly follow-up; weekly EMAs (prompted at specific time and location)
Other study factors			
Socio-demographics	Age, sex, education, employment, first language	Questionnaire	Baseline only
Body mass index (BMI)	BMI	Questionnaire (self-reported weight, height)	Baseline only
Social networks	Number of friends, social activity	Questionnaire (US General Social Survey Name Generator); mobile phone sensor (geo-location, accelerometer)	Baseline; monthly follow-up; weekly EMAs

Data analysis

Analysis of the social media campaign was conducted by the WSU Social Media Unit, who provided information on total reach of the campaign via Instagram and Facebook, and descriptive analyses of impressions (that is, the number of times ads were displayed in news feeds), click throughs, and advertisement preferences, by sex and social media platform (Instagram or Facebook).

Descriptive analyses of the baseline questionnaire were conducted to investigate the distribution of responses by socio-demographic factors, BMI category, dietary behaviours, physical activity factors, and sleep duration, wellbeing and social connectedness. Plots of individual and aggregate trajectories of EMAs by week of participation were also constructed in order to investigate trends in each of the EMA content areas (emotions, engagement, physical activity, diet, relationships, sleep, and other activities), and determine the range of responses and adherence over the 16-week follow-up period.

A series of univariate multilevel mixed effect logistic regression models were also conducted to investigate associations between baseline characteristics of participants and subsequent dietary behaviour and physical activity. Dietary behaviours included number of fruit serves, vegetable serves and fast food serves, in the last 24 hours, and were categorised in to binary variables as follows; fruit serves ($\geq$3 vs $\leq$2), vegetable serves ($\geq$4 vs $\leq$3), and fast food (consumed vs not consumed). Physical activity was also considered as a binary variable, that is, whether or not physically active for more than 60 minutes in the last 24 hours.

Results

Social media campaign summary

Between 8 October (2019) and 8 January (2020) five different social media ads were disseminated via Instagram and Facebook (Appendix 4). The total reach of this campaign was 164,640 adolescents in the Western Sydney area, of which 61% were female (n=100,640) and 39% were male (n=62,944) (Figure 1A). The total number of 'impressions' (that is the number of times ads were displayed in news feeds) was 1,389,957, and this was higher among females (n=955,418, 69%) than males (n=425,222, 31%). The total number of click throughs to the study webpage URL was 11,048, with a substantially higher level of interest among females (n=8295, 75%) than males (n=2680, 25%). The overall cost per link click was $0.45, and was $0.49 for males and $0.44 for females.

The total number of unique link clicks showed large variations between the five social media ads. Those with a personal request and more colourful design (Appendix 4, Advertisements 1,3 and 4) were clicked up to 5,000 times compared to the more generic advertisements (Appendix 4, Advertisements 2, 5) with only 94 clicks. Additionally, and reflecting the target age-group, the number of impressions was much higher for Instagram, with three-fold higher impressions on Instagram (895,183) compared to Facebook (360,959) (Figure 1B). The link click rates, however, were similar for both platforms (5,637 clicks on Instagram and 4,941 on Facebook). Females were more likely to respond to social media ads and vice versa for males. For example, 39% of total reach were males but only 25% of all link clicks were from this group.

Figure 1A. Impressions, reach, and URL link clicks by sex

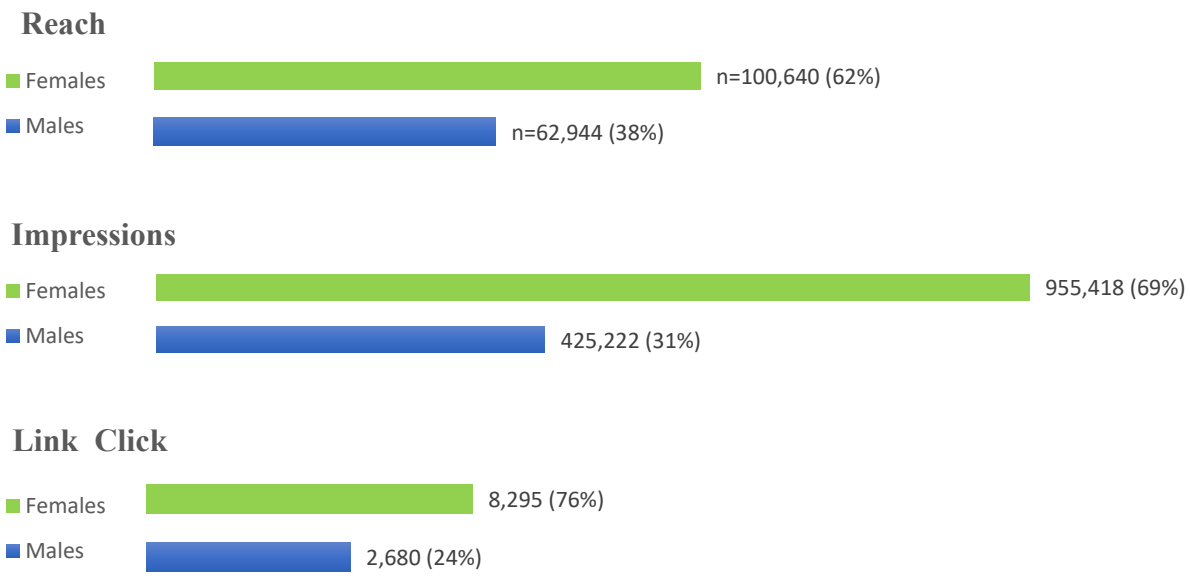
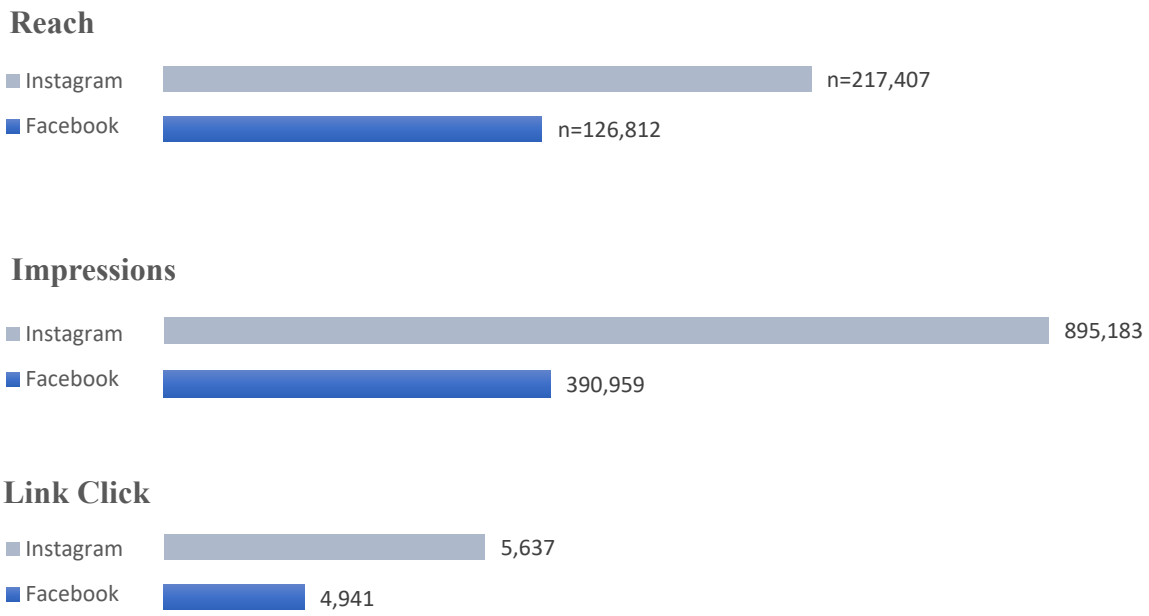


Figure 1B: Impressions, reach, and URL link Clicks by platform



Socio-demographic characteristics of participants at baseline

A total of 1,298 adolescents completed the baseline questionnaire, with 50% aged between 16-18 years (Table 2). Overall, 80.8% were female and 17.5% were male. The highest proportion of participants had finished school (46.3%) followed by 21.5% who were in Year 12, 7.8% in Year 11, 12.5% in Year 10 and less than 10% were in Years 7 to 9. Fifteen percent spoke a language other than English at home.

Table 2. Socio-demographic characteristics at baseline, by sex

Characteristics	Males *n*=228 (17.5%)	Females *n*=1048 (80.8%)	Total *N*=1298 (100%)
Age			
median (IQR)	17(16,18)	17(16,18)	17(16,18)
Body Mass Index (BMI)			
median (IQR)	22.5(20,25)	22.2(20,25.2)	22.3(20,25.4)
Year of school			
Year 7	1(0.44)	1(0.1)	2(0.15)
Year 8	11(4.82)	20(1.91)	31(2.39)
Year 9	22(9.65)	51(4.87)	74(5.7)
Year 10	34(14.91)	125(11.93)	162(12.48)
Year 11	20(8.77)	79(7.54)	101(7.78)
Year 12	50(21.93)	223(21.28)	280(21.57)
Not at school	9(3.95)	38(3.63)	48(3.7)
Finished school	81(35.53)	511(48.76)	600(46.22)
Trade certificate			
No	76(84.44)	442(80.66)	526(81.3)
Yes	14(15.56)	106(19.34)	121(18.7)
Highest qualification			
Secondary school qualification	4(28.57)	44(41.51)	48(39.67)
Nursing qualification	0(0)	6(5.66)	7(5.79)
Teaching qualification	0(0)	1(0.94)	1(0.83)
Trade certificate/ apprenticeship	4(28.57)	5(4.72)	9(7.44)
Certificate other than the above	3(21.43)	44(41.51)	47(38.84)
Associate diploma	3(21.43)	6(5.66)	9(7.44)
Work at a job			
No	117(51.32)	412(39.35)	540(41.63)
Permanently unable	2(0.88)	3(0.29)	5(0.39)
Yes	109(47.81)	632(60.36)	752(57.98)
Looking for a job			
No	59(50.43)	157(38.11)	221(40.93)
Yes	58(49.57)	255(61.89)	319(59.07)
Work for salary			
No	18(16.51)	57(9.02)	78(10.37)
Yes	91(83.49)	575(90.98)	674(89.63)
Weekly work hours			
median (IQR)	10(6,16)	12(7,20)	12(7,20)
Language spoken at home			
English	187(82.02)	894(85.47)	1100(84.88)
Other	41(17.98)	152(14.53)	196(15.12)

Values are n (%) unless otherwise stated.
IQR, interquartile range.

Overweight and obesity at baseline

Overall, 62.6% of participants were classified as a normal weight (Table 3). Every fourth participant was either overweight (17.9%) or obese (9.2%), and 10.3% were underweight. The proportions of males and females in each BMI category were similar.

Table 3. BMI classification by prevalence in adolescents, by sex

BMI category	Males		Females		Total	
	Prevalence %	General adolescent population[a] %	Prevalence %	General adolescent population %	Prevalence %	General adolescent population %
Underweight (BMI<18.5)	10.0	7.3	10.5	7.1	10.3	7.2
Normal (18.5≤BMI≤24.9)	63.8	65.1	62.7	68.1	62.6	66.7
Overweight (25≤BMI≤29.9)	19.9	18.3	17.0	16.3	17.9	17.9
Obese (BMI≥30)	6.3	10.1	9.8	7.0	9.2	9.0

[a] Source: The Australian Bureau of Statistics' (ABS) National Health Survey: First Results, 2017-18 (27)

Sleep duration, physical activity and small screen recreation at baseline

Fifty percent of all adolescents engage, on average, between one and five hours per day in physical activity including sports, playing with friends, and walking to school (Table 4). When asked how many days participants were active over the past week, only 5.3% (10.7% of males, 4.3% of females) reported to have engaged in a physical activity for at least 60 minutes every day. Thirty-five percent were sufficiently active on four to six days, 50% were sufficiently active on one to three days, and 10% percent were not active on any day of the previous week.

The median time spent on sedentary activities was 15 hours per day and included doing homework, reading, tutoring, hobbies, sitting around, playing an instrument, and small screen recreation. Seventy-four percent of all adolescents indicated spending, on average, more than 4 hours per day on watching TV, playing video games or using a computer for fun. Fifty-six percent (56%) of participants reported sleeping ≥8 hours the previous night, which was similar among both males and females.

Table 4. Physical activity, sedentary behaviour and sleep duration, by sex

Study factor	Study population			General adolescent population[a]		
	Males *n*=228 (17.5%)	Females *n*=1048 (80.8%)	Total *N*=1298 (100%)	Males	Females	Total
Physical activity[b]						
Median time in hrs (IQR)	4(2,5)	3(1,4)	3(1,5)			
0 days	17(7.56)	108(10.56)	128(10.08)	28.5%	49.5%	36.7%
1 to 3 days	86(38.22)	532(52)	634(49.92)	37.8%	35.8%	37.6%
4 to 6 days	98(43.56)	339(33.14)	440(34.65)	15.8%	8.7%	13.1%
7 days (recommended)	24(10.67)	44(4.3)	68(5.35)	15.9%	4.9%	10.1%
Sedentary activity [c]						
Median time in hrs (IQR)	5(11.5, 19.5)	15 (11.5,19)	15 (11.5, 19)			
Small screen recreation						
Median time in hrs (IQR)	6.5 (5, 10)	6.5 (4,8.5)	6.5 (4.5,9.0)			
Weekdays						
≤ 2 hours	23(10.09)	125(11.93)	151(11.63)	25.6%	32.5%	28.9%
> 2 hours to 4 hours	58(25.44)	249(23.76)	312(24.04)	30.0%	32.2%	31.1%
> 4 hours	147(64.47)	674(64.31)	835(64.33)	44.3%	35.3%	40.0%
Weekend						
≤ 2 hours	19(8.33)	108(10.31)	130(10.02)	15.2%	19.4%	17.2%
> 2 hours to 4 hours	29(12.72)	180(17.18)	211(16.26)	23.2%	29.4%	25.8%
> 4 hours	180(78.95)	760(72.52)	957(73.73)	61.5%	51.2%	57.0%
Other sedentary activities[d]						
Median time in hrs (IQR)	6.5(4,8.5)	6.5(4.5,9)	6.5(4.5,9)			
Sleep duration						
Median time in hrs (IQR)	8.4 (7.3,9.4)	8.3 (7.3,9.3)	8.3 (7.2,9.3)			
< 8 hours	81(35.53)	397(38.17)	485(37.6)			
8 hours	13(5.7)	64(6.15)	77(5.97)			
> 8 hours	134(58.77)	579(55.67)	728(56.43)			

[a] Source: The ABS National Health Survey: First Results, 2017-18 (27)
[b] Number of days that students were physically active for at least 60 minutes over the previous week
[c] Sedentary activities include watching TV, playing games, use computer, doing homework, reading, being tutored, doing hobbies, sitting around, playing a musical instrument
[d] Other sedentary activities include doing homework, reading, tutoring, doing hobbies, playing musical instrument, sitting around

Diet at baseline

The median daily intake of fruits and vegetables was one serve of each (Table 5). Only 7.5% of all participants reported consuming the recommended daily amount of three serves or more of fruits, and 4.9% reported four serves or more of vegetables. Twelve percent of all adolescents reported consuming at least one serve of meat per day. Forty-two percent of adolescents reported consuming fast food including burgers, pizza, chips, or French fries at least once a day, while every second participant consumed at least one soft drink over the previous week. This was similar for both males and females.

Table 5. Dietary behaviour at baseline, by sex

Items	Study population			General adolescent population[a]		
	Males *n*=228 (17.5%)	Females *n*=1048 (80.8%)	Total *N*=1298 (100%)	Males	Females	Total
Fruit (daily intake)						
Median serve (IQR)	1(0,1)	1(0,1)	1(0,1)			
2 serves or less	206(91.96)	954(92.71)	1179(92.54)	69.7%	67.4%	71.8%
3 or more serves	18(8.04)	75(7.29)	95(7.46)	25.1%	29.5%	23.8%
Vegetables (daily intake)						
Median serve (IQR)	1(0,1)	1(1,2)	1(1,2)			
3 serves or less	216(96.43)	978(94.86)	1213(95.06)	82.3%	83.7%	81.5%
4 or more serves	8(3.57)	53(5.14)	63(4.94)	16.1%	17.3%	16.3%
Meat (daily intake)						
Median serve (IQR)	0(0,0)	0(0,0)	0(0,0)			
Did not consume	209(91.67)	916(87.4)	1145(88.21)			
At least once a day	19(8.33)	132(12.6)	153(11.79)			
Fast Food (daily intake)*						
Median serve (IQR)	0(0,1)	0(0,1)	0(0,1)			
Did not consume	126(55.26)	617(58.87)	754(58.09)			
At least once a day	102(44.74)	431(41.13)	544(41.91)	49.4%	36.4%	43.3%
Soft Drinks (daily intake)						
Median serve (IQR)	0(0,0)	0(0,0)	0(0,0)			
Did not consume	201(92.63)	911(95.59)	1130(94.96)			
At least once a day	16(7.37)	42(4.41)	60(5.04)	15.8%	8.5%	11.9%

[a] Sources: The ABS National Health Survey: First Results, 2017-18 (27); The National Secondary Students' Diet and Activity (NaSSDA) survey 2009-10 (28)

* Fast food included any meals or snacks such as burgers, pizza, chicken, or chips from places like McDonalds, Hungry Jacks, Pizza Hut, KFC, Red Rooster or local takeaway food places

Psychological distress, wellbeing, and social connectedness at baseline

Overall, 32% of participants (18.9% for males, 34.4% for females) had Kessler 6 (K6) scores indicative of probable mental illness (K6 score >18) (Table 6). Engagement, Perserverance, Optimism, Connectedness and Happiness (EPOCH) scores were relatively normally distributed, although the median values for females were slightly below the scale midpoint for Engagement (2.5; IQR 2.0-3.4) and Optimism (2.8; IQR 2.0-3.5). Over seventy-five percent of males and females reported three or more important contacts in the previous 6-months, including friends and family.

Table 6. Psychological distress, wellbeing, and social connectedness, by sex

Study factor	Males *n*=228 (17.5%)	Females *n*=1048 (80.8%)	Total *N*=1298 (100%)
K6 score			
Median (IQR)	7 (5,11)	10 (7,14)	10 (6,14)
General adolescent population[a]	*6 (8,13)*	*11 (8,14)*	*10 (8,13)*
6-18	181(79.4)	671(64.0)	860(66.3)
19-30	43(18.9)	361(34.4)	417(32.1)
EPOCH median scores (IQR)			
Engagement	3.0 (2.3,3.5)	2.5 (2.0,3.3)	2.5 (2.0,3.3)
Perseverance	3.3 (2.5,3.8)	3.0 (2.5,3.8)	3.0 (2.5,3.8)
Optimism	3.0 (2.3,3.8)	2.8 (2.0,3.5)	2.8 (2.3,3.5)
Connectedness	3.8 (3.0,4.5)	4.0 (3.0,4.8)	4.0 (3.0,4.8)
Happiness	3.3 (2.5,4.0)	3.0 (2.3,3.8)	3.0 (2.3,3.8)
Social connectedness			
Median (IQR)	4 (2,6)	5 (3,7)	5 (3,7)

Values are n (%) unless otherwise stated.
[a] Mewton *et al.* (20)

Note: K6 scores of 6-18 indicate 'No probable serious mental illness'; K6 scores 19-30 indicate 'Probable serious mental illness'.

Trends in wellbeing, dietary behaviours, and physical activity

The following section summarises the findings from each of the weekly EMAs and shows (i) individual and (ii) average trajectories over the 16-week follow-up period. These EMAs relate to physical activity, screen time, diet, positive emotions, relationships, engagement, sleep, and academic activity.

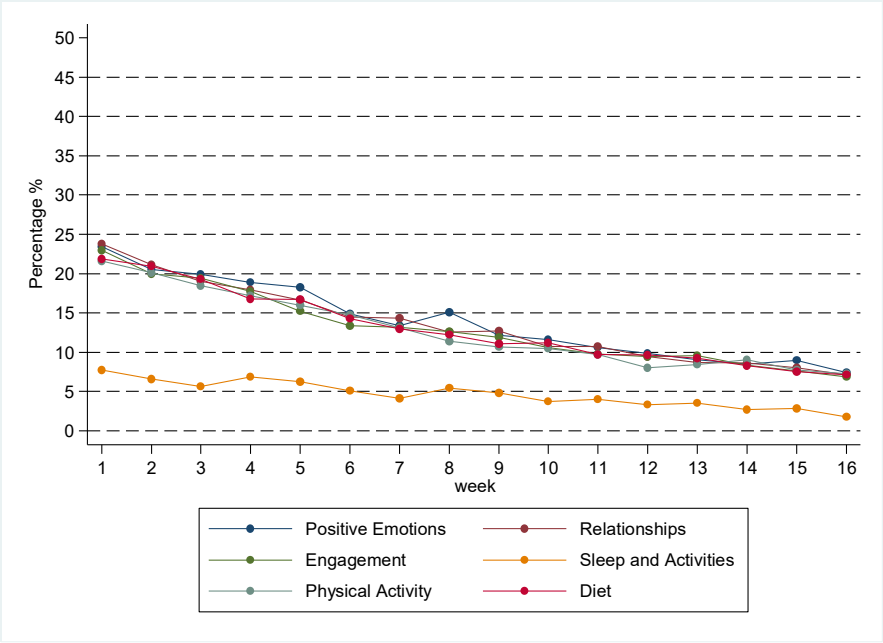
The total number of EMAs ranged from 964 responses for sleep and academic achievement to 2,886 for positive emotion scores (Table 7). Participant responses to EMAs decreased over the follow-up period, from approximately 25% to 10% completion for all EMAs except 'sleep hours' (Figure 2). This latter EMA had the lowest completion rate.

Over the 16-week follow-up period, males were more likely to have engaged in a physical activity for at least 60 minutes over the past 24 hours than females (Table 7). Half of participants spent at least 1 hour watching TV in the previous 24 hours, and 3 hours using the internet/social media in the previous 24 hours. Half of participants reported 3 serves of fruit and 3 serves of vegetables in the previous 24 hours. Fifty percent reported sleeping 8 hours or more. Individual and aggregate trajectories in EMA responses were reasonably consistent over the follow-up period (Figures 3-14), with the exception of hours in class and studying reflecting the school holiday period in December 2019 and January 2020.

Table 7: Summary of ecological momentary assessment (EMA) responses for wellbeing, dietary behaviours, and physical activity, by sex

Study factor	Males N(%); median(IQR)	Females N(%); median(IQR)	Total N(%); median(IQR)
Positive emotions (total responded surveys = 2886, Male=545(19.4%))			
Positive emotion score	2(2, 3)	2(1, 3)	2(1, 3)
Relationship (total responded surveys = 2803, Male=530(19.5%))			
Was Alone in last 24 hours	89(16.8)	369(16.8)	483(17)
Was not alone in last 24 hours	441(83.2)	1823(83.2)	2357(83)
Engagement (total responded surveys = 2705, Male=542(20.6%))			
Engaged with work last 24 hours	25(4.6)	95(4.6)	120(4.5)
Engaged with studies last 24 hours	119(22)	408(19.5)	547(20.2)
Engaged with entertainment activities last 24 hours	98(18)	416(19.9)	530(19.6)
Engaged with other activities last 24 hours	300(55.4)	1173(56)	1507(55.7)
Sleep and academic (total responded surveys = 964, Male=178(19%))			
Sleep hours	8(7, 9)	8(7, 9)	8(7, 9)
Hours spent in classes last 24 hours	0(0, 5)	0(0, 4)	0(0, 5)
Hours spent studying outside classes last 24 hours	1(0, 3)	0(0, 2)	1(0, 2)
Physical activity (total responded surveys = 2645, Male=516(20.1%))			
Physically active for 60+ minutes last 24 hours	298(57.8)	955(46.5)	1260(48.7)
Hours watching TV in last 24 hours	0(0, 2)	1(0, 3)	1(0, 2)
Hours spent internet/social media in last 24 hours	3(2, 5)	3(2, 5)	3(2, 5)
Diet (total responded surveys = 2711, Male=537(20.3%))			
Fruit serves in the last 24 hours	2(0.5, 3)	2(0, 3)	2(0, 3)
Vegetable serves in the last 24 hours	2(1, 3)	2(1, 3)	2(1, 3)
Fast food serves in the last 24 hours	0(0, 1)	0(0, 1)	0(0, 1)

Figure 2: Response percentages of EMAs by week



Physical activity (EMA trajectories)

Figure 3A: Individual trajectories of physical activity, by week of participation (60+ minutes in the previous 24 hours)

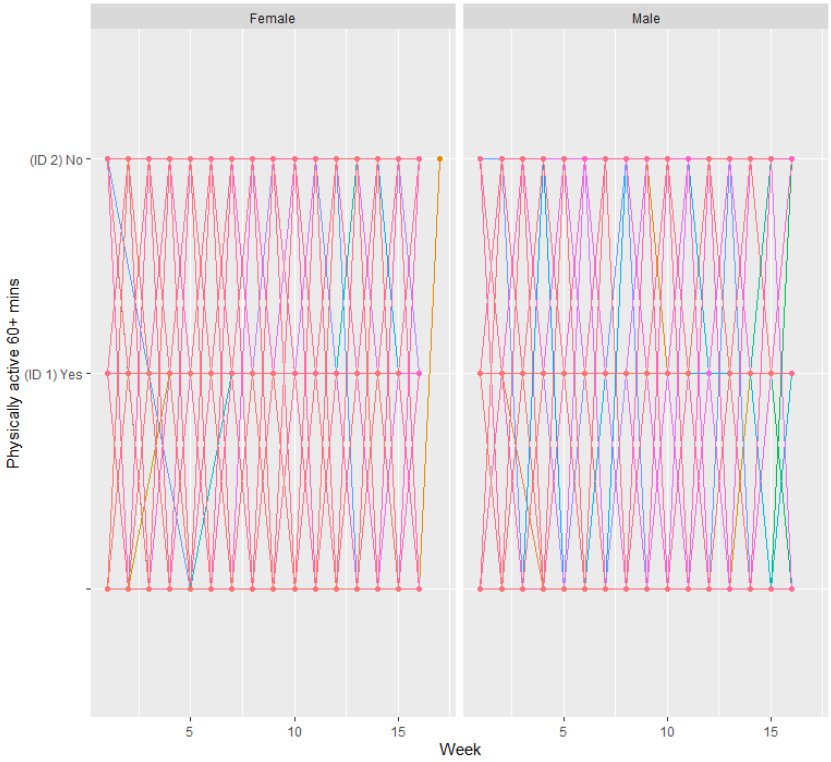
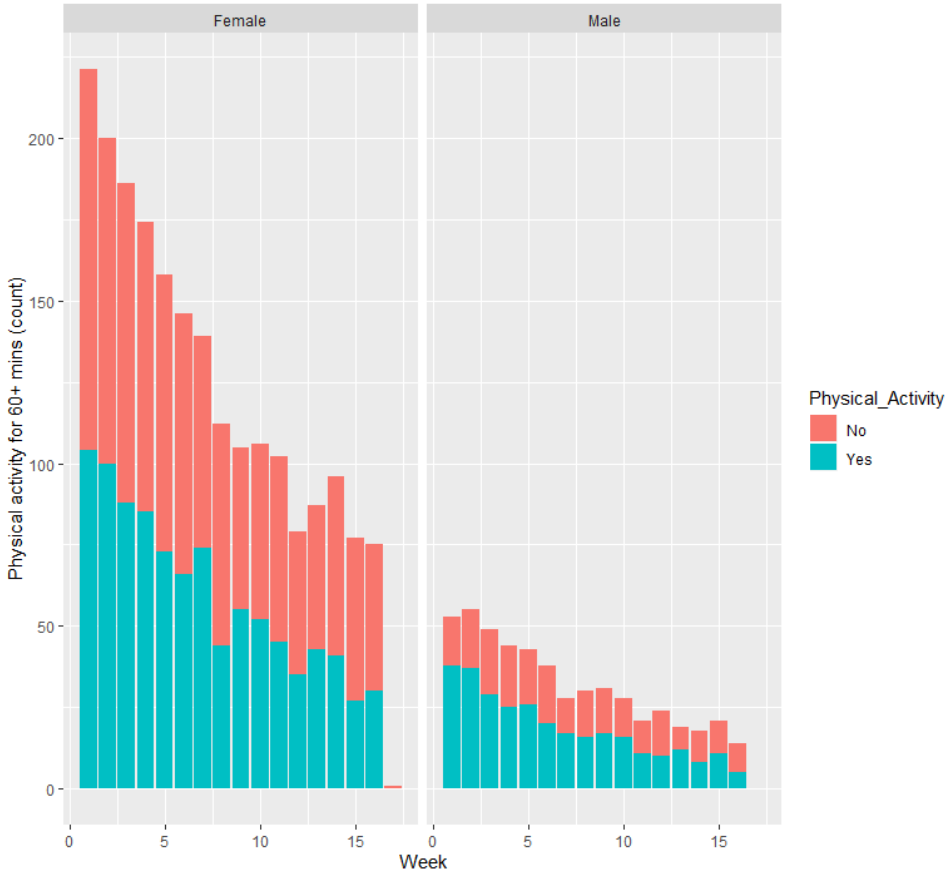


Figure 3B: Aggregate trajectory of physical activity, by week of participation (60+ minutes in the previous 24 hours)



Social media, internet, and television (EMA trajectories)

Figure 4A: Individual trajectories of TV watching, by week of participation (hours in the previous 24-hours)

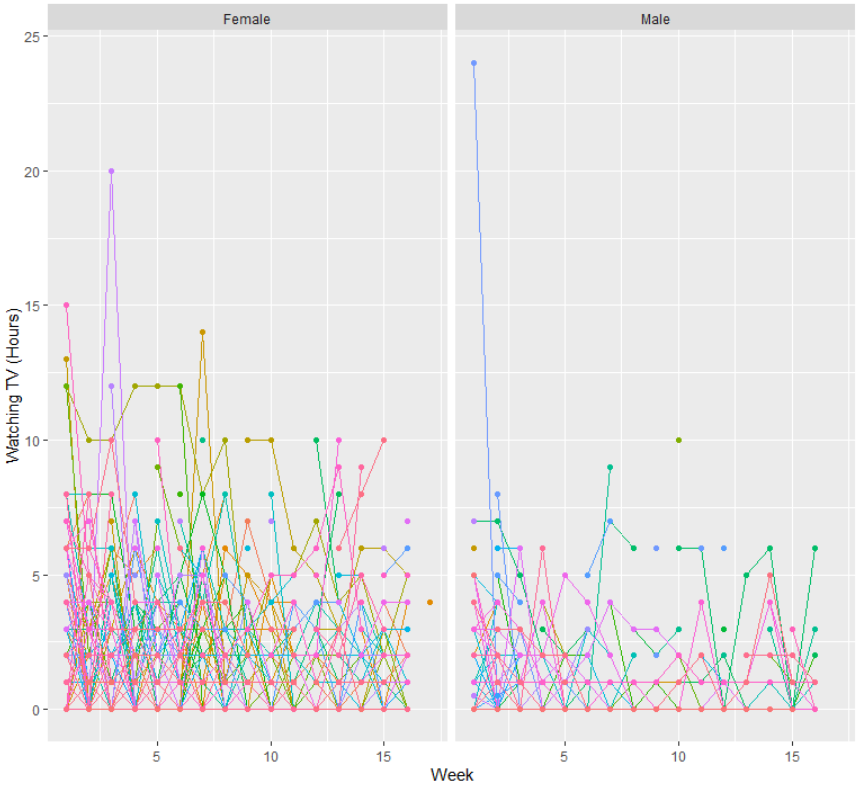


Figure 4B: Aggregate trajectories of TV watching, by week of participation (hours in the previous 24-hours)

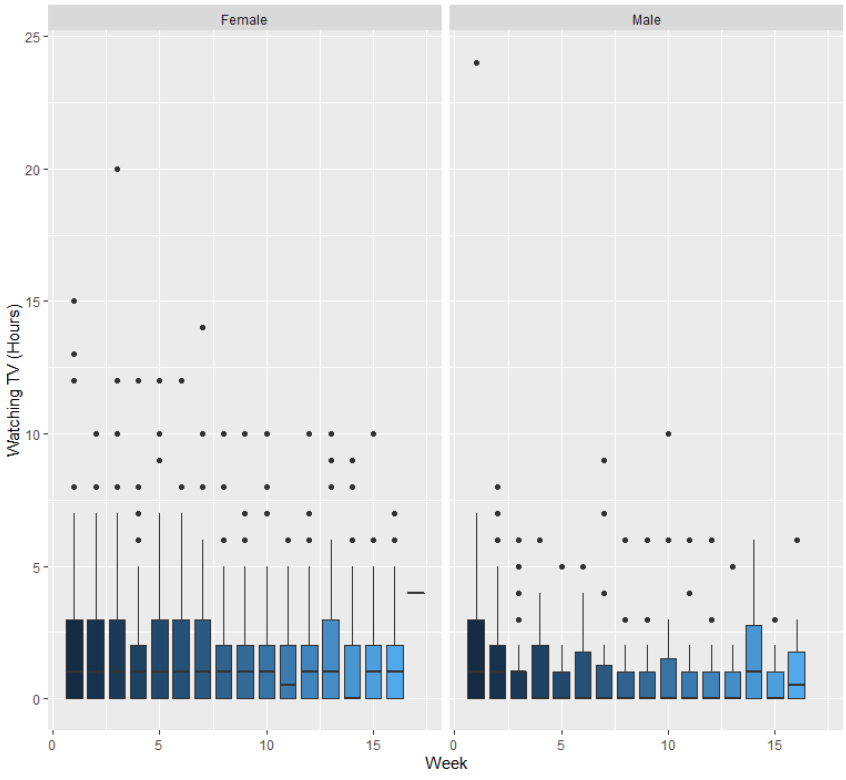


Figure 5A: Individual trajectories of social media and internet use (previous 24 hours), by week of participation

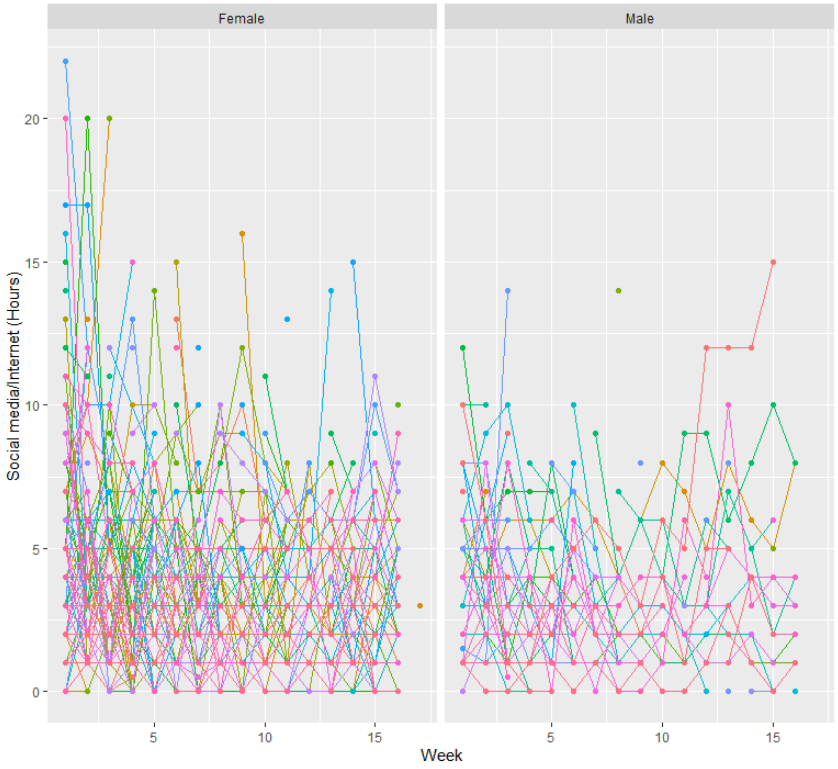
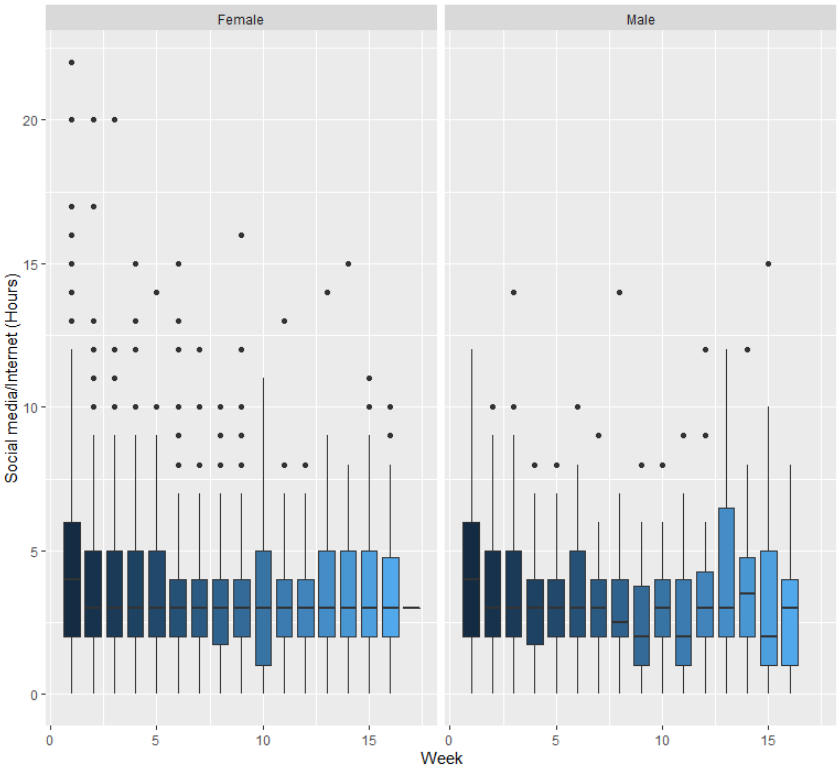


Figure 5B: Aggregate trajectories of social media and internet use (previous 24 hours), by week of participation



School activity (EMA trajectories)

Figure 6A: Individual trajectories of hours spent in class (previous 24 hours), by week of participation

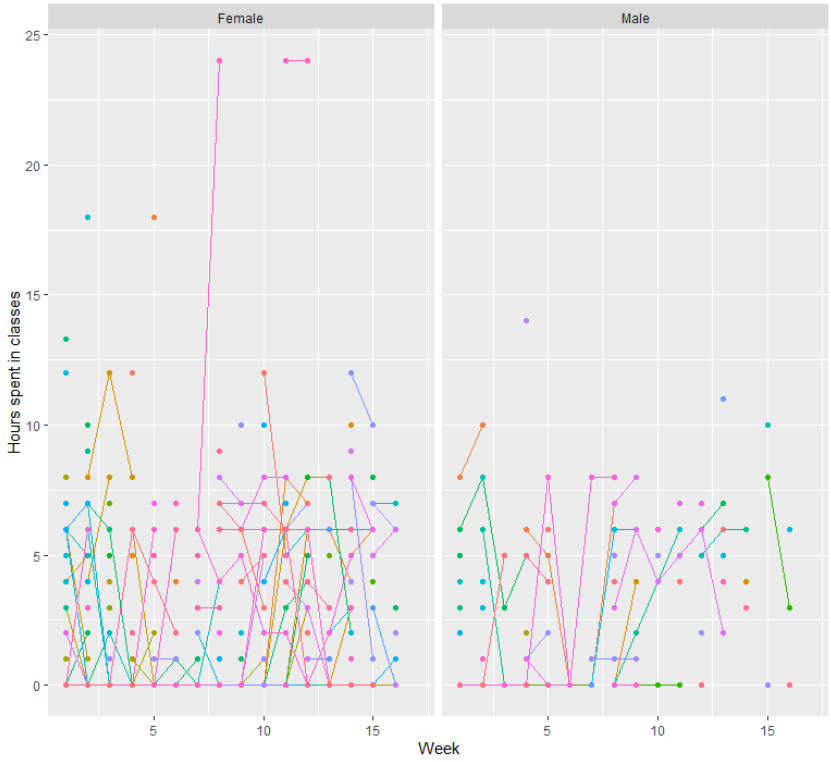


Figure 6B: Aggregate trajectories of hours spent in class (previous 24 hours), by week of participation

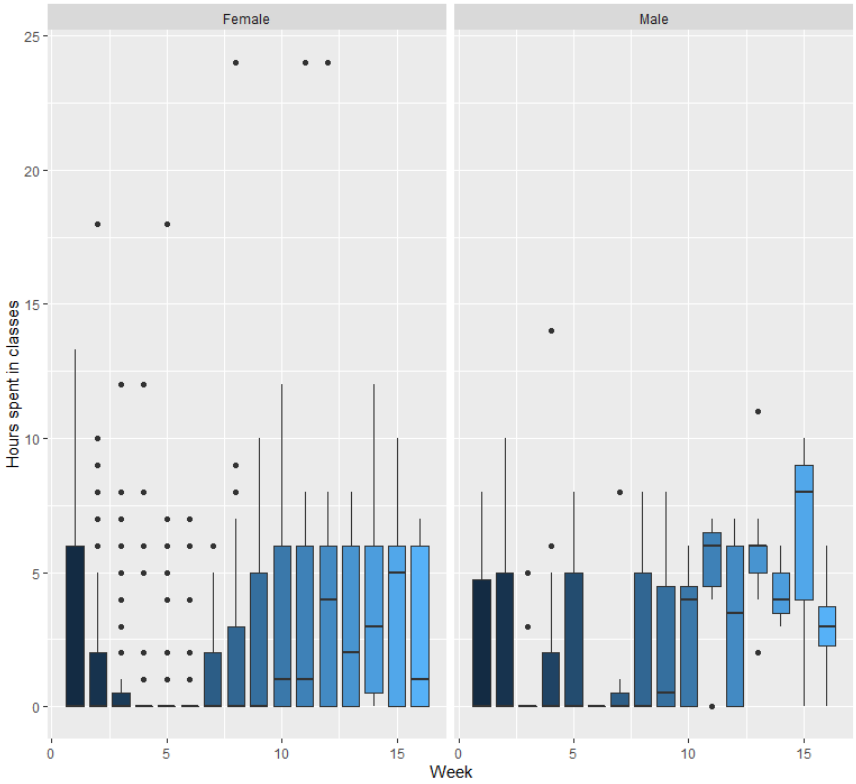


Figure 7A: Individual trajectories of hours spent studying (previous 24 hours), by week of participation

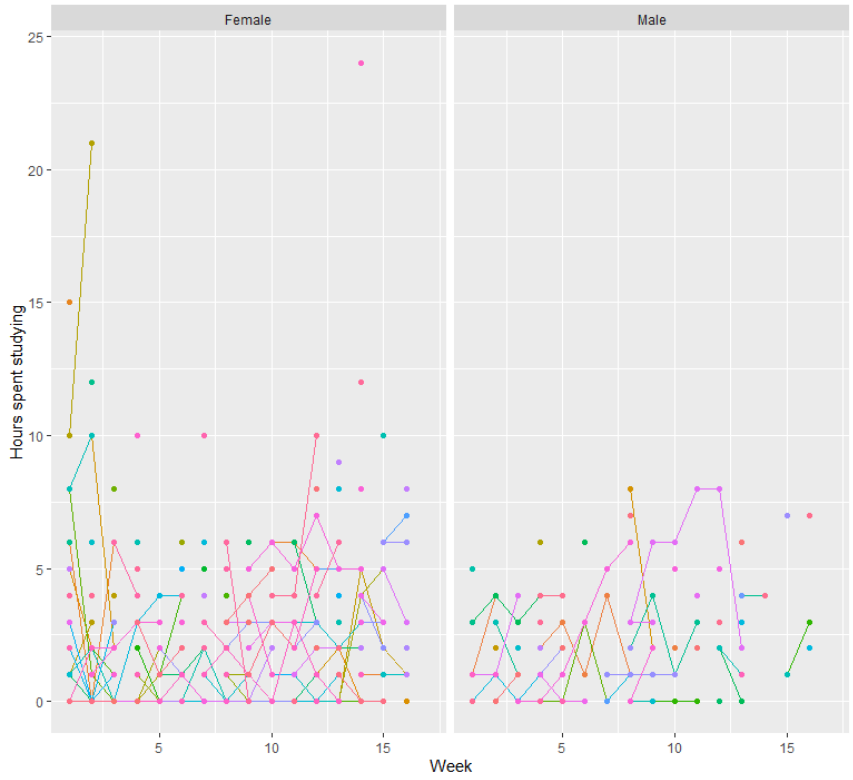
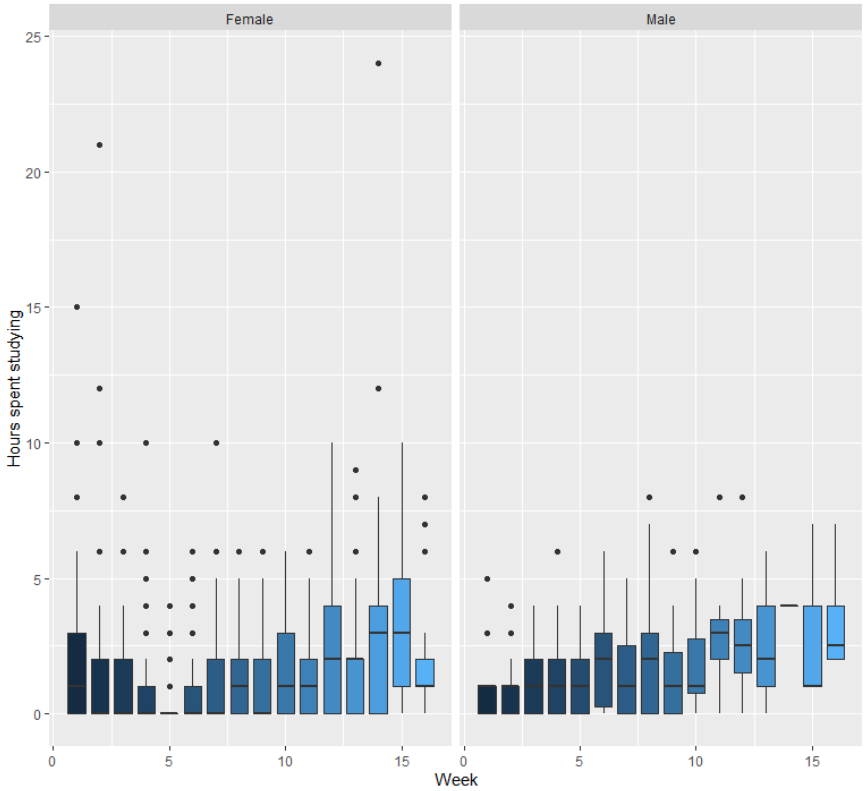


Figure 7B: Aggregate trajectories of hours spent studying (previous 24 hours), by week of participation



Diet (EMA trajectories)

Figure 8A: Individual trajectories of number of serves of fruit (previous 24 hours), by week of participation

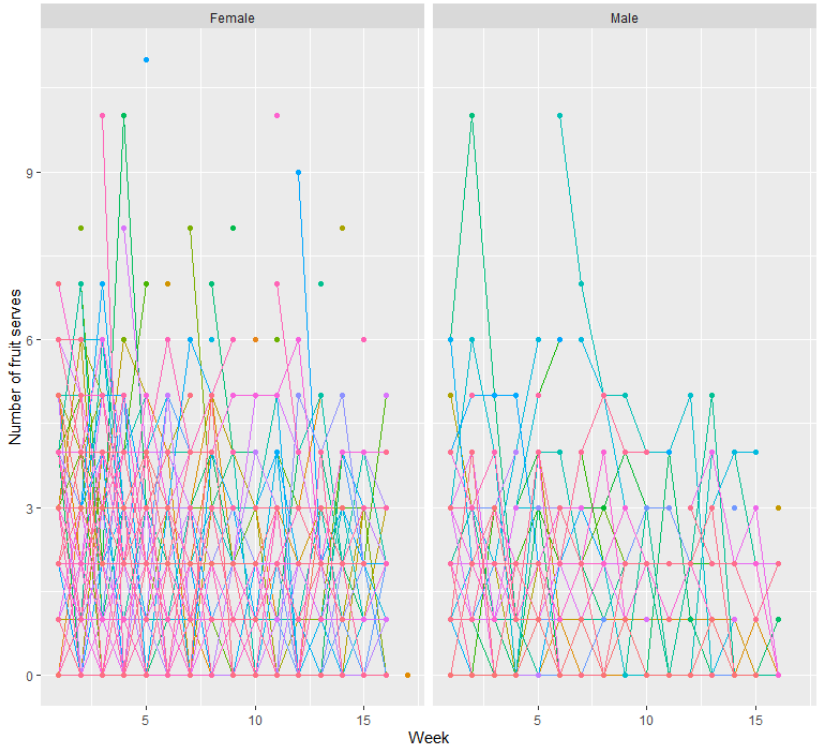


Figure 8B: Aggregate trajectories of number of fruit serves (previous 24 hours), by week of participation

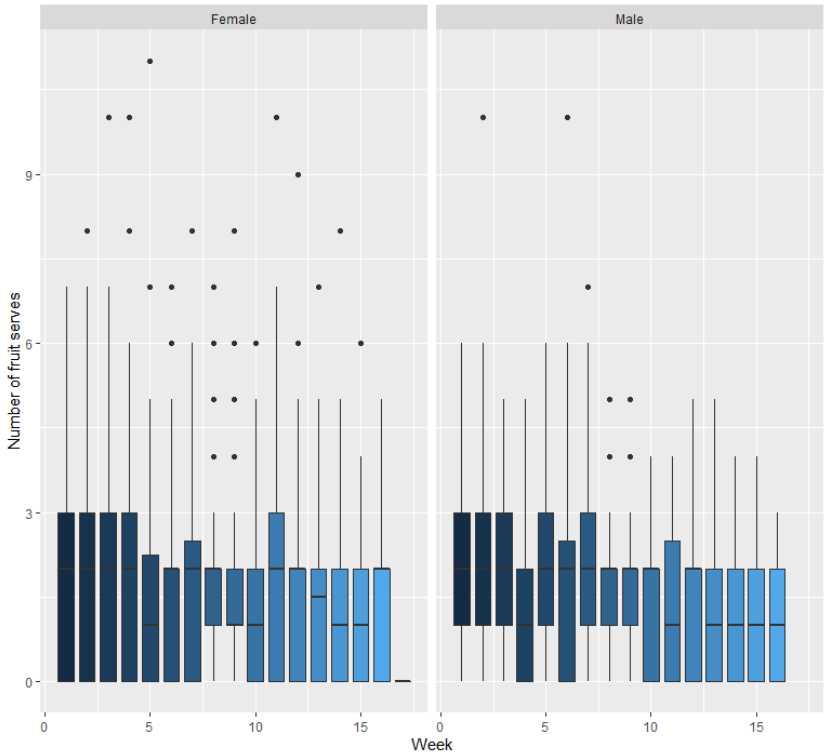


Figure 9A: Individual trajectories of number of serves of vegetables (previous 24 hours), by week of participation

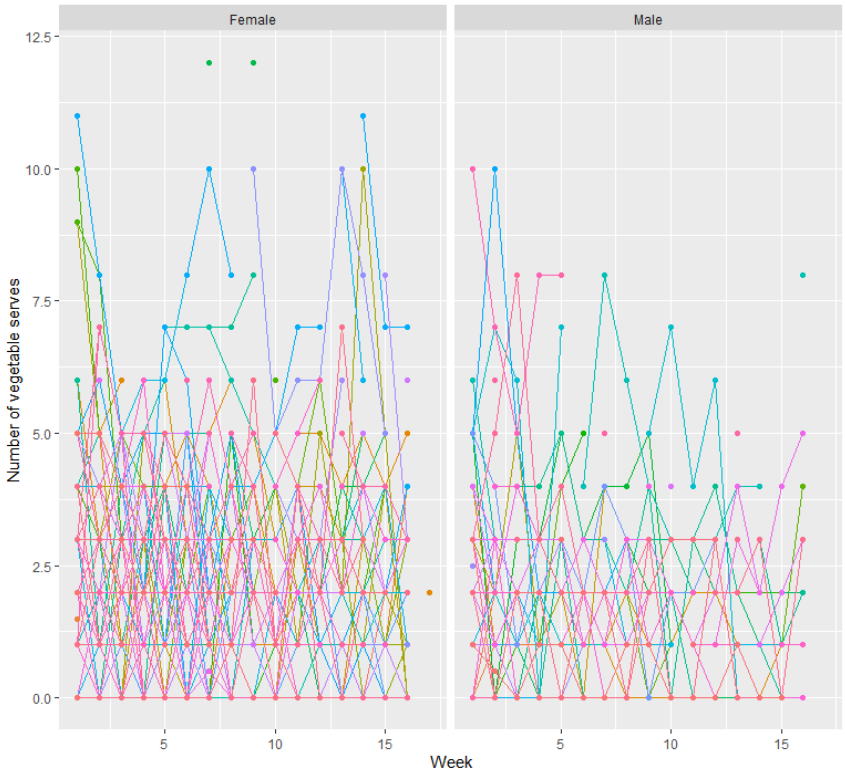


Figure 9B: Aggregate trajectories of number of serves of vegetables (previous 24 hours), by week of participation

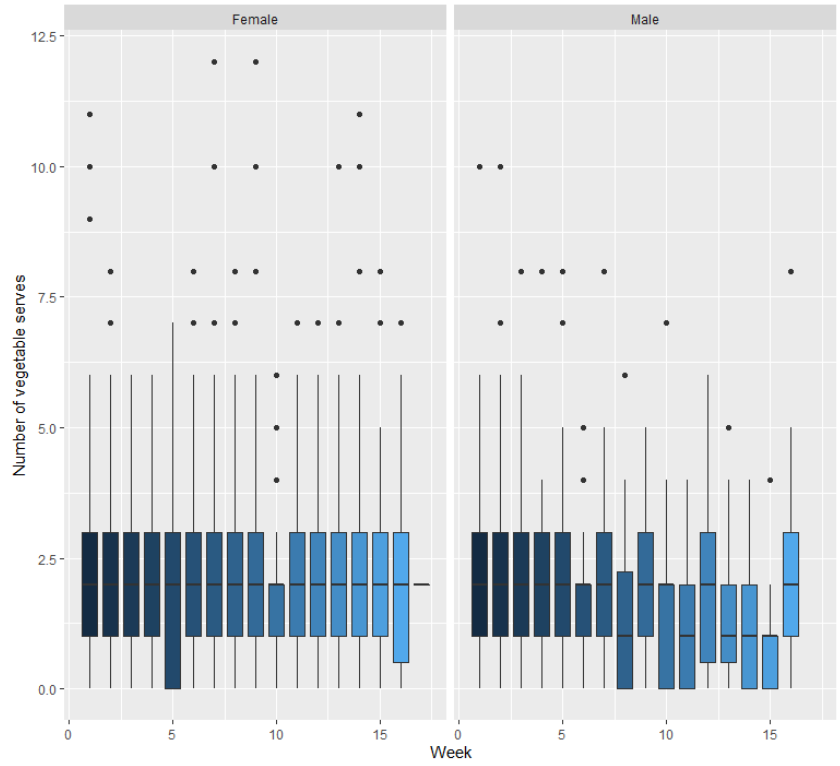


Figure 10A: Individual trajectories of number of serves of vegetables (previous 24 hours), by week of participation

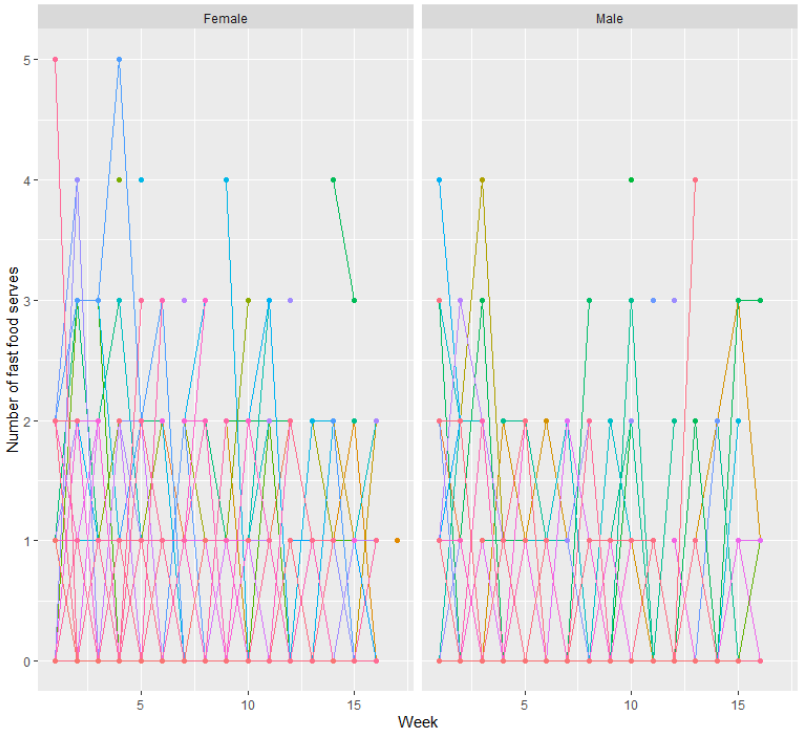
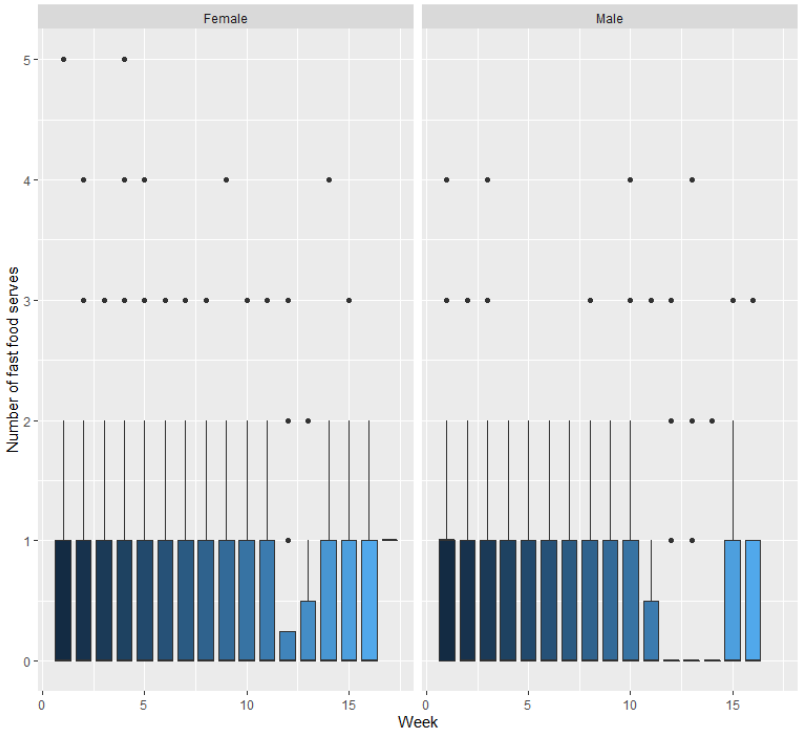


Figure 10B: Aggregate trajectories of number of serves of vegetables (previous 24 hours), by week of participation



Wellbeing and sleep (EMA trajectories)

Figure 11A: Individual trajectories of positive emotion scores, by week of participation (previous 24-hours)

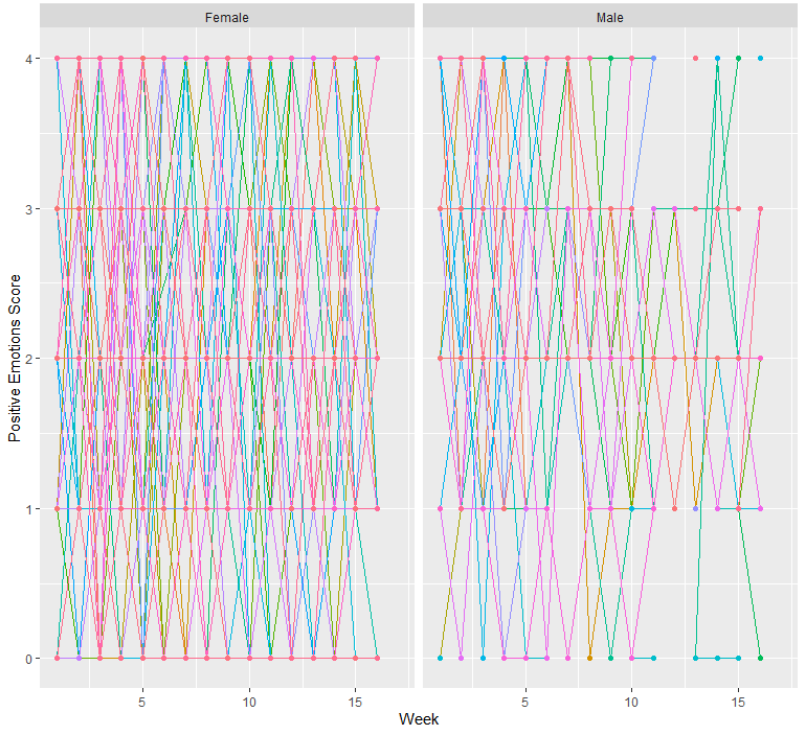


Figure 11B: Aggregate trajectories of positive emotion scores (previous 24 hours), by week of participation

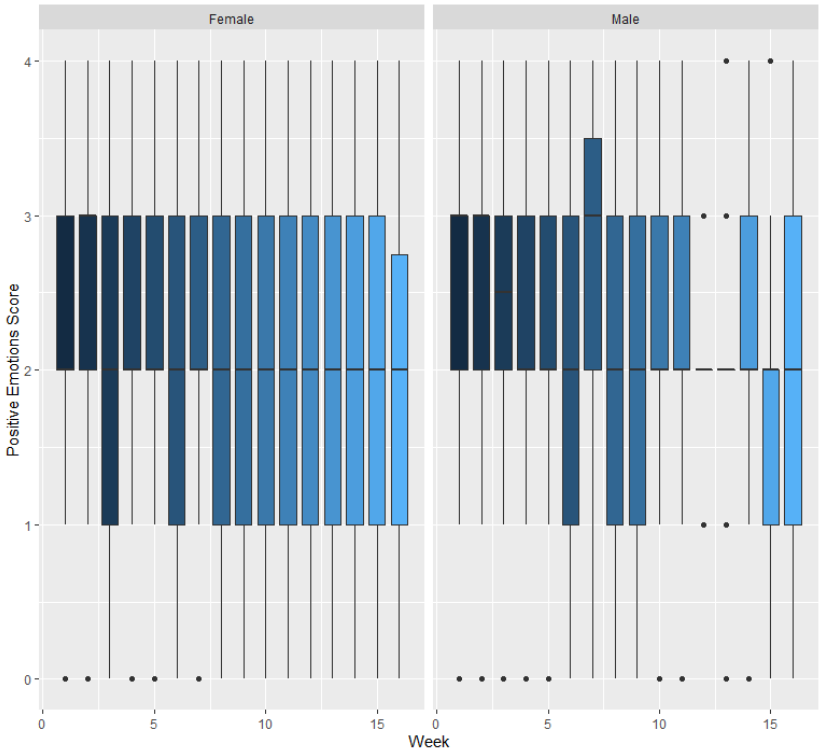


Figure 12A: Individual trajectories of social contact in the past hour, by week of participation

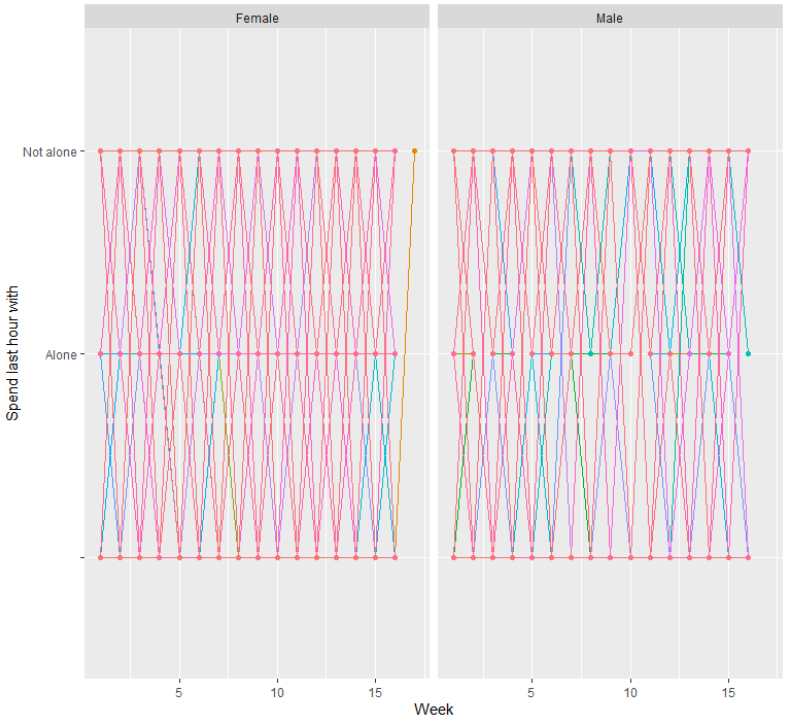


Figure 12B: Aggregate trajectories of social contact in the past hour, by week of participation

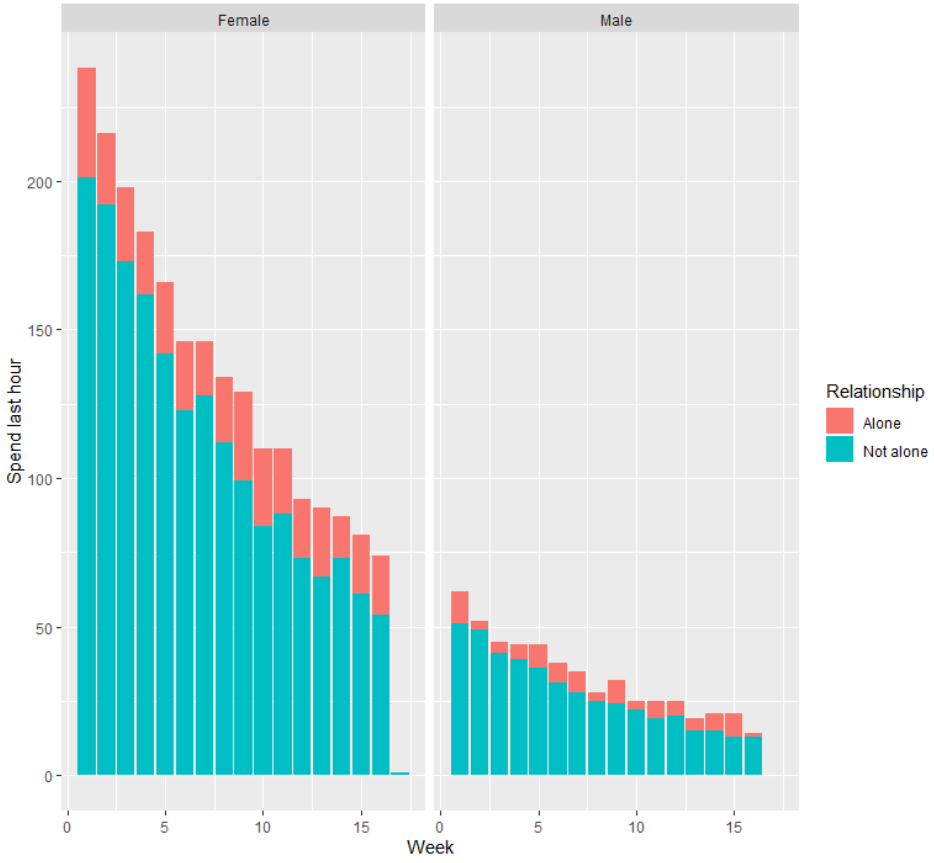


Figure 13A: Individual trajectories of activity in the past hour, by week of participation

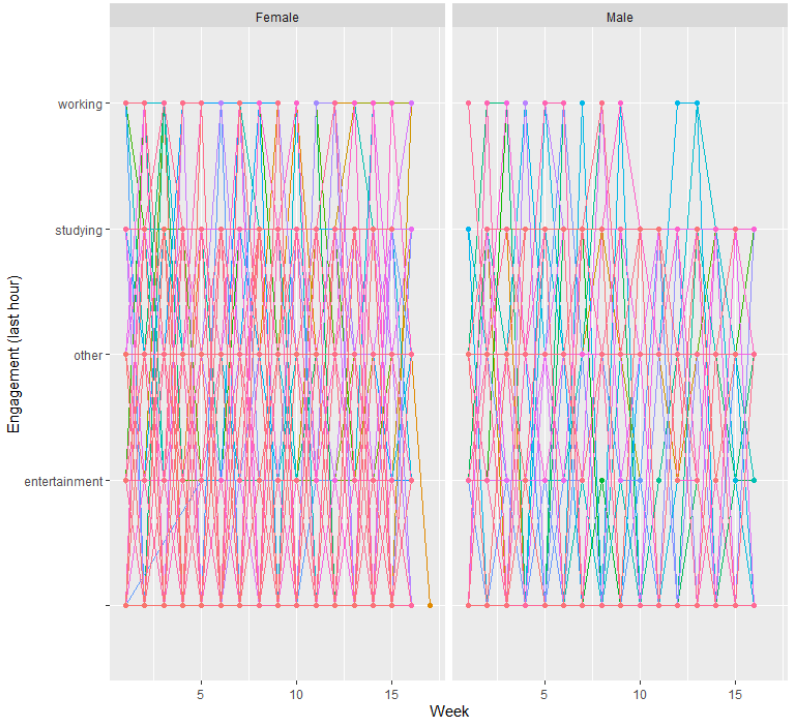


Figure 13B: Aggregate trajectories of activity in the past hour, by week of participation

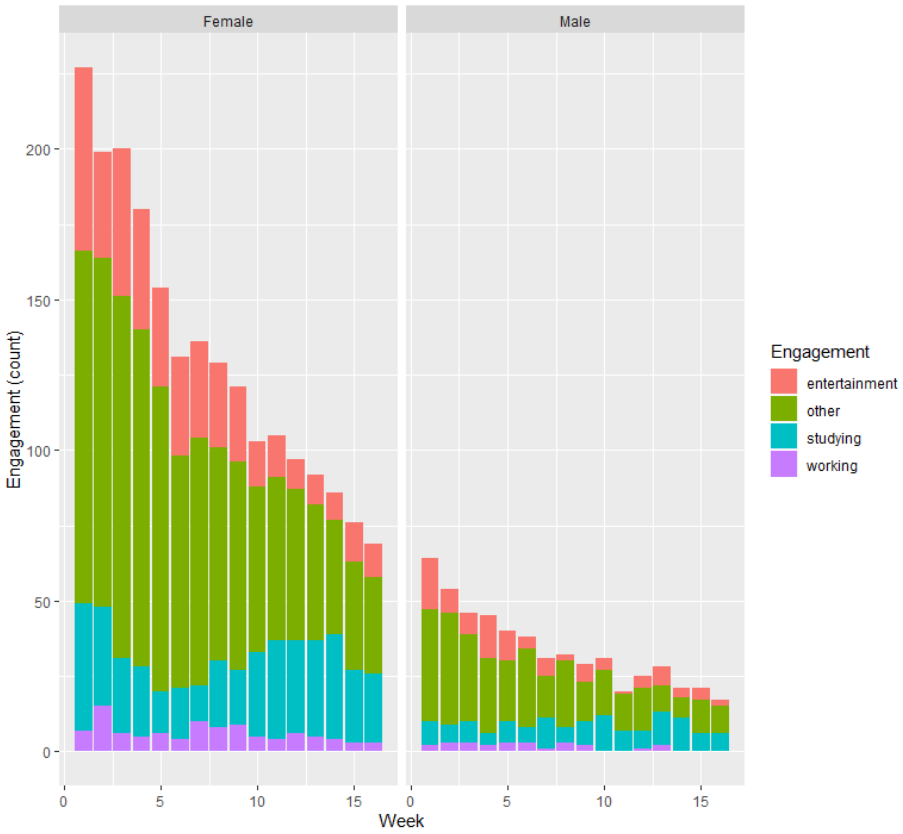


Figure 14A: Individual trajectories of hours of sleep (previous 24-hours), by week of participation

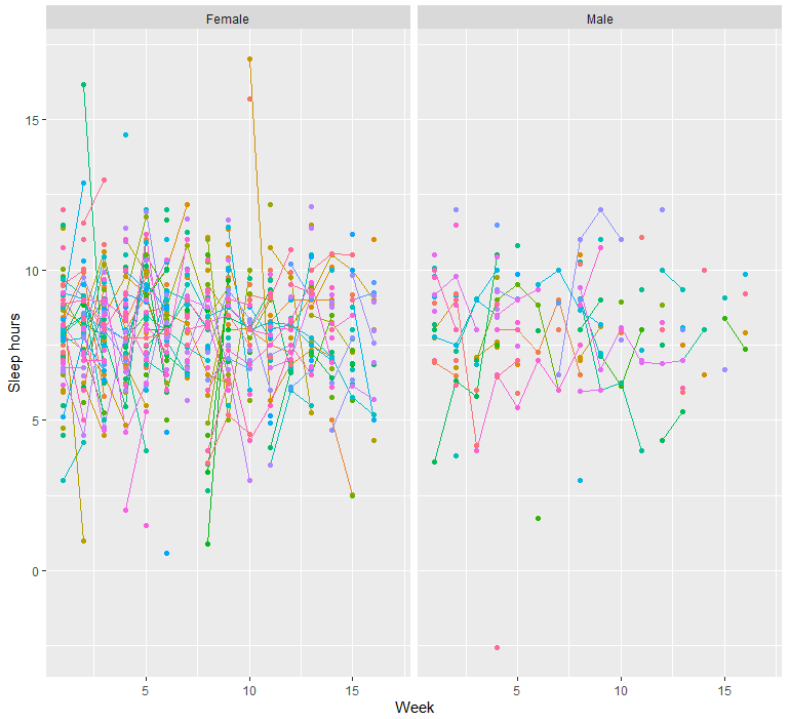
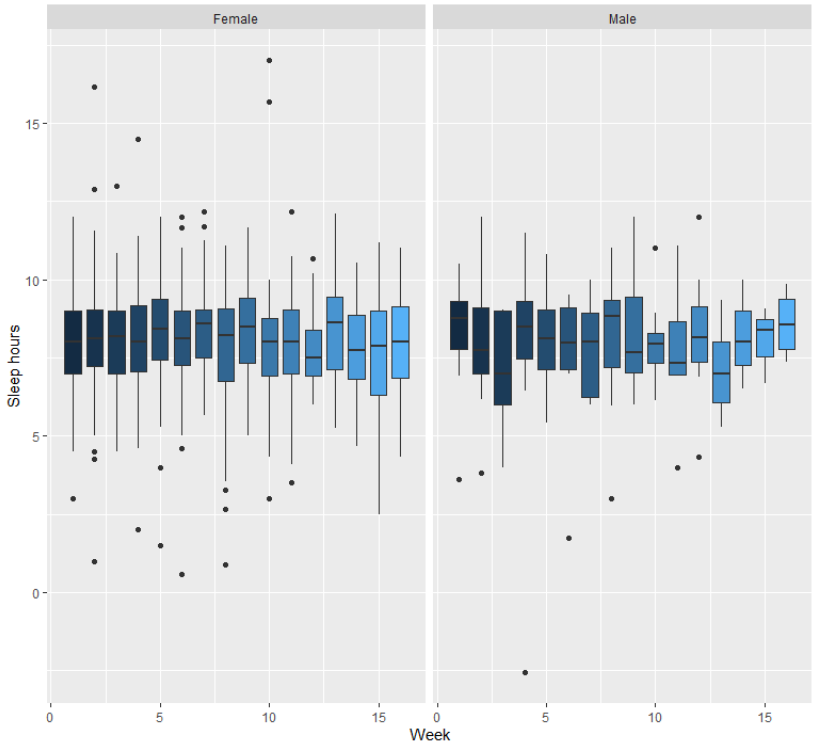


Figure 14B: Aggregate trajectories of hours of sleep (previous 24-hours), by week of participation



Determinants of dietary behaviours and physical activity over follow-up

Younger participants were more likely to report higher fruit and vegetable consumption, higher levels of physical activity, and lower fast food consumption compared to older age participants (Table 8 and 9). Obesity at baseline was associated with a lower likelihood of eating 3 or more fruit serves, 4 or more vegetable serves, and 60+ minutes of physical activity over the follow-up period; and a higher likelihood of eating fast food in the previous 24 hours. Similarly, a higher level of sedentary hours and screen time at baseline was associated with a lower likelihood of eating 3 or more fruit serves, 4 or more vegetable services, 60+ minutes of physical exercise, and a higher likelihood of eating fast food in the previous 24 hours. Overall, higher levels of social connection and psychological wellbeing at baseline were also associated with a higher likelihood of fruit and vegetable consumption, higher levels of physical activity, and lower likelihood of fast food consumption at follow-up.

Table 8: Univariate associations between baseline socidemographic factors, sleep, pyschological distress and wellbeing on subsequent dietary behaviour and physical activity.

Characteristics		Fruit 3 or more serves (past 24 hours)	Vegetables 4 or more serves (past 24 hours)	Fast food* (past 24 hours)	Physical activity 60+ minutes (past 24 hours)
Gender					
	Male	Ref	Ref	Ref	Ref
	Female	0.72(0.48, 1.07)	1.29(0.72, 2.33)	0.88(0.67, 1.15)	0.42(0.31, 0.58)
Age					
	19	Ref	Ref	Ref	Ref
	18	0.76(0.45, 1.28)	1.14(0.57, 2.25)	1.11(0.8, 1.55)	0.61(0.41, 0.91)
	17	1.25(0.78, 2.02)	0.84(0.44, 1.62)	0.85(0.63, 1.17)	0.67(0.46, 0.98)
	16	1.43(0.87, 2.34)	0.78(0.39, 1.57)	0.71(0.51, 0.99)	0.96(0.65, 1.42)
	15	1.65(0.84, 3.25)	1.13(0.44, 2.89)	0.96(0.6, 1.53)	1.3(0.74, 2.27)
	14	1.15(0.47, 2.82)	0.38(0.08, 1.71)	0.79(0.43, 1.44)	1.33(0.66, 2.72)
	13	3.85(1.12, 13.29)	1.53(0.26, 9)	0.6(0.24, 1.46)	2.58(0.86, 7.74)
BMI Category					
	Normal (18.5≤BMI≤24.5)	Ref	Ref	Ref	Ref
	Underweight (BMI<18.5)	0.95(0.56, 1.64)	0.85(0.4, 1.82)	0.78(0.54, 1.12)	0.85(0.55, 1.31)
	Overweight (25≤BMI≤29.9)	0.77(0.5, 1.18)	0.49(0.26, 0.92)	1.16(0.88, 1.52)	0.89(0.64, 1.25)
	Obese (BMI≥30)	0.48(0.26, 0.9)	0.56(0.24, 1.31)	2.01(1.39, 2.9)	0.47(0.29, 0.75)
Job work					
	No	Ref	Ref	Ref	Ref
	Yes	1.02(0.75, 1.4)	1.16(0.75, 1.79)	1.48(1.2, 1.82)	1.29(1, 1.65)
Language speak at home					
	English	Ref	Ref	Ref	Ref
	Other	1.11(0.72, 1.71)	0.74(0.39, 1.4)	0.63(0.47, 0.85)	0.68(0.48, 0.97)
Sleep hours					
	<8 hours	0.81(0.41, 1.58)	0.72(0.3, 1.74)	1.26(0.8, 1.98)	0.95(0.56, 1.6)
	8 hours	Ref	Ref	Ref	Ref
	>8 hours	0.9(0.47, 1.73)	0.89(0.38, 2.1)	1.33(0.85, 2.07)	0.81(0.48, 1.36)
TV hours					
	0	Ref	Ref	Ref	Ref
	<3	0.61(0.46, 0.82)	0.45(0.31, 0.66)	1.4(1.12, 1.75)	1.03(0.84, 1.27)
	3-5	0.38(0.25, 0.58)	0.24(0.13, 0.43)	1.86(1.39, 2.49)	0.62(0.47, 0.82)
	≥5	0.42(0.25, 0.71)	0.27(0.13, 0.56)	2.08(1.46, 2.96)	0.34(0.23, 0.49)
Sedentary hours[a]					
	≤2 hours	Ref	Ref	Ref	Ref
	2-4 hours	0.97(0.35, 2.7)	0.59(0.18, 1.93)	1.42(0.76, 2.63)	0.89(0.49, 1.63)
	>4 hours	0.68(0.26, 1.76)	0.6(0.21, 1.72)	2.12(1.2, 3.75)	0.93(0.54, 1.62)
Screen time[a]					
	≤2 hours	Ref	Ref	Ref	Ref
	2-4 hours	0.85(0.34, 2.15)	0.8(0.32, 2.03)	1.23(0.74, 2.07)	0.73(0.43, 1.23)
	>4 hours	0.78(0.35, 1.76)	0.42(0.18, 0.98)	1.32(0.83, 2.08)	0.65(0.41, 1.03)
Social connection					
	no contact	Ref	Ref	Ref	Ref
	1-2	0.58(0.34, 0.98)	0.83(0.43, 1.6)	0.88(0.6, 1.29)	0.79(0.52, 1.21)
	3-5	0.6(0.36, 0.98)	0.61(0.34, 1.12)	1.25(0.88, 1.79)	0.73(0.49, 1.08)
	>5	0.55(0.33, 0.92)	0.58(0.32, 1.08)	1.15(0.8, 1.65)	0.72(0.48, 1.08)
K6 score					
	6-18	Ref	Ref	Ref	Ref
	19-30	0.73(0.54, 0.98)	1(0.68, 1.49)	1.27(1.04, 1.55)	0.82(0.65, 1.03)
Engagement		1.17(1, 1.37)	1.5(1.2, 1.87)	0.95(0.85, 1.06)	1.36(1.2, 1.55)
Perseverance		1.25(1.06, 1.48)	1.28(1.02, 1.62)	0.86(0.77, 0.96)	1.61(1.42, 1.84)
Optimism		1.3(1.11, 1.52)	1.31(1.06, 1.63)	0.89(0.8, 0.99)	1.41(1.25, 1.59)
Connectedness		1.33(1.14, 1.56)	1.33(1.06, 1.67)	0.94(0.85, 1.05)	1.06(0.94, 1.2)
Happiness		1.39(1.19, 1.62)	1.45(1.16, 1.81)	0.94(0.85, 1.05)	1.33(1.18, 1.51)

***** Fast food included any meals or snacks such as burgers, pizza, chicken, or chips from places like McDonalds, Hungry Jacks, Pizza Hut, KFC, Red Rooster or local takeaway food places

;

Table 9: Descriptive summary of baseline and weekly responses

Characteristics		Fruit consumption ≤2 serves	Fruit consumption ≥3 serves	Vegetables consumption ≤3 serves	Vegetables consumption ≥4 serves	Fast food consumption Yes	Fast food consumption No	Physical activity 60+ mins Yes	Physical activity 60+ mins No	Total
Gender										
	Male	594(19.07)	166(21.09)	680(19.83)	79(16.77)	300(20.24)	464(19.02)	321(15.57)	420(23.89)	882(18.53)
	Female	2521(80.93)	621(78.91)	2749(80.17)	392(83.23)	1182(79.76)	1975(80.98)	1740(84.43)	1338(76.11)	3877(81.47)
Age										
	19	612(19.26)	146(18.16)	666(19.05)	94(19.42)	304(20.03)	460(18.52)	374(17.58)	369(20.65)	888(18.22)
	18	670(21.08)	106(13.18)	675(19.31)	99(20.45)	335(22.07)	445(17.91)	465(21.85)	295(16.51)	962(19.74)
	17	877(27.6)	221(27.49)	978(27.97)	119(24.59)	421(27.73)	685(27.58)	616(28.95)	468(26.19)	1381(28.33)
	16	678(21.33)	207(25.75)	775(22.17)	110(22.73)	293(19.3)	594(23.91)	477(22.42)	426(23.84)	1099(22.55)
	15	180(5.66)	60(7.46)	207(5.92)	33(6.82)	89(5.86)	152(6.12)	102(4.79)	115(6.44)	284(5.83)
	14	107(3.37)	34(4.23)	122(3.49)	18(3.72)	52(3.43)	88(3.54)	65(3.05)	59(3.3)	159(3.26)
	13	54(1.7)	30(3.73)	73(2.09)	11(2.27)	24(1.58)	60(2.42)	29(1.36)	55(3.08)	101(2.07)
BMI Category										
	Normal (18.5≤BMI≤24.5)	2011(64.75)	537(67.21)	2220(64.74)	330(69.47)	958(64.38)	1593(65.85)	1311(62.97)	1152(66.28)	3099(65.12)
	Underweight (BMI<18.5)	295(9.5)	78(9.76)	324(9.45)	49(10.32)	104(6.99)	269(11.12)	227(10.9)	166(9.55)	457(9.6)
	Overweight (25≤BMI≤29.9)	546(17.58)	132(16.52)	613(17.88)	64(13.47)	270(18.15)	408(16.87)	365(17.53)	313(18.01)	824(17.31)
	Obese (BMI≥30)	254(8.18)	52(6.51)	272(7.93)	32(6.74)	156(10.48)	149(6.16)	179(8.6)	107(6.16)	379(7.96)
Job work										
	No	1426(44.98)	345(42.91)	1580(45.3)	191(39.46)	594(39.21)	1184(47.78)	1019(48)	761(42.68)	2190(45.05)
	Yes	1744(55.02)	459(57.09)	1908(54.7)	293(60.54)	921(60.79)	1294(52.22)	1104(52)	1022(57.32)	2671(54.95)
Language spoken at home										
	English	2707(85.18)	681(84.7)	2975(85.1)	411(84.92)	1334(87.88)	2066(83.24)	1773(83.32)	1549(86.68)	4132(84.81)
	Other	471(14.82)	123(15.3)	521(14.9)	73(15.08)	184(12.12)	416(16.76)	355(16.68)	238(13.32)	740(15.19)
Sleep hours										
	8 hours	107(6.43)	17(7.08)	114(6.48)	11(7.59)	45(5.73)	81(7.13)	65(6.13)	53(6.61)	130(6.33)
	<8 hours	659(39.63)	89(37.08)	699(39.74)	49(33.79)	311(39.62)	447(39.35)	414(39.02)	328(40.9)	817(39.8)
	>8 hours	897(53.94)	134(55.83)	946(53.78)	85(58.62)	429(54.65)	608(53.52)	582(54.85)	421(52.49)	1106(53.87)
TV hours										
	0	683(27.39)	209(37.93)	746(27.6)	146(42.82)	264(23.32)	628(32.64)	635(29.9)	605(33.97)	1242(31.63)
	≤3	1206(48.36)	260(47.19)	1314(48.61)	149(43.7)	555(49.03)	913(47.45)	939(44.21)	893(50.14)	1844(46.96)
	3-5	389(15.6)	50(9.07)	413(15.28)	29(8.5)	196(17.31)	248(12.89)	333(15.68)	203(11.4)	541(13.78)
	>5	216(8.66)	32(5.81)	230(8.51)	17(4.99)	117(10.34)	135(7.02)	217(10.22)	80(4.49)	300(7.64)
Sedentary hours										
	≤2 hours	46(3.9)	5(5.26)	47(3.87)	4(6.35)	17(3.13)	45(5.97)	32(4.2)	23(4.53)	62(4.78)
	2-4 hours	208(17.64)	22(23.16)	220(18.14)	11(17.46)	82(15.07)	153(20.29)	140(18.37)	90(17.72)	235(18.1)
	>4 hours	925(78.46)	68(71.58)	946(77.99)	48(76.19)	445(81.8)	556(73.74)	590(77.43)	395(77.76)	1001(77.12)

Table 9: Descriptive summary of baseline and weekly responses (continued)

Characteristics		Fruit consumption ≤2 serves	Fruit consumption ≥3 serves	Vegetables consumption ≤3 serves	Vegetables consumption ≥4 serves	Fast food consumption Yes	Fast food consumption No	Physical activity 60+ mins Yes	Physical activity 60+ mins No	Total
Screen time										
	≤2 hours	70(5.94)	7(7.37)	70(5.77)	7(11.11)	31(5.7)	55(7.29)	40(5.25)	39(7.68)	86(6.63)
	2-4 hours	199(16.88)	17(17.89)	200(16.49)	16(25.4)	89(16.36)	128(16.98)	125(16.4)	89(17.52)	217(16.72)
	>4 hours	910(77.18)	71(74.74)	943(77.74)	40(63.49)	424(77.94)	571(75.73)	597(78.35)	380(74.8)	995(76.66)
Social connectedness										
	no contact	184(6)	51(6.87)	194(5.77)	39(8.82)	89(6.21)	162(6.77)	125(6.13)	109(6.43)	343(7.45)
	1-2	757(24.7)	171(23.05)	821(24.41)	107(24.21)	296(20.64)	632(26.41)	484(23.73)	413(24.37)	1099(23.88)
	3-5	1184(38.63)	265(35.71)	1311(38.98)	139(31.45)	582(40.59)	871(36.4)	803(39.36)	608(35.87)	1723(37.43)
	>5	940(30.67)	255(34.37)	1037(30.84)	157(35.52)	467(32.57)	728(30.42)	628(30.78)	565(33.33)	1438(31.24)
K6 score										
	6-18	2020(68.5)	539(74.76)	2238(69.05)	319(74.36)	934(66.43)	1626(71.66)	1310(67.46)	1158(70.57)	3034(69.35)
	19-30	929(31.5)	182(25.24)	1003(30.95)	110(25.64)	472(33.57)	643(28.34)	632(32.54)	483(29.43)	1341(30.65)
Engagement		2.75(2, 3.25)	3(2.25, 3.5)	2.75(2, 3.25)	3(2.5, 3.5)	2.75(2, 3.25)	2.75(2.25, 3.25)	2.5(2, 3.25)	2.75(2.25, 3.5)	2.75(2, 3.25)
Perseverance		3(2.38, 3.75)	3.25(2.5, 4)	3(2.5, 3.75)	3.5(2.5, 4.25)	3(2.5, 3.5)	3(2.5, 3.75)	3(2.25, 3.5)	3.25(2.75, 4)	3(2.5, 3.75)
Optimism		2.75(2, 3.5)	3(2.25, 3.75)	2.75(2, 3.5)	3(2.5, 3.75)	2.75(2, 3.5)	2.75(2, 3.5)	2.75(2, 3.25)	3(2.25, 3.75)	2.75(2, 3.5)
Connectedness		4(3, 4.75)	4.25(3.25, 4.75)	4(3, 4.5)	4.25(3.5, 4.75)	4(3.25, 4.75)	4(3.25, 4.75)	4(3, 4.75)	4(3.25, 4.75)	4(3.25, 4.75)
Happiness		3(2.25, 3.75)	3.25(2.5, 4)	3(2.25, 3.75)	3.5(2.5, 4)	3(2.25, 3.75)	3(2.25, 3.75)	3(2.25, 3.75)	3.25(2.5, 4)	3(2.25, 3.75)

Summary

This study aimed to test the feasibility of recruiting adolescents via social media, using mobile phone software to collect health and wellbeing measures in (near) real-time, and to investigate patterns of dietary behaviour, physical activity and other health and wellbeing factors over a 16-week follow-up period. A total of 1,298 participants completed the baseline questionnaire, ranging from 13-19 years of age. Participants were more likely to be recruited via Instagram than Facebook, and were predominantly female (80.8% of participants), and aged between 16 and 18 years. The study consisted of a total of 464 separate EMAs over the 16-week follow-up period (29 EMAs per week). 45% percent of participants completed at least one EMA, with rates of completion declining over the study period (from approximately 25% to 10%). Less than 1% of participants completed all EMAs over the follow-up period.

Overweight and obesity
Overall, 62.6% of participants were classified as a normal weight. Every fourth participant was either overweight (17.9%) or obese (9.2%), and 10.3% were underweight. The proportions of males and females in each BMI category were similar.

Sleep duration, physical activity and small screen recreation at baseline
Overall, 5.3% of participants (10.7% of males, 4.3% of females) reported to have engaged in a physical activity for at least 60 minutes every day in the previous week. Thirty-five percent were sufficiently active on four to six days, 50% were sufficiently active on one to three days, and 10% percent were not active on any day of the previous week. The median time spent on sedentary activities was 15 hours per day and included doing homework, reading, tutoring, hobbies, sitting around, playing an instrument, and small screen recreation. Seventy-four percent of all adolescents indicated spending, on average, more than 4 hours per day on watching TV, playing video games or using a computer for fun. 56% of participants reported sleeping ≥8 hours the previous night, which was similar among both males and females.

Diet at baseline
Only 7.5% of all participants reported consuming the recommended daily amount of three serves or more of fruits, and 4.9% reported four serves or more of vegetables in the previous week. Twelve percent of all adolescents reported consuming at least one serve of meat per day. Forty-two percent of adolescents reported consuming fast food including burgers, pizza, chips, or French fries at least once a day, while every second participant consumed at least one soft drink over the previous week.

Psychological distress, wellbeing, and social connectedness
Overall, 32% of participants (18.9% for males, 34.4% for females) had Kessler 6 (K6) scores indicative of probable mental illness (K6 score >18) (Table 6). Engagement, Perserverance, Optimism, Connectedness and Happiness (EPOCH) scores were relatively normally distributed, although the median values for females were slightly below the scale midpoint for Engagement (2.5; IQR 2.0-3.4) and Optimism (2.8; IQR 2.0-3.5). Over seventy-five percent of males and females reported three or more important contacts in the previous 6-months, including friends and family

Trends in wellbeing, dietary behaviours, and physical activity
Over the 16-week follow-up period, males were more likely to have engaged in a physical activity for at least 60 minutes over the past 24 hours than females (Table 7). Half of

participants spent at least 1 hour watching TV in the previous 24 hours, and 3 hours using the internet/social media in the previous 24 hours. Half of participants reported 3 serves of fruit and 3 serves of vegetables in the previous 24 hours. Fifty percent reported sleeping 8 hours or more. Individual and aggregate trajectories in EMA responses were reasonably consistent over the follow-up period, with the exception of hours in class and studying reflecting the school holiday period in December 2019 and January 2020

Determinants of dietary behaviours and physical activity over follow-up
Obesity at baseline was associated with a lower likelihood of eating 3 or more fruit serves, 4 or more vegetable serves, and 60+ minutes of physical activity over the follow-up period; and a higher likelihood of eating fast food in the previous 24 hours. Similarly, a higher level of sedentary hours and screen time at baseline was associated with a lower likelihood of eating 3 or more fruit serves, 4 or more vegetable services, 60+ minutes of physical exercise, and a higher likelihood of eating fast food in the previous 24 hours. Overall, higher levels of social connection and psychological wellbeing at baseline were also associated with a higher likelihood of fruit and vegetable consumption, higher levels of physical activity, and lower likelihood of fast food consumption at follow-up.

Limitations
There are a number of methodological limitations to this study. Firstly, while there was a positive response to the study through Instagram and Facebook, the participants who were more likely to engage were overwhelmingly female, and more likely to be older in age (16-18 years). Recruitment via social media did not result in a sample representative of all adolescents aged 13-19 years, and likely reflects the greater engagement in social media among females than males. Despite the imbalance by sex, the distribution of responses by key dietary behaviours, physical activity, and wellbeing outcomes were not substantially dissimilar to other representative prevalence studies of adolescents (such as National Secondary Students' Diet and Activity survey, and National Health Survey).

An additional limitation was the low EMA and follow-up survey completion rate. Despite a use of an incentive ($30 GiftPay voucher), only 45% of participants completed one or more subsequent EMA, and less than 1% completed all available EMAs. Additionally, we sought consent from participants to provide information from mobile phone sensors in order to validate self-report measures of physical and social activity (not yet collated for this report). However, a large number of participants either did not turn on some sensors (e.g. geo-location) or there were intermittent trajectories of movement where sensor data were not collected. This resulted in complete sensor information being available on 152 participants over the follow-up period (not shown in this report).

There is also the risk of recall bias in this study given the self-reported nature of the baseline and follow-up questionnaires. However, results were generally comparable with previous research findings for some of the measures (as indicated in results tables). Ecological momentary assessments in (near) real time have the potential to circumvent recall bias and can be further augmented through mobile sensor data to validate self-report data, which will be the focus of subsequent research.

Implications
The unbalanced sample in this study in terms of sex and age may be reflective of the type of social media use between males and females, and future studies should consider disseminating more targeted social media ads as well as using other platforms (eg. Snapchat) in addition to Facebook and Instagram. While the present study established a Youth Advisory Group to seek

feedback on the design and implementation of project materials, more integrated strategies to embed co-design of these materials earlier on in the study is something to consider for future research. Additionally, improvements in retention and adherence to the study could perhaps include smaller, but more regular incentives, feedback of tailored information to participants, as well as the application of gamification elements in follow-up surveys.

Conclusion

This pilot study has demonstrated the feasibility of conducting an adolescent health cohort study recruited via social media with detailed trajectories of health behaviours and wellbeing collected via mobile phone. Findings from the study are broadly consistent with other cross-sectional prevalence surveys of adolescents, however the longitudinal nature of the current study will allow for more in-depth investigation of temporal relationships between the related adolescent health priorities of overweight and obesity, diet, physical activity, and wellbeing. These more detailed investigations will form the basis of subsequent analyses.

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APPENDIX 1: Youth Advisory Group

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APPENDIX 2: Baseline and follow-up questionnaire modules

BASELINE AND FOLLOW-UP QUESTIONNAIRE MODULES

Explanatory note

The questions listed here will not be administered all at the same time. As they will be delivered by the Ethica Health mobile phone app, the module sections will divided into self-contained questionnaires allowing staged deployment of questions - which can also be controlled by the participant - rather than administering all questions at once.

A longer baseline questionnaire will be activated at the start of the study, however this baseline questionnaire does not need to be completed in one session, and participants will have the option of completing separate modules over a series of sessions.

Following the baseline questionnaire, the remaining study questions will be in the form of very short weekly Ecological Momentary Assessments (EMAs) as described in Attachment 3, and a longer monthly questionnaire schedule questions in Module B relating to recent wellbeing and psychological stress, and social networks.

BASELINE ITEMS AND QUESTIONNAIRE

A. Socio-demographics: Items collected by self-report

[Socio-demographic questions are drawn from the *ABS National Mental Health and Wellbeing Study*; The *NSW Case-Control Study of Suicide and Attempted Suicide in Young Adults*; The *SSWAHS Youth Sexual Survey*].

General questions about you

A1. What is your gender?

Male
Female
Transgender
Other

A2. How old are you?

Age in years____

A3. What year of high school are you in?

Year 7 (Skip to A6)
Year 8 (Skip to A6)
Year 9 (Skip to A6)
Year 10 (Skip to A6)
Year 11 (Skip to A6)
Year 12 (Skip to A6)
Not at school
Finished school

A4. (Since leaving school) have you completed a trade certificate, or any other educational qualification?

No (Skip to A6)
Yes

A5. Which of these best describes the highest qualification you have completed?

Secondary school qualification
Nursing qualification
Teaching qualification
Trade certificate/ apprenticeship
Technician's certificate/ advanced certificate
Certificate other than the above
Associate diploma

A6. In the last week, did you do any work at all in a job?

No
Permanently unable (skip to A11)
Yes (skip to A8)

A7. At any time during the last 4 weeks have you been looking for full-time or part-time work?

No (skip to A11)
Yes (skip to A11)

A8. Do you work for an employer for wages or salary?

No
Yes

A9. What is your main job, that is the job in which you usually work most hours?

Job Title: _____

A10. How many hours a week do you usually work in your job?

Number of hours: _____

A11. What language do you speak at home?

English
Other (Please specify: _____ *)*

B. Physical health and diet

Physical health and diet questions are drawn from:

NSW Centre for Public Health Nutrition
[V. M. Flood, K. Webb & A. Rangan 2005, Recommendations for short questions to assess food consumption in children for the NSW Health Surveys, NSW Centre for Public Health Nutrition];

Adolescent Sedentary Activity Questionnaire (ASAQ)
[Hardy LL, Booth ML, Okely AD. The reliability of the adolescent sedentary activity questionnaire (ASAQ). Preventive medicine. 2007 Jul 1;45(1):71-4.];

Adolescent Physical Activity Measure
[Hardy LL, Booth ML, Okely AD. The reliability of the adolescent sedentary activity questionnaire (ASAQ). Preventive medicine. 2007 Jul 1;45(1):71-4.]

ACT Secondary Student Alcohol and Drug Survey.

Questions about sleep

B1. What time did you go to bed and turn the lights out to go to sleep last night?

Time: _____

B2. What time did you wake up today?

Time: _____

B3. Is this a typical night's sleep for that day of the week?

Yes
No, usually sleep more
No, usually sleep less

Questions about your physical activity

Physical activity is any activity that increases your heart rate and makes you get out of breath some of the time.

Physical activity can be done in sports, playing with friends, or walking to school.

Some examples of **physical activity** are running, brisk walking, rollerblading, biking, dancing, skateboarding, swimming, soccer, basketball, football, and surfing.

Add up all the time you spend in physical activity each day (don't include your physical education or gym class).

B4. Over the past 7 days, on how many days were you physically active for a total of 60 minutes or more per day?

*Number of days*_____

B5. Over a typical or usual week, on how many days were you physically active for a total of 60 minutes or more per day?

*Number of days*_____

Think about a normal school week. Over Monday to Friday, how long do you spend doing the following activities before and after school each day?

B6. Homework
Hrs____ *Mins____*

B7. Watching TV, including DVDs and videos, or downloading or streaming shows or movies in your free time outside of school purposes?
Hrs____ *Mins____*

B8. Playing games on a computer or handheld device, for example a mobile phone, or tablet, or games console (like a PlayStation or Xbox) in your free time outside of school purposes?
Hrs____ *Mins____*

B9. Using a computer, handheld device (for example a mobile phone or tablet) for chatting online, internet, emailing, social networking sites, in your free time outside of school purposes?
Hrs____ *Mins____*

B10. Reading for fun?
Hrs____ *Mins____*

B11. Being tutored?
Hrs____ *Mins____*

B12. Travelling (car/bus/train)?
Hrs____ *Mins____*

B13. Doing crafts or hobbies?
Hrs____ *Mins____*

B14. Sitting around (chatting with friends/on the phone/relaxing)
Hrs____ *Mins____*

B15. Playing/ practicing a musical instrument?
Hrs____ *Mins____*

Think about a normal weekend. Over Saturday and Sunday, how long do you spend doing the following activities on the weekend?

B16. Homework
Hrs____ Mins____

B17. Watching TV, including DVDs and videos, or downloading or streaming shows or movies, in your free time outside of school purposes?
Hrs____ Mins____

B18. Playing games on a computer or handheld device, for example a mobile phone, or tablet, or games console (like a PlayStation or Xbox) in your free time outside of school purposes?
Hrs____ Mins____

B19. Using a computer, handheld device (for example a mobile phone or tablet) for chatting online, internet, emailing, social networking sites, in your free time outside of school purposes?
Hrs____ Mins____

B20. Reading for fun?
Hrs____ Mins____

B21. Being tutored?
Hrs____ Mins____

B22. Travelling (car/bus/train)?
Hrs____ Mins____

B23. Doing crafts or hobbies?
Hrs____ Mins____

B24. Sitting around (chatting with friends/on the phone/relaxing)
Hrs____ Mins____

B25. Playing/ practicing a musical instrument?
Hrs____ Mins____

Questions about what you eat

Fruit and Vegetables

B27. How many serves of fruit do you usually eat each day? (a serve= 1 medium piece or 2 small pieces of fruit or 1 cup diced pieces).

_____serves per day
_____ serves per week
Don't eat fruit
Don't know

B28. How many serves of vegetables do you usually eat each day? (A serve = ½ cup cooked vegetables or 1 cup of salad vegetables).

_____serves per day
_____ serves per week
Don't eat vegetables
Don't know

Milk

B29. How many cups of milk do you usually drink in a day?
(1 cup=250ml, a household tea cup).
(milk=cow's milk, soy milk, milk on cereal, flavoured milks).

_____ number of cups per day.
_____ number of cups per week
Doesn't drink cow's milk or other milk
Don't know
Refused

B30. What type of milk do you usually consume?

Whole
Low/reduced fat
Skim
Evaporated or sweetened condensed
Soy milk (regular).
Soy milk (reduced fat).
None of the above
Don't know

Meats

B31. How often do you eat red meat, such as beef or lamb? Include all steaks, chops, roasts, mince, stir fries and casseroles. Do not include pork or chicken.
Longer list (do not read out): Veal, Offal (liver, kidney), Mutton, Game (buffalo, crocodile, goanna, goat, hare, kangaroo, rabbit, snake, venison, wild boar)
_____ times per day
_____ times per week
_____ times per month
Rarely/never
I don't know/ can't say

B32. How often do you eat meat products such as sausages, frankfurters, devon, ham, hamburgers or chicken nuggets?
Longer list (do not read out): Salami, bacon, meat pies, sausage rolls, luncheon meats, delicatessen meats, meat paste, liver paste, pate, saveloys, cheerios, hot dogs, rissoles, canned meats, smoked chicken, other smoked meats.

_____ times per day
_____ times per week
_____ times per month
Rarely/never
I don't know/ can't say

'Extra' foods

B33. How often do you eat chips, French fries, wedges, fried potatoes or crisps?

_____ times per day
_____ times per week
_____ times per month
Rarely/never
I don't know/ can't say

B34. How often do you have meals or snacks such as burgers, pizza, chicken, or chips from places like McDonalds, Hungry Jacks, Pizza Hut, KFC, Red Rooster or local takeaway food places?

_____ times per week
_____ times per month
Rarely/never
I don't know/ can't say

B35. How many cups of soft drink, cordials, or sports drink, such as lemonade or Gatorade do you usually drink in a day? (1 cup=250ml. One can of soft drink = 1 ½ cups. One 500ml bottle of Gatorade = 2 cups)

_____cups per day
_____cups per week
Doesn't drink soft drink
Don't know
Refused

Other drinks

B36. How many cups of fruit juice do you usually drink in a day? (1 cup=250ml, a household tea cup or 1 large popper)

_____cups per day
_____cups per week
Doesn't drink juice
Don't know
Refused

B37. How many cups of water do you usually drink in a day? (1 cup=250ml, a household tea cup, 1 average bottle of water = 1 ½ cups)

_____cups per day

_____cups per week
Doesn’t drink water
Don’t know
Refused

B38. What source of water do you usually drink?
Tap water
Filtered water
Bottled water
Don’t know

B39. In the last twelve months, were there times that you ran out of food and couldn’t afford to buy more?
Yes
No
Don’t know
Refused

Questions about your body

B40: How tall are you?

____metres, _____ centimetres

B50: How much do you weigh?

____kilograms

C. Mental Health: Kessler-6

[Mewton L, Kessler RC, Slade T, Hobbs MJ, Brownhill L, Birrell L, Tonks Z, Teesson M, Newton N, Chapman C, Allsop S. The psychometric properties of the Kessler Psychological Distress Scale (K6) in a general population sample of adolescents. Psychological assessment. 2016 Oct;28(10):1232.]

Questions about your mental health and wellbeing

These questions concern how you have been feeling over the past 30 days. In the last FOUR WEEKS, about how often:

C1. Did you feel nervous?

None of the time
A little of the time
Some of the time
Most of the time
All of the time

C2. Did you feel hopeless?

None of the time
A little of the time
Some of the time
Most of the time
All of the time

C3. Did you feel restless or fidgety?

None of the time
A little of the time
Some of the time
Most of the time
All of the time

C4. Did you feel so sad that nothing could cheer you up?

None of the time
A little of the time
Some of the time
Most of the time
All of the time

C5. Did you feel that everything was an effort?

None of the time
A little of the time

Some of the time
Most of the time
All of the time

C6. Did you feel worthless?

None of the time
A little of the time
Some of the time
Most of the time
All of the time

D. Wellbeing: EPOCH Measure of Adolescent Well-being

[Kern ML, Benson L, Steinberg EA, Steinberg L. The EPOCH measure of adolescent well-being. Psychological assessment. 2016 May;28(5):586.]

[Note: Suffix to question numbers below relate to each domain of wellbeing: E - 'Engagement', P - 'Perserverance', O - 'Optimism', C - 'Connectedness', H - 'Happiness']

Questions about your mental health and wellbeing

This is a survey about you! Please read each of the following statements.
Circle how much each statement describes you. Please be honest - there are no right or wrong answers.

D1_C1 When something good happens to me, I have people who I like to share the good news with.

1	*2*	*3*	*4*	*5*
Almost never	*Sometimes*	*Often*	*Very often*	*Almost always*

D2_P1 I finish whatever I begin.

1	*2*	*3*	*4*	*5*
Almost never	*Sometimes*	*Often*	*Very often*	*Almost always*

D3_O1 I am optimistic about my future

1	*2*	*3*	*4*	*5*
Almost never	*Sometimes*	*Often*	*Very often*	*Almost always*

D4_H1 I feel happy.

1	*2*	*3*	*4*	*5*
Almost never	*Sometimes*	*Often*	*Very often*	*Almost always*

D5_E1 When I do an activity, I enjoy it so much that I lose track of time.

1	*2*	*3*	*4*	*5*
Almost never	*Sometimes*	*Often*	*Very often*	*Almost always*

D6_H2 I have a lot of fun.

1	*2*	*3*	*4*	*5*
Almost never	*Sometimes*	*Often*	*Very often*	*Almost always*

D7_E2 I get completely absorbed in what I am doing.

1	*2*	*3*	*4*	*5*
Almost never	*Sometimes*	*Often*	*Very often*	*Almost always*

D8_H3 I love life.

1	*2*	*3*	*4*	*5*
Almost never	*Sometimes*	*Often*	*Very often*	*Almost always*

D9_P2 I keep at my schoolwork until I am done with it.

1	*2*	*3*	*4*	*5*
Almost never	*Sometimes*	*Often*	*Very often*	*Almost always*

D10_C2 When I have a problem, I have someone who will be there for me.

1	*2*	*3*	*4*	*5*
Almost never	*Sometimes*	*Often*	*Very often*	*Almost always*

D11_E3 I get so involved in activities that I forget about everything else.

1	*2*	*3*	*4*	*5*
Almost never	*Sometimes*	*Often*	*Very often*	*Almost always*

D12_E4 When I am learning something new, I lose track of how much time has passed.

1	*2*	*3*	*4*	*5*
Almost never	*Sometimes*	*Often*	*Very often*	*Almost always*

D13_O2 In uncertain times, I expect the best.

1	*2*	*3*	*4*	*5*
Almost never	*Sometimes*	*Often*	*Very often*	*Almost always*

D14_C3 There are people in my life who really care about me.

1	*2*	*3*	*4*	*5*
Almost never	*Sometimes*	*Often*	*Very often*	*Almost always*

D15_O3 I think good things are going to happen to me.

1	*2*	*3*	*4*	*5*
Almost never	*Sometimes*	*Often*	*Very often*	*Almost always*

D16_C4 I have friends that I really care about.

1	*2*	*3*	*4*	*5*
Almost never	*Sometimes*	*Often*	*Very often*	*Almost always*

D17_P3 Once I make a plan to get something done, I stick to it.

1	*2*	*3*	*4*	*5*
Almost never	*Sometimes*	*Often*	*Very often*	*Almost always*

D18_O4 I believe that things will work out, no matter how difficult they seem.

1	*2*	*3*	*4*	*5*
Almost never	*Sometimes*	*Often*	*Very often*	*Almost always*

D19_P4 I am a hard worker.

1	*2*	*3*	*4*	*5*
Almost never	*Sometimes*	*Often*	*Very often*	*Almost always*

D20_H4 I am a cheerful person

1	*2*	*3*	*4*	*5*
Almost never	*Sometimes*	*Often*	*Very often*	*Almost always*

E. Social Networks (Egocentric): US General Social Survey Name Generator

A question about your social network

E1. From time to time, most people discuss important matters with other people. Looking back over the last six months—who are the people with whom you discussed matters important to you? Please just write their first names or initials.

First names/ Initials _____

F. Mental health and wellbeing resources for young people

F1. Thinking about your feelings, your friends, or your life in general can sometimes lead to you feeling worried.

If you need any more information about any worries you might have, or you feel you need to talk to someone about how you are feeling, you can contact Reach Out <https://au.reachout.com/>. Reach out has lots of information for young people, and also people you can talk to like Kids Helpline (1800 55 1800).

FOLLOW-UP ITEMS (ADMINISTERED MONTHLY)

A. Mental Health: Kessler-6

[Mewton L, Kessler RC, Slade T, Hobbs MJ, Brownhill L, Birrell L, Tonks Z, Teesson M, Newton N, Chapman C, Allsop S. The psychometric properties of the Kessler Psychological Distress Scale (K6) in a general population sample of adolescents. Psychological assessment. 2016 Oct;28(10):1232.]

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APPENDIX 3: Ecological momentary Assessment (EMA) items

Domain or subdomain	EMA	Notes
Positive emotion or happiness	At the moment, how happy are you? 1 = not at all | 5 = very much	Based on EMAs in Dockray et al 2010. Can use for other affects too. They also used it for tiredness, stress, and anger/frustration. Alt phrasing: In the past five minutes, how happy have you been?
Relationships	In the past hour .. Who were you with? (select all that apply) ( ) alone ( ) mother ( ) father ( ) sister(s) or brother(s) ( ) other relatives ( ) classmates, peers ( ) strangers ( ) boyfriend or girlfriend ( ) friend (s) How many? __ female ( ) male ( ) ( ) others-·---	Modified version of question from the Sloan Study of Youth and Social Development.
Engagement	In the past hour .. 1. what was the main thing you were doing? [open-ended] 2. - How well were you concentrating? 3. - Was this activity interesting? [1 not at all to 5 very much]	Modified version of question from the Sloan Study of Youth and Social Development.
Meaning	In the past hour .. what was the main thing you were doing? [open-ended] 4. Was it important to you? 5. How important was it to your future goals? [1 not at all to 5 very much]	Modified version of question from the Sloan Study; see above.

Achievement	In the past hour .. what was the main thing you were doing? [open-ended] 6. - How challenging was it? 7. - Were you learning anything or getting better at something? 8. - How skilled are you at it?	Modified version of question from the Sloan Study; see above.
Sleep	What time did you go to bed and turn the lights out to go to sleep last night? ___ What time did you wake up today? ___ Is this a typical night's sleep for that day of the week? 1. Yes 3. No, usually sleep more 5. No, usually sleep less 6. No typical sleep	
Academic behaviour	In the past 24 hours .. - How many hours have you spent in classes? - How many hours have you spent studying or doing homework outside of class time?	Written for Pathways to Wellbeing Study
Physical activity	In the past 24 hours, were you physically active for a total of 60 minutes of more? 'Physical activity' is any activity that increases your heart rate and makes you get out of breath some of the time. 1. Yes 2. No	
Physical activity	In the past 24 hours, did you spend any time watching TV? 1. Yes 2. No. If Yes, how long did you spend watching TV? Hrs__ Min___	

Physical activity	In the past 24 hours, did you spend any time on the internet, social media (like Instagram, Youtube, or Facebook), or playing computer games? 1. Yes 2. No. If Yes, how long did you spend on the internet, social media, or playing computer games? Hrs__ Min___	
Diet	In the past 24 hours, have you eaten any serves of fruit? 1. Yes 2. No If Yes, how many serves of fruit? (A serve = 1 medium piece or 2 small pieces of fruit or 1 cup of diced pieces) Number: _____	
Diet	In the past 24 hours, have you eaten any serves of vegetables? 1. Yes 2. No If Yes, how many serves of vegetables? ? (A serve = ½ cup cooked vegetables or 1 cup of salad vegetables) Number: _____	
Diet	In the past 24 hours, have you had any meals or snacks such as as burgers, pizza, chicken, or chips from places like McDonalds, Hungry Jacks, Pizza Hut, KFC, Red Rooster or local takeaway food places? 1. Yes 2. No If Yes, How many meals?	

	Number: _____	

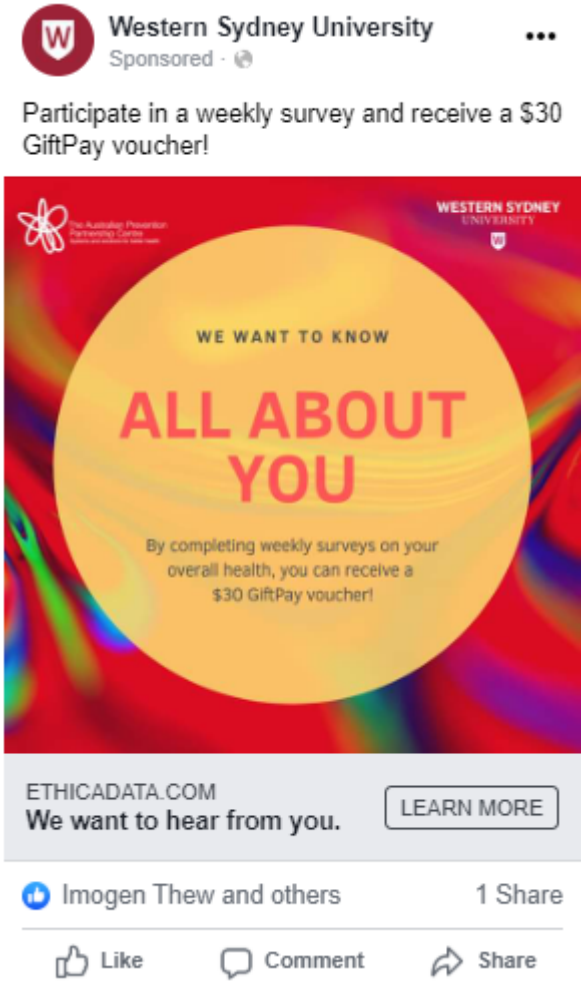
References

Dockray et al 2010 A Comparison of Affect Ratings Obtained with Ecological Momentary Assessment and the Day Reconstruction Method

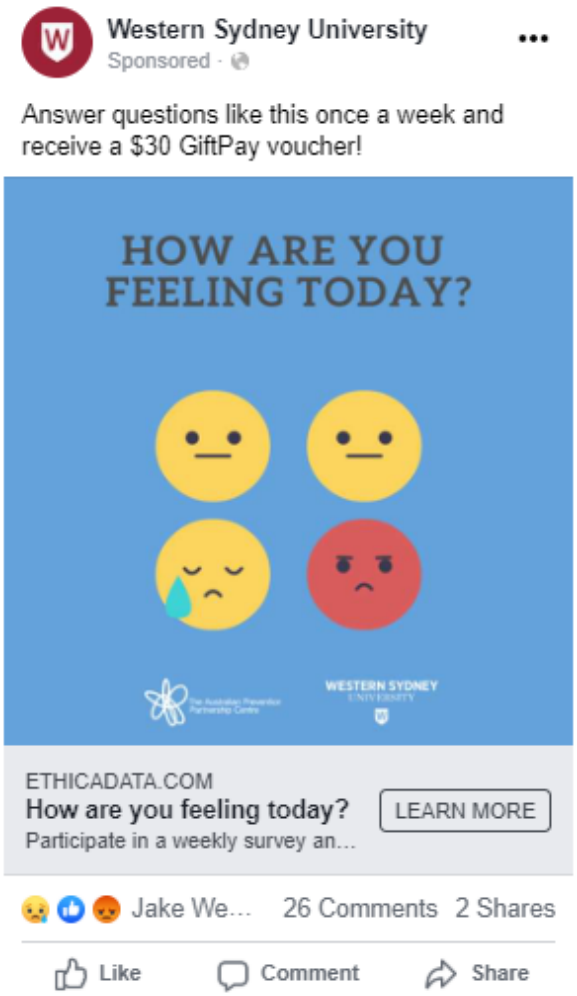
APPENDIX 4: Social media campaign advertisements

Advertisement 1: Sleep

Advertisement 2: Generic



Advertisement 3: Wellbeing



Advertisement 4: Diet

Advertisement 5: Generic