Original Paper

Young peoples’ attitudes and motivations towards social media and mobile apps for weight-control: A mixed methods study
Abstract

Background: Effective prevention is critical to halt the obesity epidemic. Mobile-health applications would potentially reach large numbers at low-cost, but there is already a profusion of lifestyle apps, which are mostly non-evidence-based and evidently ineffective against rising obesity prevalence.

Objective: This study explores preferences and usage of lifestyle apps among young people in six countries.

Methods: A mixed-study was conducted among young people aged 13-24-years residing in the UK, Belgium, Finland, Greece, Singapore and New Zealand. Participants were recruited by an online advertisement on Facebook, asking for volunteers interested in mobile apps in general, and not specific to lifestyle or health, to complete a short survey comprised of 18 questions on demographics, weight-gain and mobile app preferences and then to join online asynchronous English-language Focus Groups. Focus groups were held during 2017, in password-protected web-rooms, moderated by an experienced researcher. Descriptive statistics were carried out for the survey and thematic analysis was applied to transcripts.

Results: A total of 2,285 young people (610 ‘adolescents’ aged 13-17 and 1,675 ‘young adults’ aged 18-24) responded to the advertisement and completed the survey with 72.0%, n=1,645 reported being concerned about weight-gain for themselves or friends. Then, 807 young people (376 adolescents and 431 young adults) were selected on the basis of age and country to participate in twelve online focus groups, with 719 young people completing. Thematic analysis of transcripts revealed three main common themes; a) Feelings on weight-changes and weight-gain prevention apps; b) Social media apps, lifestyle apps and motivation for downloading and retaining; c) Confidentiality, data safety and data usage.

Conclusions: Participating young people are commonly, consistently across 6 countries, concerned about weight-gain and obesity. Evidence-based mHealth IT programmes for preventing weight-gain would be well received, provided the views of young people themselves are incorporated in programme content and app design.

Keywords: prevention, weight-gain, young adults, obesity, public health, online focus groups, mobile apps, mhealth
Introduction

Obesity is one of the biggest public health challenges of the 21st century. At least 650 million adults and 340 million youths are currently obese [1], and effectiveness of obesity treatments is rather modest [2]. Effective prevention methods are needed to halt the obesity epidemic.

The transition from adolescence to young adulthood is a critical life-period for obesity development [3,4,5]. We currently have the largest-ever generation of adolescents and young people, and the most vulnerable to obesity and secondary non-communicable diseases (NCDs), in human history [6]. Effective promotion of sustainable health behaviours to prevent obesity must specifically target people where primary prevention is still possible. The prevalence of overweight and obesity (BMI>25kg/m^2) is still relatively low (22.8%) at age 18, rising to 48.6% at age 35 [7]. Body weights rise most rapidly between ages 13-24 years internationally [8,9,10,11,12,13,14]. Those with steeper weight-gain trajectories as young adults will probably be among those reaching BMI>30kg/m^2, now affecting 40% by age 65 in the UK [15].

Adolescence and young adulthood present vital opportunities for intervention, with multiple lifestyle changes for emerging self-determining, financially-independent, young adults outside parental control [16]. Social interactions often centre on heavily-marketed food and drinks, tending to promote greater consumption [17]. Young people tend to be a neglected group from conventional health promotion campaigns, considered ‘hard to reach’ through lack of interface with health information dissemination or engagement with health professionals [18]. The internet has become the dominant mode for communication, information exchange, and increasingly for healthcare delivery. Thus eHealth (electronic technology in healthcare) and its sub-sector mHealth (mobile technology in healthcare) offer numerous advantages above traditional methods [19]. While conventional didactic methods lack reach, innovative eLearning and support can prevent unwanted weight-gain in young adults [20]. Transferring existing online resources with proven effectiveness for weight-gain prevention into mobile applications (“apps”) could reach a much greater proportion of the target population. Near-universal smartphone ownership, projected to reach five billion by 2019, has been matched by increasing availability and access to mHealth apps, mostly for weight-loss and fitness [21]. Mobile app downloads reached 149.3 billion in 2016 [22] and...
over 25,000 apps are currently aimed solely at weight-management [23], but few (0.17%) report having incorporated experts’ and/or users’ inputs during development, and less have been tested for effectiveness, mostly with poor results [24,25]. Efforts to treat established obesity in young people have been rather ineffective [26,27], and there are no apps dedicated, or specifically tailored, to weight-gain prevention for adolescents or adults.

The present study documents the views of young people on weight-gain and its prevention, and their opinions and preferences for development of a weight-gain prevention app, tailored to the needs of young people.

Methods

This study followed an exploratory mixed method design, with an online survey followed by online asynchronous focus groups [28]. The study was approved by the Institutional Ethical Review Board of the Catholic University of Louvain.

Recruitment

Young people were recruited via the advertisement service provided by Facebook (Facebook, Palo Alto, 2017). The advertisements appeared in a pop-up format, in the profiles of those who declared their age to be between 13-24 years and residing in one of six countries/territories where English is either an official language (UK, New Zealand and Singapore) or widely spoken and understood among young people (Greece, Belgium, and Finland). The advertisement invited young people to help guide researchers in building a mobile app, with a link to an online recruitment questionnaire that comprised 18 questions (Appendix 1). Participants were not required to have any particular interest in weight management or health, and no financial or other incentives were offered.

The recruitment questionnaire comprised 18 questions on demographics, personal information including weight, height, smoking habits, current usage of apps, and potential interest in a future mobile app for weight-gain prevention. The collected data were managed by SurveyMonkey (Palo Alto, 2017). Respondents were assured anonymity, but also invited to provide their email address if they wished to participate in an online focus group, in which some of the questions could be discussed further. Those who volunteered to participate in the focus groups were first separated by age-group into adolescents (13-17 years old) or young adults (18-24 years old) and then block-randomised into eight groups by gender and country,
so that these characteristics were uniformly distributed across were groups (Figure 1). No 
incentives were offered for participation. The focus groups were conducted on an online 
platform in password-protected web-rooms (ProBoards, www.proboards.com). The focus 
groups were asynchronous, open 24 hours/day for two weeks to accommodate participants 
from all different time-zones and life/school/work schedules, allowing more views to be 
documented.

Figure 1: Study Procedures for participants completing the survey and those selected to 
participate to the focus groups
The moderator (CKN) posted information on the study, ground-rules on group etiquette, confidentiality, ethical considerations, and consent, and a discussion guide in every web room. The discussion guide (Appendix 2) was created to guide the focus groups, with open-ended questions and prompts to introduce pre-selected topics: current use of lifestyle apps, factors motivating downloading and retaining apps, use of social media, concerns about weight-gain, concerns about environmental and ethical issues around food and drink production and distribution.

The moderator emphasized that all responses were welcomed, that none would be considered right or wrong, but that they were monitored for any inappropriate content or behaviour. Being unable to share facial expressions, which contribute to face-to-face focus groups, participants were encouraged to use emoticons in their postings which were used in the analysis.

Qualitative Analysis

Transcribed data were transferred to software (Nvivo, version 11) for analysis. Thematic analysis was chosen as the most appropriate analytical method, through its ability to identify patterned meanings across a dataset and responses [29]. Coding and analysis was carried out using both inductive and deductive data-driven approaches, as described by Braun and Clark [30]. Analysis of transcripts started with multiple readings by the principal researcher (NKC) to identify key words and phrases. Relevant words and phrases identified were coded, and data were categorised describing main issues reported by participants. All initial codes relevant to the discussion guide and research question were grouped into themes by combining similar codes. ‘Main themes’ emerged from relevant combinations of named themes, each accompanied by a detailed analysis, to explain the salient of the large sections of data collected from the focus groups.

Reflexivity Statement

Reflexivity relates to sensitivity to the ways in which the researcher and the research process may shape the data collected, including the role of prior assumptions and experience. This study was carried out online, hence the researcher had minimal contact with the participants during recruitment and conducting of the focus groups. The participants could enter the web room at any time and from any place, when they felt comfortable to do so. Our study was designed to elicit contributions from a broad range of participants. During the focus group
process, no individual’s views were preferred over those of others. A goal of data analysis was the identification of common themes that emerged from comparison across the focus groups. However, equal importance was attached to the analysis focusing on the details of individuals’ reports relating to specific views and experiences as well as those of the groups as a whole.

150 **Statistical Analysis**
151 Descriptive statistics used SPSS 24 (IBM, Armonk, NY, USA). Differences between groups were tested with the MedCalc statistical software (MedCalc, Belgium). Weight, height, and BMI centiles for adolescents (ages 13-24) were calculated according to the International Obesity Task Force (IOTF) [31].

155 **Results**
156 Over an 84-hour period after posting the Facebook advertisement, 2,285 young people aged 13-24 years responded to the advertisement and completed the survey. Demographic information for those completing the survey are presented in Tables 1 and 2.

159 Young people (72.0%, n=1,645) reported being concerned about weight-gain for themselves or friends, with more young adults (aged 18-24) being concerned than adolescents (aged 13-17) ($x^2=18.6, p<0.0001$). There were no differences between countries among young adults expressing concern about unwanted weight-gain, but there was a greater range for adolescents, for example between Finland (55.4%) and Greece (76.2%). A similar percentage of young people (72.5%, n=1,657) reported being interested in a weight-gain prevention app, again with significantly more young adults being interested in such an app than adolescents ($x^2=11.4, p=0.0007$). Approximately half of the young adults (49.7%, n=833) and one third of the adolescents (31.0%, n=189) reported currently using a lifestyle mobile-app with significantly more young adults currently using one ($x^2=-172.4, p<0.001$). Among young people, there was no difference in the BMI of those who reported using lifestyle apps and those who did not (21.9 kg/m$^2$ to 22.0 kg/m$^2$). Similarly, for adolescents, there was no significant difference in BMI centiles of those who reported using a lifestyle app and those who did not. In adolescents, reported use of lifestyle apps increased with age, from 27.6% at age 13 to 40.8% at age 17 years, ($x^2=23.56, p<0.0001$). There were no differences between countries among young adults for expressing concern about unwanted weight-gain, but there was a greater range for adolescents expressing concern about unwanted weight-gain, eg between Finland 55.4% and Greece (76.2%).
From the 2,285-young people who completed the survey, 807 young people (376 adolescents aged 13-17, and 431 young adults aged 18-24) offered and were contacted to participate in the focus groups, stratified by country and age. Twelve focus group sessions, held in total at the start of 2017, were completed by 719 young people (completion rate=89%). Detailed demographic characteristics of focus group participants are presented in Tables 1 and 2. Due to the large number of participants, some quantitative analysis was possible.

**Table 1:** Demographic characteristics of adolescents completing the survey and those selected to participate in the six online focus groups

<table>
<thead>
<tr>
<th>Survey n=6</th>
<th>Focus group 1 n=58</th>
<th>Focus group 2 n=60</th>
<th>Focus group 3 n=58</th>
<th>Focus group 4 n=57</th>
<th>Focus group 5 n=58</th>
<th>Focus group 6 n=55</th>
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<td>15.0 (1.4)</td>
<td>15.0 (1.4)</td>
<td>15.0 (1.4)</td>
<td>15.0 (1.4)</td>
<td>15.0 (1.4)</td>
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<td>Gender %</td>
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<td>56.9</td>
<td>56.9</td>
<td>64.9</td>
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<td>Weigh (kg), mean (SD)</td>
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<td>58.2 (7.9)</td>
<td>60.9 (8.3)</td>
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<td>Height (m), mean (SD)</td>
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<td>1.64 (0.07)</td>
<td>1.64 (0.07)</td>
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<td>22.4 (2.2)</td>
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<td>15.5</td>
<td>15.8</td>
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<td></td>
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<td>15.5</td>
<td>15.8</td>
<td>15.5</td>
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<td>Belgium % 17.2</td>
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<td>67.2</td>
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<td>Focus group 2 n=76</td>
<td>Focus group 3 n=75</td>
<td>Focus group 4 n=73</td>
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<td>Parents smoking, Yes %</td>
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<td>27.6</td>
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<td>Current use of lifestyle apps Yes %</td>
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<td>36.2</td>
<td>36.2</td>
<td>28.1</td>
<td>32.8</td>
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Table 2: Demographic characteristics of young adults completing the survey and those selected to participate in the focus groups
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<th>(10.3)</th>
<th>(10.5)</th>
<th>(13.5)</th>
<th>(10.4)</th>
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<td>(0.08)</td>
<td>(0.08)</td>
<td>(0.09)</td>
<td>(0.1)</td>
<td>(0.1)</td>
<td>(0.07)</td>
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<td>21.5</td>
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<td>9</td>
<td>(2.6)</td>
<td>(2.8)</td>
<td>(2.9)</td>
<td>(3.9)</td>
<td>92.4</td>
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Main themes

Main themes emerging from both adolescents’ and young adults’ focus groups are identified and presented with a general explanation of findings and exemplar quotes.

Theme 1: Feelings on weight-changes and weight-gain prevention application

Young people reported that weight-changes are of concern for them (n=568, 79% of participants). While most participants were neither overweight nor obese, they considered body weight an important indicator of health and fitness in all countries. To the adolescent participants, weight-changes were considered an important part of the ‘growing-up’ process, but they reported concerns over weight-changes during this time and questioned what is
considered ‘normal’ weight-gain. Adolescents used emoticons expressing negative feelings eg
sad face, face crying on unwanted weight-gain. Adolescents also expressed concerns about
the best way to voice their issues around body-weight, diet and physical activity to parents
and friends, and how it is often hard to make lifestyle choices free from families’ or friends’
influences

“I think I am really fat because previous cloths don't fit me. And I think I am going to get health
problems according to my weight. I do exercise regularly. It would be awesome to have some info on
what is normal weight.” (male, 14 years old, Finland).

“I'm one of the tallest girls in the year, and scared one of the heaviest as well, people keep saying it's
because of your height but is height the only reason or should I be doing more things? I don't think I
eat that much and I already do gym 5 hours a week but is this not enough maybe?” (Female, 13 years
old, New Zealand)

Young adults discussed how weight-changes related to taking full responsibility of their
lifestyle with other significant changes taking place in their lives. were identified as Factors
identified  for  weight-increase  were  the  type  of  food  available  and  its  cost  along  with
promotion of unhealthy food like crisps, chocolate. Increased alcohol consumption in their
life was also another reason identified for weight-gain by young adults residing in the UK
and New Zealand. Emoticons used in this case was mostly that of sad face.

“I put on a lot of weight. Clothes do not fit me. I tried with my friends to lose weight with things like
going for a run but then we would go out drinking so…didn’t lose any weight in the end.” (Male, 22
years old, New Zealand)

Most (n= 546, 76% of participants) said that they would be interested in app access to
electronic information on weight-gain prevention. All young people reported being already
exposed to abundant information on different diets, ‘super-foods’ and physical activity
regimes through websites, magazines, or articles shared through social media. This plethora
of information, often conflicting, was difficult to process, and they would welcome advice
and information from a source they could trust. Young people again used emoticons with the
text. Emoticons used were those of face confused, face spinning, and sad face. Having access
to trustworthy and evidence-based information from what they consider a reliable source was
a very commonly mentioned statement (n=489, 68% of participants). They mistrust and
cannot connect with the general guidelines provided by government agents, but they think
that information coming mostly from independent researchers and healthcare professionals would be trustworthy and real.

“I’m quite lazy and need motivation to exercise and be fit. When living at home, my mum always reminded me of exercising and cooked nice meals. Would really love if someone would message me and maybe motivate each other online?” (Male, 19 years old, Belgium)

Based on previous research on online resources for weight-gain prevention for young people, participants were asked to discuss what type of information they would like to be included in a weight-gain prevention app, by providing the examples used in the previous study (20). Most identified diet as the most important factor for weight-changes, and they said they would like information on what is good to eat without promoting excessive weight-gain) calories, snacks, and ‘normal’ weight-gain trajectories. When asked about environmental and commercial issues around food, they expressed concern over whether chemical or antibiotics had been used, and whether people in certain food sectors are forced to work. These issues/concerns were reported mostly from young people over 16 years old.

Participants also discussed wider geo-political aspects of food practices, especially how corporations producing and handling food affect consumers, society, and the environment including climate change. Adolescents in all countries reported having school lessons on environmental issues, associating certain food habits with environmental issues and current social movements. They wanted better information over how food choices affect the planet, online to reach more people and better-inform decisions on their actions. They proposed either joining existing social movements, or creating new ones, according to local needs and characteristics, to promote ‘Food Citizenship’: “the practice of engaging in food-related behaviors that support, rather than threaten, the development of a democratic, socially and economically just, and environmentally sustainable food system”.

Theme 2: Social media apps, lifestyle apps and motivation for downloading and retaining

Young people reported using apps every day, but most apps used daily are ones linked with social media and instant communication (n=719, 100% of participants) The most popular social media used by young people are Facebook, Instagram, Twitter, and Snapchat. This is a similar finding amongst participants from different countries. Young people reported using Facebook mostly for its messaging service or in closed groups for school work. Instagram is very popular due to its more private nature and a smaller degree of commercialisation they think it has compared to other social media.
“Facebook is kind of dead. Everybody used to have it and most of us will still do but not really for posting anything” (Male, 16 years old, Belgium).

“Instagram hasn’t been flooded with the older generation yet (not everyone has an Instagram), it’s ‘hip’ and “cool. There are no links” (Female, 17 years old, New Zealand)

Young people reported using Twitter for following news and people they are interested in, but not for posting new content of their own as they feel it is less private. Snapchat carries a lot less social pressure, allowing young people to be more authentic, but also both addictive and liberating. They felt closed groups on Facebook were suitable for sharing longer pieces of information on weight-gain prevention, Snapchat or Twitter for short messages.

Young people were not aware of the entire range of lifestyle apps (diet, physical activity) currently available on the market. When they reported using lifestyle apps, these apps were either one of the most popular apps in app shops or were recommended by friends or family.

Young people reported using those for weight-management and increasing/monitoring their physical activity. Some reported using the default lifestyle apps incorporated into their smart phone device. Poor retention for those using lifestyle app apps the main reasons for not continuing to use was mainly related to lack of time ie taking too much time to use and find the information they wanted and receiving frequent and too general reminders which participants found annoying.

“I thought I wanted to have a calorie input thing, so that I can put how many calories I had that day but it took too much time and got bored of it soon” (Female, 23 years old, Singapore)

Theme 3: Data safety and usage, confidentiality

During the discussion on what technical features young people would like in a lifestyle app, the issues of safety, data usage, and confidentiality emerged most frequently. They were particularly concerned about releasing personal details or allowing apps to have access to personal data or other accounts (emails, Facebook etc) on smartphones. They were aware of their ‘digital footprints’. They did not wish to post traceable personal data or opinions, as they may change their mind later, and such posts might disadvantage them in the future.

Online reputation and identity seem to be a very important discussion-point among young people (n=438, 61% of participants). However, they would want some form of support to encourage them to use an app like chat bots, and they were happy to engage with their peers via anonymous online chats or direct messaging.
“Your tweets are easily searchable on Twitter which is ok but not good if you want to be yourself”
(Male, 20 years old, UK)

Data usage with mobile apps was another important issue. Most young people are on a restricted budget with limited mobile data. Despite the high internet coverage, some young people reported not having internet at home due to high cost. It is of great importance to them to avoid draining their battery or mobile data.

“Some apps just take up all my data. Maybe have something like a light version like the one Facebook has, the messenger lite.” (Female, 17 years old, Greece)

Discussion
Principal Results

There is growing interest in web-based approaches for health, under the current WHO Research Agenda, with a view to developing ‘Health in your Pocket’ interventions [32]. The European Commission echos this with calls for a digital Single Market [33]. Obesity has become a global public health issue, affecting both developed and developing countries. Solutions that have the potential to be scaled up to reach large populations are therefore vital.

The digitalised world, which younger generations are in tune with, offers an opportunity for implementing solutions that are affordable that can potentially have global reach [34]. By the year 2020, an entire generation will have grown up in a fully digital world, with computers, internet, smart-phones, and social networking all being second nature.

The young people in our study, from six countries, experience this globalised world in a remarkably similar way, with similar concerns and preferences. Young people are commonly concerned about unwanted weight-gain and would very much welcome advice on prevention with the aid of reliable information sources. Younger generations are reliant on mobile communications. They are well adapted to the digital environment, and also well aware of its potential perils. As experienced users, they want end-products to meet closely their requirements and needs.

Comparison with Prior Work

About one-third of adolescents and half of the young adults reported currently using lifestyle apps. This agrees with a previous study where lifestyle apps were reported to be used by 27.6% of adolescents [35]. Those currently using lifestyle apps mostly use either the most popular apps available in app stores, or those recommended by friends and family. Young
people tend to take up referrals from close friends, family or a trustworthy source, rather than government agencies.

Finding the right motivation to engage with weight-gain prevention tools is critical. A recent study exploring the use of a dietary assessment app found that rewards were a good motivation to use a dietary assessment app [36]. Another study using young adults’ focus groups found that social media and mobile gaming is an acceptable method for increasing vegetable consumption [37]. Creating a user-friendly and engaging mobile app on weight-gain prevention will entail working through the issues reported (safety, cost, online reputation) and the mobile apps content desired by young people should be the next step in app design. Involving young people in the design process, piloting, and marketing creates a sense of ownership to increase their engagement and motivation for using the app.

The results of this study can inform the development of weight-gain prevention programmes and to adapt already available web-resources to suit the needs and preferences of young people.

Limitations

Although the issues appear very similar in the six countries studied, there are limitations. One of the strengths is the inclusion of participants from six different countries where English is widely learned and used, allowing for clear communication and expression of responses. In the present study, only English language was used for the online focus groups. The countries were selected as those where large proportions of young people speak English at a high standard, but the participants may have been individuals with relatively high educational attainment, and their views are not necessarily reflective of non-English speakers in those countries. To overcome partially this issue, we offered the recruitment advertisement in the local language too. The high consistency in results between countries where English is usually the first language across social and educational classes (UK, Singapore, New Zealand) and those where English is more often a second language (Belgium, Greece, Finland) suggests that the results may be widely generalisable. We did not include developing countries where socially determined obesity risks are different and smart-phone ownership is lower.
The present study used a relatively new recruitment method for research, with advertisements posted on social media. This ensured maximum visibility across the participating countries, and unified adoption with the same approach in all countries. The online method allowed for far more young people to participate than traditional focus groups. The advertisements did not mention weight or health, in order to reduce selection bias and to attract a broad range of participants. Both recruitment and conducting methods were low-cost, convenient, and confidential, suited to reaching young people and for addressing sensitive topics such as body weight. There was no requirement for labour-intensive transcription with online focus groups. All focus group methods engage with subsectors of the target population which are interested in the topic and have time available. The online approach allows a wide section to participate, in their own time, but does introduce some limitations. The lack of face-to-face interaction and visual cues to influence discussions has been mentioned, but freedom from shyness allows participants to exchange views more freely, avoids intimidation. Also, participants used emoticons to express their feelings. Young people are especially familiar with the use of emoticons and they feel that emoticons can clarify meaning to the text [38].

Our focus groups were mixed in gender and stratified by age and country. Some researchers have preferred gender-specific focus groups, for fear of males dominating the discussion - the 'peacock effect' [39]. This effect is less likely to occur in an online environment where participants could log in and express views at any time, without threat from others. Online focus groups inevitably have some different characteristics from conventional face-to-face focus groups, being akin to moderated discussion fora, or blogs, and whether they generate the same research information needs separate investigation.

Conclusions

Young people are commonly, and consistently across six countries, concerned about weight-gain and obesity. Applying non-industry evidence-based IT programmes to guide young people towards preventing weight-gain would be well received, provided that the views of young people themselves are incorporated in programme content and app design.

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Conflict of Interest
None disclosed
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