How is online self-reported weight compared with image-captured weight? A comparative study using data from an online longitudinal study of young adults

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Data described in the manuscript, code book, and analytic code will be made available upon request pending

Abstract

Background: Accurate anthropometric measurement is important within epidemiological studies and clinical practice. Traditionally, self-reported weight is validated against in-person weight measurement.

Objective: This study aimed to 1) determine the comparison of online self-reported weight against images of weight captured on scales in a young adult sample, 2) compare this across body mass index (BMI), gender, country and age groups, and 3) explore demographics of those who did/did not provide a weight image.

Methods: Cross-sectional analysis of baseline data from a 12-month longitudinal study of young adults in Australia and the UK was conducted. Data was collected by online survey via Prolific research recruitment platform. Self-reported weight and socio-demographics (e.g. age, gender) were collected for the whole sample (n=512), and images of weight for a sub-set (n=311). Tests included Wilcoxon signed-rank test to evaluate differences between measures, Pearson correlation to explore the strength of the linear relationship, and Bland-Altman plots to evaluate agreement.

Results: Self-reported weight (median (IQR), 92.5kg (76.7-112.0)) and image-captured weight (93.8kg (78.8-112.8)) were significantly different ($z=-6.76$, $p<0.001$), but strongly correlated ($r=0.983$, $p<0.001$). In the Bland-Altman plot ((mean difference -0.99kg (-10.83, 8.84), most values were within limits of agreement (2 SD). Correlations remained high across BMI, gender, country and age groups ($r>0.870$, $p<0.002$). Participants with BMI in ranges 30-34.9 and 35-39.9kg/m^2 ranges were less likely to provide an image.

Conclusions: This study demonstrates the method concordance of image-based collection methods with self-reported weight in online research.

Key words: validation; weight; self-report; online; young adults

Introduction

Accurate assessment of anthropometric measures is important within epidemiological studies and clinical practice. Measurements collected by trained personnel are the gold standard, however alternate methods are increasingly being used, necessitated partly by the increase in online research studies during the last few decades (1). The increase in online research studies as well as clinical services such as telehealth is burgeoned by technological and computing advances, enabling more streamlined data collection, analysis and reporting, and clinical consultations (2). Key advantages of online research and clinical services can reduce inequalities by enabling reach to those higher disadvantaged or minority groups which can commonly be at post risk. More specifically reducing participant/patient burden, for example eliminating the need to travel for study participation or clinical appointments, and reducing data collection and consultation times by automating processes; providing the option of anonymity; and reducing inequalities, by increasing the potential reach of, and access to studies and services (2, 3).

Growth in the use of online methods in recent years was exacerbated by the COVID-19 pandemic, where remote methods were necessary to facilitate physical distancing and isolation requirements (4). Online methods can also be advantageous in settings such as mental health services, as they may help to minimise anxiety and stigma. While online methodologies may not always be feasible, for example where specialised measurement equipment is needed, it does present opportunity for many studies and services, where validated online equivalencies of in-person assessments can be utilised.

Traditionally, validation of a novel method would involve comparison against a gold standard objective measure, for example online self-reporting of weight validated against in person measurement of weight by trained personnel (5). method comparison of the novel and standard measures is commonly assessed by correlations and levels of agreement. Many studies have demonstrated the validity of self-reported weight compared with measured weight in studies of children and adolescents (6-8), young adults (5, 9), mid-life adults (7, 10-12), and older adults (7). However, evidence for self-reported weight as a valid measure is conflicting in some groups, such as adolescents (13) Factors such as age, gender, weight status and whether the study participants were aware that weight will be measured may impact the accuracy of self-reported weight. Across studies, it seems inconsistent as to whether males or females are more accurate in self-reporting their weight (5, 7, 9, 11). When weight status is examined, studies suggest that those at either end of the spectrum i.e. those living with underweight or with obesity, may be less accurate in self-reporting weight, when compared to those in the healthy weight range (14, 15). To date, participants in most studies were aware that they would be asked to self-report and have their weight measured (5-11), which could influence their reporting, however this is untested. In the USA Cancer Prevention Study-3, self-reported and measured weight were collected for a sub-set of n=2,643, and correlation coefficients were 0.99 and 0.98 among adult females and males respectively (10). Similarly, a correlation coefficient of 0.96 was reported when comparing online self-reported weight and measured weight in a sub-sample of adolescents (n=1,698) in the

Swedish BAMSE Cohort Study (6). However, these types of comparisons are only possible where in-person data collection is an option.

Evolving technology-based methodologies, whereby data can be collected from a range of geographical locations (e.g. across rural, remote and international borders), requires a novel means of validation. Online research recruitment platforms such as Prolific (©Prolific Academic Ltd), are increasingly being used by industry and research studies, as a means of increasing time and resource efficiency in international recruitment and data collection. There is consequently a need for alternate methods of data collection, to support the growing field of online research. In dietary assessment, capturing intake using image based methods such as smartphone applications has been validated against self-reported dietary intake by 24 hour recall and 3-day food diaries in adult populations (16, 17). Similarly, the validity of active travel behaviour captured by wearable camera has been compared against self-reported behaviour, with acceptable correlation between the two (18). Image based assessment of weight could be another means of collecting self-reported weight data in online research, however, this approach has yet to be tested.

Therefore, this study aims to:

1. Determine the comparison of online self-reported weight against images of weight captured on a set of scales, in a sample of young adults from Australia and the UK.
2. Compare the accuracy of self-reported versus image-captured weight across body mass index (BMI), gender, country of residence and age groups.
3. Explore differences in demographic factors between young adults who provided an image of their weight and those who chose not to.

Methods

Study design

This is a cross-sectional analysis of data collected at time-point one (9th December 2021 - 11th February 2022) of a 12-month longitudinal study of young adults (18-35 years) in the UK and Australia via the Prolific recruitment research platform. Prolific has a database of over 130, 000 participants internationally, from which a specific sample can be recruited based on over 100 demographic characteristics. The commercial platform offers a diverse population of participants and has been shown to provide high quality data (19) and good retention in online longitudinal research (20) Full details of the longitudinal study have been published (21). The initial main aim of the longitudinal study was to track eating behaviours, mental health, health-related behaviours and weight over 12-months, to explore changes and interrelationships in these factors over time. At the end of the survey, participants could complete an optional sub-study where they were asked to upload an image of their weight captured on a set of scales. Those who chose not to were asked to complete a brief survey to provide their reasons for choosing not to. Importantly, at the time of completing the main survey where participants self-reported weight, they were not aware that they would later be asked to upload an image of their weight. The optional sub-study included two or three questions, depending on whether they uploaded an image or reported their reasons not to, respectively. Those measures included within the current analysis are outlined below. The conduct and reporting of this work complies with STROBE guidelines for observational studies (22). Ethical approval was granted by Leeds Beckett University, UK (reference number 86004) and the University of Newcastle, Australia (reference number H-2022-0110). All participants gave informed consent before participating.

Participants and recruitment

Inclusion criteria to the main study were: young adults (18-34 years at time-point one), body mass index (BMI) ≥20 kg/m^2, and UK or Australian resident. Exclusion criteria included being pregnant or trying to get pregnant, breastfeeding, and not fluent in English. The target sample size at time-point one was 500 which was arrived at due to budget limitations of the study, including: 100 participants per BMI category (20-24.9; 25-29.9; 30-34.9; 35-39.9; ≥40 kg/m^2), with 50% male/female, and 75% from the UK/25% Australia within each BMI category. More UK participants were recruited to reflect the larger proportion of UK participants on the commercial platform. To achieve these numbers and proportions in recruitment, invitations were sent in the commercial platform to potentially eligible participants based on the criteria and their demographic characteristics as collected by the platform, and participants completed a brief eligibility screen before proceeding to the main survey. Participants were paid via the commercial platform for participating; £5.00 (approx. $9.00 AUD) for completing the main survey and £1.00 or 20p for completing the additional sub-study (depending on whether they uploaded an image or provided reasons for choosing not to, respectively). The amount paid per study component is relative to the time taken to complete, as per commercial platform standards.

Measures

Socio-demographic characteristics

Socio-demographics included in this study were age, gender, country of residence, household income, highest level of education, ethnicity, and whether participants were enrolled at university/college. Questions were sourced/adapted from Australian and UK census questionnaires (23, 24).

Height and Weight – self-report

Participants reported their height in metres or feet and inches, and weight in kilograms, pounds, or stones and pounds. Participants were asked whether their height and weight were measured by themselves, a health professional, or were an estimate. Participants were asked to rate their confidence in the accuracy of their reported weight (0/Not at all confident to 100/Entirely confident), and how long since their weight was measured. BMI was calculated from self-reported height and weight using the standard equation (weight (kilograms)/height(metres)^2), and categorised according to World Health Organization cut-points (25).

Weight – image capture

Participants were asked to take and upload an image of their weight recorded on a set of scales, and to report the scale units of measurement. Instructions were provided to standardise images, including how to accurately measure weight (e.g. place scales on a hard, flat surface), and take the image (e.g. ensure scale reading is visible), as well as a sample image as a guide. Weight values captured in images were extracted and documented by one researcher (M.W). A second researcher (T.B) independently extracted and documented 10% of images (n=31) to confirm accuracy. Weight values were then converted to kilograms for analyses and reporting.

Reasons for not uploading a weight image

Participants who chose not to upload an image were asked three questions to determine their reasoning, including whether they uploaded an image (yes/no/can't remember), and if no or can't remember were selected, two multiple-choice questions to determine their main reason, and any further reasons for choosing not to (e.g. no access to scales, felt uncomfortable uploading an image, did not have the time). There was also an open-ended 'other, please specify' response option to the multiple-choice questions.

Statistical analysis

Analyses were conducted using Stata Software version 14.2. Descriptive statistics include median (inter-quartile range), given non-parametric data, and number and percentages. Differences in demographic characteristics between those who did and did not upload an image were tested using Mann-Whitney tests for continuous variables and chi^2 tests for categorical variables. Significant associations identified using chi^2 tests, and where the variable included >two categories, were tested using two-sample tests of proportions, to identify which categories significantly differed from each other. The comparison of self-reported against image-captured weight includes Wilcoxon signed-rank test to evaluate differences between the two measures, Pearson correlation to explore the strength of the linear relationship, and Bland-Altman plots to evaluate the degree of agreement. The mean difference between weight measurements was calculated as image-captured minus self-reported weight. The mean differences of self-reported and image-captured weight were approximately normally distributed, determined by visual assessment of the histogram and the Shapiro-Wilk test for normality. It was decided that LOA <2SD would indicate a fairly good level of agreement (26). Pearson correlation and Bland-Altman tests were also conducted by BMI, gender, country of residence and age groups. Differences in participants' confidence in the accuracy of their self-reported weight was tested across BMI, gender, country of residence and age groups using ANOVA with post-hoc Tukey's HSD test. Differences in the main reasons participants chose not to upload an image of their weight across BMI categories was tested using Chi^2 test, with two-sample tests of proportions to identify which categories significantly differed. Regarding gender, while recruitment targets were set to achieve 50% female/50% male within each BMI category, this was based on participants' demographic information within the commercial platform and in completing the main survey participants were asked to select their gender with options of male, female, non-binary or another gender identity. Six participants identified as non-binary, however, as this is too small a number to conduct Pearson correlation and Bland-Altman tests, they were not included in validation testing. P-value for significance was $p<0.05$.

Results

Description of the study sample

The main study sample included 512 participants (Figure 1); median age 28.5 years, almost equal proportions of male to female, primarily from the UK (82.2%) and primarily self reported White ethnicity (77.9%) (Table 1). Participants' self-reported weight was predominantly based on measuring themselves (78.7%), followed by estimation (12.3%), and measurement by a health professional (9.0%). For those whose self-report was based on measuring themselves or by a health professional, the median (IQR) time since measurement was 24.0 (3.0-168.0) hours. Those whose self-report was based on an estimation, the median (IQR) time since last measurement was 4.7 (2.9-15.2) weeks. Most participants (60.7%) provided an image of their weight and those who did reported higher weight confidence than those who did not.

Comparison of online self-reported weight versus image-captured weight

Median (IQR) self-reported weight was 92.5kg (76.7-112.0), and 93.8kg (78.8-112.8) for image-captured weight which was statistically significant (z=-6.76, p<0.001). Self-reported and image-captured weight were strongly correlated (*r*=0.983, p<0.001). Figure 2 shows the Bland-Altman plot for the average versus mean difference between self-reported and image-captured weight (mean difference -0.99kg (-10.83, 8.84)). Most values were within the LOA i.e. 2 SD, indicating a fairly good level of agreement across the range of weight status. Note that a smaller LOA means greater agreement.

Accuracy of self-reported weight versus image-captured weight by BMI category, gender, country of residence and age

Self-reported and image-captured weight were strongly correlated for participants in each BMI category (all p<0.001). Correlation coefficients were; BMI range 20-24.9kg/m^2 (*r*=0.940, p<0.001), 25-29.9 kg/m^2 (*r*=0.871, p<0.001), 30-34.9 kg/m^2

(*r*=0.956, p<0.001), 35-39.9 kg/m^2 (*r*=0.929, p<0.001), and ≥40kg/m^2 (*r*=0.976, p<0.001). Supplementary Figures 1-5 display the Bland-Altman plots for the average versus mean difference between weight measures by BMI category. The mean difference (LOA) were; BMI range 20-24.9 kg/m^2 range (-0.96kg (-7.82, 5.89)), 25-29.9 kg/m^2 (1.30kg (-13.52, 10.91)), 30-34.9 kg/m^2 (-1.46kg (-9.17, 6.25)), 35-39.9 kg/m^2 (-1.42kg (-12.37, 9.52)), and ≥40kg/m^2 (0.47kg (-10.02, 10.95)). The tighter LOA for those in the healthy weight range compared with other weight ranges indicates higher agreement. In each Bland-Altman plot, most values were within the LOA. Participants confidence in the accuracy of their self-reported weight was not significantly different across BMI categories (F (4,507) = 1.81, (p=0.12).

Self-reported and image-captured weight were strongly correlated by gender (females; *r*=0.985, p<0.001, males; *r*=0.978, p<0.001). Supplementary Figures 6-7 display the Bland-Altman plots. The mean difference (LOA) for males was (-1.23kg (-12.56, 10.10)), and for females (-0.83kg (-8.88, 7.23)). Most values were within the LOA in both Bland-Altman plots. Confidence in the accuracy of self-reported weight was significantly different by gender (F (2,509) = 3.53, p=003), with post-hoc test showing higher confidence among males (mean±SD, 90.4±12.0), than females (mean±SD, 86.7±18.9), p=0.024.

Self-reported and image-captured weight were strongly correlated by country of residence (UK; *r*=0.981, p<0.001, Australia; (*r*=0.995, p<0.001). Supplementary Figures 8-9 display the Bland-Altman plots. The mean difference (LOA) for participants in the UK was -0.92kg (-11.38, 9.54), and for those in Australia was -1.41kg (-6.29, 3.47)). The tighter LOA for those in Australia compared with the UK indicates higher agreement. Most values were within the LOA in both Bland-Altman plots. Participants confidence in the accuracy of their self-reported weight was not significantly different by country of residence ($F (1,510) = 1.09$, $p=0.30$).

Self-reported and image-captured weight were strongly correlated by age (18-24 years; r=0.980, p<0.002, 25-29 years; r=0.994, p<0.001, 30-35 years; r=0.975, p<0.001). Supplementary Figures 10-12 display the Bland-Altman plots. The mean difference (LOA) were; age 18-24 years (-1.42kg (-12.37, 9.52)), age 25-29 years (-0.84kg (-6.96, 5.27)), and age 30-35 years (-0.85kg (-11.99, 10.29)). In each Bland-Altman plot, most values were within the LOA. Confidence in the accuracy of self-reported weight was significantly different by age group ($F (2,509) = 5.58$, $p=0.004$), with post-hoc test showing higher confidence among participants aged 30-35 years (mean±SD, 90.6±15.4), than 18-24 year olds (mean±SD, 84.9±17.1), p=0.003.

Comparison of demographics of young adults who uploaded an image of their weight and those who chose not to

Most participants uploaded an image of their weight (60.7%). A significantly higher proportion of those who did were from the UK and were in the BMI range 20-24.9 kg/m^2 or obesity class I BMI range (Table 1). A significantly higher proportion of those who did not provide an image were in the BMI range 35-39.95 kg/m^2 or BMI ≥40 kg/m^2 range. Those who uploaded an image reported greater confidence in the accuracy of their self-reported weight than those who did not, however the difference was not significant. Of the 201 participants who did not upload an image, 114 (57%) responded with their reasons for choosing not to (Table 2). The main reason was feeling uncomfortable to (42.1%), followed by not having access to weighing scales (35.1%). Comparison of these main two reasons by BMI category showed that participants in the BMI range 35-39.9 kg/m^2 (55.6%) and ≥40 kg/m^2 (53.3%) BMI range were significantly more likely to indicate feeling uncomfortable in uploading an image compared with those in the BMI range 20-24.9 kg/m^2 (19.1%) ($p<0.05$). Participants in the BMI range 25-29.9 kg/m^2 (48.2%) were significantly more likely to report not having access to weighing scales than those in the BMI range ≥40 kg/m^2 (18.8%) ($p<0.05$).

Discussion

This study found that online self-reported and image-captured weight had high agreement in an international sample of young adults. This remained when comparing across BMI groups, gender, country of residence and age. This suggests that online self-reported weight through images could be used as a novel / alternative method or combination of triangulation of the two to increase confidence of results for reporting in online research and practice settings. Tighter limits of agreement were found among those with a BMI range 20-24.9 kg/m^2, males, Australian participants, and those aged 25-29 years compared with other groups in each demographic factor. Less than half of the young adults chose not to provide an image of their weight. Their main reasons were feeling uncomfortable to do this, and not having access to weighing scales, and a higher proportion were in BMI range 35-39.9 kg/m^2 and ≥40 kg/m^2 BMI ranges. These factors need to be considered in future studies and settings using online data collection.

Correlation between self-reported and image-captured weight was high among the 61% of the sample who had both measures (r=0.98). Median self-reported weight was 1.3kg lower than median image-captured weight. This is consistent with

Australian studies comparing online self-reported weight with in-person measured weight among young adults (*r*=0.99, mean difference -0.55 to +0.7kg) (5, 9). Similarly, a study comparing self-reported and measured weight in UK adults found self-reported weight was underestimated by 1.85kg in males and 1.40kg in females (r>0.9) (27), while Imeraj et al. found self-reported weight via smartphone app was 1.03kg lower than in-person measured weight among adults with obesity in a weight loss RCT (12). Commonly, studies assess weight and height together to calculate BMI. Using image capture to validate online self-reported height, however, may be less feasible. It is far less common to own height measurement equipment than weighing scales, and potentially more difficult to take an image of recorded height on a stadiometer without assistance. Whilst an online method of validating self-reported height would be useful in population groups where height is changing, e.g. children and adolescents, height in a young adult population should be stable.

Agreement between self-reported and image-captured weight was high across BMI, gender, country of residence and age groups. The mean difference and LOA between weight measures was greater in participants with a BMI range 30-34.9 kg/m^2 or 35-39.9 kg/m^2 range than those in the BMI range 20-24.9 kg/m^2, while those in the range ≥40 kg/m^2 had a low mean difference and wide LOA. While confidence in the accuracy of self-reported weight did not differ by BMI, those in the BMI range 20-24.9 kg/m^2 appear to be more aware of, and accurate in, reporting their weight. One possible explanation could be that those in the lower ranges are more comfortable with their weight and with weighing themselves, and may weigh themselves more often. The mean difference and LOA was also greater in males than females, however confidence in the accuracy of self-reported weight was significantly higher among males. Compared with other studies of adolescents through to older adults, there is inconsistency as to whether males or females more accurately self-report their weight compared with measured weight (5, 7, 9, 11). Participants in the UK had a lower mean difference than those in Australia (-0.92kg and -1.41kg), however the LOA was tighter for those in Australia. While these differences could be more to do with other factors such as BMI and gender than country of residence, it could also be due to a greater proportion of UK participants and a more normal distribution of values in this sub-set. Younger participants (18-24 years) had a higher mean difference and LOA compared to 25-29 and 30-35 year olds, suggesting greater accuracy with age. However, in a comparison of self-reported and measured weight in young adults, Pursey et al. found that younger participants were more accurate (5). An additional consideration could also be that weight is often unstable at this age and changes with growth and lifestyle. Overall, the fact that agreement remained high when considering BMI, gender, country and age group, further supports the use of this method of validating self-reported weight in online research and practice settings.

The majority of young adults (61%) chose to provide an image of their weight, suggesting overall acceptability of this data collection method for measuring weight.. There was a trend towards a higher proportion of image uploads in those with higher education level, which could be indicative of higher health literacy than those with a lower education level. This also highlights that populations at risk such as those with lower education levels may be less comfortable to measure in this format. Almost 40% of the sample chose not to provide an image, with the predominant two reasons being that they felt uncomfortable to, and not having access to weighing scales. Therefore, using this approach in future research and practice will require consideration of these potential barriers to participation. Issues of access may be overcome, by ensuring weighing scales are accessible free of charge at local venues such as pharmacies or doctor surgeries, or through friends and family. Participants feeling uncomfortable to upload an image of their weight is a more sensitive issue, and the suitability of this method for the population/s of interest will need to be explored further through public and patient involvement work.

Exploration of the differences between young adults in this study who did and did not provide a weight image found significant differences by country and BMI. Participants in the UK were more likely to provide an image than those in Australia. This difference by geographical location could be driven by factors such as cultural and societal norms, and access. Participants with a BMI in range 20-24.9 kg/m^2 or 30-34.9 kg/m^2 ranges were more likely to provide an image, while those with a BMI in the 35-39.9 and 40 kg/m^2 ranges were less likely. The main reason participants chose not to provide an image was feeling uncomfortable to do so, and this reason was reported by a significantly higher proportion of individuals in the higher weight ranges than those in the 20-24.9 kg/m^2 range. A potentially related barrier could be that some household scales have a maximum weight which individuals in higher weight ranges may be more likely to exceed. Other factors to consider are experiences of weight stigma and satisfaction/dissatisfaction with weight or body image (28, 29). There are mixed findings regarding the effects of self-weighing on psychological outcomes, however, for some self-weighing is associated with low mood, low self-esteem or body dissatisfaction (30), and therefore may be avoided. It should be noted that participants remained anonymous throughout data collection,. Anonymity was requested for ethical reasons, although it was also hoped that it may help some participants feel more comfortable in taking and sharing an image of their weight. While anonymity may be possible in some research studies, if this method were used in clinical settings, data would need to be identifiable in order to link with clinical records, which is a critical consideration.

Strengths and limitations

The strengths of this study include the moderate sample size, and importantly, the equivalent distribution of the sample across BMI categories and gender. The novelty of capturing weight data through images, and the fact that 60% of the cohort sample volunteered to provide an image for comparison against self-reported weight are further strengths. The anonymity of data collection may have boosted the response rate for providing an image of weight. Participants self-reported their weight and were later informed of the sub-study where they would be asked to upload an image of their weight, which is potentially also a strength in terms of reducing self-report bias. As this is a longitudinal study, there is the opportunity to explore whether accuracy/agreement changes in future time points where people will be aware of this ask. The additional data collected from those who chose not to upload a weight image is also novel, and sheds light on some of the key barriers to online weight data collection. There are potential limitations in that access to both study participation (i.e online via commercial research platform) and to participating in the optional sub-study component (i.e access to weighing scales and technology to take and upload an image) may have excluded those without access to these technology/devices. While this is an international study, it is limited to the UK and Australia, and is therefore not necessarily generalizable to other countries. Household income was not adjusted for in the current study, participants were excluded if not fluent in English and further payments were made for additional parts of survey completion which may have influenced the responses. An additional limitation includes that there is also variability in home scales. Furthermore, the sample being young adults is also important in terms of generalizability to other age groups, e.g. young adults may be more familiar with, and likely to have access to the required technology when compared to older adults.

Implications for research and practice

This study has demonstrated the method concordance of using image based data collection with self-reported weight data. Future studies may choose to implement this method as an adjunct to self-reporting method or validate against the gold standard measure of weight collected in person to provide further confidence in online measures. This finding is critical for future research and practice where online methods are preferred. Future research to further explore and mitigate potential barriers to image upload, why participants did not have access to scales, and exploring the reproducibility of these findings in other population groups, would be hugely beneficial.

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Data sharing: Data described in the manuscript may be made available upon request pending application and approval.

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Table 1. Baseline demographic characteristics of young adults in an online longitudinal study (n=512)

	Total (n=512)	Uploaded weight image (n=311)	Did not upload weight image (n=201)
Characteristic	N (%) or Median (IQR)		
Age (years)	28.5 (24.0-32.0)	29.0 (24.0-32.0)	28.0 (24.0-31.0)
Gender			
Female	254 (49.6)	163 (52.4)	91 (45.3)
Male	252 (49.2)	144 (46.3)	108 (53.7)
Non-binary	6 (1.2)	4 (1.3)	2 (1.0)
Country*			
UK	421 (82.2)	265 (85.2)	156 (77.6)
Australia	91 (17.8)	46 (14.8)	45 (22.4)
Racial background			
White	399 (77.9)	232 (74.6)	167 (83.1)
South Asian	37 (7.2)	27 (8.7)	10 (5.0)
Other Asian background	20 (3.9)	13 (4.2)	7 (3.5)
Black/ African/ Caribbean/ Black British	18 (3.5)	14 (4.5)	4 (2.0)
Aboriginal or Torres Strait Islander	4 (0.8)	1 (0.3)	3 (1.5)

Mixed / multiple ethnicity groups	28 (5.5)	20 (6.4)	8 (4.0)
Other ethnicity group/s	6 (1.2)	4 (1.3)	2 (1.0)
Household income (per week)			
$1500/£819 or more	49 (9.6)	29 (9.3)	20 (10.0)
$1000-$1499/£546-£818	116 (22.7)	78 (25.1)	38 (18.9)
$500-$999/£273-£545	115 (22.5)	69 (22.2)	46 (22.9)
$1-$499/£0.60-£272	201 (39.3)	120 (38.6)	81 (40.3)
Nil/Negative income	8 (1.6)	4 (1.3)	4 (2.0)
Unsure/Don't want to answer	23 (4.5)	11 (3.5)	12 (6.0)
Highest level of education completed			
No formal qualifications	5 (1.0)	2 (0.6)	3 (1.5)
General Education Development tests (GED), General Certificate of Secondary Education (GCSE), School Certificate (or equivalent)	47 (9.2)	21 (6.8)	26 (12.9)
High school diploma, A-levels, or Higher School Certificate (or equivalent)	125 (24.4)	73 (23.5)	52 (25.9)
Technical/ Community college	55 (10.7)	38 (12.2)	17 (8.5)

University degree (undergraduate)	191 (37.3)	122 (39.2)	69 (34.3)
Higher university degree (PhD, Masters, Graduate Diploma)	89 (17.4)	55 (17. 7)	34 (16.9)
Current university/college student	126 (24.6)	73 (23.5)	53 (26.4)
Body Mass Index range (BMI) * kg/m^2			
20-24.9; [a]	98 (19.1)	65 (20.9)	33 (16.4)
25-29.9	112 (21.9)	68 (21.9)	44 (21.9)
30-34.9; [b,c]	95 (18.6)	68 (21.9)	27 (13.4)
35-39.9; [b]	102 (19.9)	58 (18.7)	44 (21.9)
≥40 [a,c]	105 (20.5)	52 (16.7)	53 (26.4)
Confidence in accuracy of self-reported weight (0-100)	92.5 (85.0-100)	95.0 (86.0-100)	90.0 (82.0-98.0)

* Significant difference between groups (i.e. uploaded weight image versus did not upload) identified using chi-square test (p<0.05). BMI categories with the same superscript letter were significantly different using post-hoc two sample test of proportions (p<0.05).

Table 2. Summary of reasons for choosing not to provide an image of weight among young adults in an online longitudinal study (n=114)

Characteristic	**N (%)**
Uploaded an image	
No	103 (90.4)
Can't remember	11 (9.7)
Main reason for not uploading an image	
Did not feel comfortable uploading an image of my weight	48 (42.1)
No access to weighing scales	40 (35.1)
Uploading an image was too much effort	7 (6.1)
Did not have the technology to upload	3 (2.6)
Did not understand the instructions on how to upload	1 (0.9)
Did not have the time	1 (0.9)
I did not see the notification for this component of the study	1 (0.9)
Other	13 (11.4)
Additional reasons for not uploading an image [a]	
No other reason	57 (50.4)
No access to weighing scales	13 (11.6)
Did not feel comfortable uploading an image of my weight	11 (9.7)
Uploading an image was too much effort	10 (8.9)
Did not have the time	9 (8.0)
I did not see the notification for this component of the study	4 (3.5)

Did not have the technology to upload	3 (2.7)
Did not understand the instructions on how to upload	1 (0.9)
Other	10 (8.9)

[a] Sum of percentages >100 as participants could select more than one response to this question

Figure legends

Figure 1. Study participant flow diagram

Figure 2. Bland-Altman Plot of agreement between self-reported and image-captured weight, with trend. Dotted line represents the mean difference and shading represents the limits of agreement (LOA). 95% CI of the mean difference (-1.55, -0.43), upper LOA (7.95, 9.86) and lower LOA (-11.85, -9.93).