

Measuring young women's self-efficacy for healthy eating: Initial development and validation of a new questionnaire

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Abstract

Healthy eating in women of childbearing age is critical to the health of future generations. Interventions that increase women's dietary self-efficacy may be particularly effective at improving healthy eating. However, no validated tool exists to measure self-efficacy for healthy eating in this specific population. We therefore designed a new questionnaire (the 8-SeED) using a think-aloud study and expert panel consultation. We then pilot-tested the 8-SeED in an interviewer-administered survey of 94 women recruited primarily from community settings. The 8-SeED is an 8-item measure of self-efficacy for healthy eating with promising psychometric properties including internal consistency, convergent, criterion, and divergent validity.

Keywords: self-efficacy, diet, scale, women's health, eating

Introduction

A healthy diet has been defined as one that contains a balance of food groups, including plenty of complex starchy carbohydrates, fruit and vegetables, adequate consumption of dairy and protein products such as lean meats, fish, eggs and beans, and reduced amounts of fat and sugar (NHS Choices, 2015). Conforming to a healthy diet offers several major health benefits, including reduced mortality (Rao, 1989), improved immunological responses (Kau, Ahern, Griffin, Goodman & Gordon, 2011; Maslowski & Mackay, 2011), and reduced risk of coronary heart disease (Hu & Willett, 2002; Kushi et al., 1985) and cancer (Goodwin & Brodwick, 1995; Willett, 1994). However, the global obesity epidemic evidences a decreasing quality of diet (Darnton-Hill, Nishida & James, 2004; Hill & Peters, 1998), especially in women (James, Leach, Kalamara & Shayeghi, 2001). Women's dietary choices are particularly important because of their impact on the growth and development of the foetus and infant, and the associated risks of disease later in the offspring's life (Barker et al. 2013, Barker 2003a). A well-nourished mother is able to provide conditions in utero that promote optimal growth and development which leads to reduced risk of numerous diseases in the offspring, including obesity (Barker 2003b; Sinclair, Lea, Rees & Young, 2006). Improving women's diets might thus be a particularly effective approach to lowering the prevalence of obesity in future generations (World Health Organization, 2000).

Self-efficacy is defined as the belief that one is capable of completing a specific behaviour and has the requisite knowledge and skill to do so (Bandura, 1998). Self-efficacy for eating a healthy diet thus denotes the belief that one can achieve a healthy diet (Bandura, 1986). Self-efficacy has been identified as a good mediator of dietary change in a number of interventions and reviews (Luszczynska & Haynes, 2009; Prestwich et al., 2013; Shaikh, Yaroch, Nebeling, Yeh & Resnicow, 2008). Indeed, in some interventions dietary self-efficacy accounts for over 50% of the variance in dietary behaviour

change (AbuSabha & Achterberg, 1997). Self-efficacy is often targeted in behaviour change interventions that aim to improve diet (e.g. Baird et al., 2014; Barker et al., 2011). A recent review found that ‘stress management’ was a particularly useful technique to promote dietary self-efficacy, followed by prompt self-monitoring of behaviour’, ‘prompt review of behavioural goals’, ‘provide feedback on performance’, ‘provide contingent rewards’, and ‘plan social support/social change’ (Prestwich et al., 2013). Growing evidence that dietary self-efficacy mediates dietary behaviour change suggests behaviour change techniques for enhancing self-efficacy should be a key feature of future interventions. A valid and reliable tool for measuring self-efficacy is needed to facilitate the development and testing of such interventions.

Bandura (2006) suggests that self-efficacy measures should be highly targeted with regard to contextual factors of the behaviour concerned; i.e. questionnaire items should be specific to the target population and all aspects of the behaviour. At present, there is no questionnaire that targets dietary self-efficacy specifically for adult women, despite significant gender differences in dietary perceptions and behaviour (Fagerli & Wandel, 1999; Wardle et al., 2004) and the known impact of women’s diets on the long-term health of their offspring (Barker, 1997). Furthermore, one very commonly-used general scale of dietary self-efficacy was designed specifically for an American culture (the Self-Efficacy for Diet and Exercise Behavior instrument; Sallis, Pinski, Grossman, Patterson & Nader, 1988) and is not well-suited for use in UK settings. We therefore aimed to develop a new questionnaire – subsequently entitled the 8-Item Self-Efficacy for healthy Diet scale (the 8-SeED) – to measure dietary self-efficacy in women of child-bearing age in the UK. The objectives were:

1. To develop a brief questionnaire that has good face validity and is understood by women of childbearing age,
2. To assess its internal consistency, and
3. To assess its convergent, discriminant, and criterion validity.

Methods

This project proceeded in three phases, undertaken from October 2013 to June 2014. First, questionnaire items were developed and collated to form the draft questionnaire. Second, the draft questionnaire was modified following pre-testing using think aloud interviews and an expert panel (Study 1). Third, the questionnaire was pilot-tested for reliability and validity in a face-to-face survey with the target population (Study 2).

All participants gave a priori written, informed consent and were thanked and debriefed on completing the study. The project received ethical approval from the host institution (XXX reference number XXXXX).

Developing the draft questionnaire

Following Bandura's (2006) guidelines, we constructed items asking about self-efficacy for healthy eating with respect to one food group each. We thus operationalised 'eating a healthy diet' as a global construct comprising the aggregate of a series of individual healthy food choices. Pertinent food groups in the target population were identified from the results of a principal components analysis (PCA) of 100 different foods consumed by 6125 women of childbearing age in Southampton (Crozier, Robinson, Borland, & Inskip, 2006). The first principal component Crozier et al (2006) identified described a diet consistent with current guidelines (Foods Standards Agency, 2010; NHS Choices, 2015; Public Health England, 2014). Food groups most strongly associated with this pattern (defined as those with PCA coefficients greater than ± 0.15) were: fruit and vegetables; low-fat or no-fat foods; wholemeal or white bread; fried potatoes; sugar; rice/pasta; and white meats or red and processed meats. We therefore constructed seven draft items, one to assess self-efficacy for making healthy dietary choices regarding each of these food groups (e.g. "How confident do you feel that, if you

wanted to, you could eat five fruit and vegetables each day?”). Other foods (e.g. fish, cheese) were less strongly associated with this pattern and so were not included on the questionnaire for reasons of brevity.

Existing dietary self-efficacy measures for other populations use a variety of response scales. To assess women’s perspectives on response scales, we developed three versions of our draft questionnaire each with identical items but different response scales: an 11-point numerical rating scale ranging from 0 to 10, (0 was labelled ‘not at all confident’, 5 labelled ‘moderately confident’, 10 labelled ‘highly confident’); a 5-point verbal rating scale (‘not confident at all,’ ‘a little confident,’ ‘quite confident,’ ‘mostly confident,’ ‘very confident’); and a 4-point agree-disagree scale (‘strongly disagree,’ ‘disagree,’ ‘agree,’ ‘strongly agree’). Items were slightly reworded for the third response scale such that agreement to statements made sense. Prompt sheets were produced showing each response scale, for the interviewer to show participants when administering the questionnaire face-to-face.

Study 1: Pre-testing the draft questionnaire using think aloud methods

Participants. Nine participants were recruited from the host institution (n=5) and from amongst women attending local Sure Start Children’s Centres (SSCCs) (n=4). SSCCs are local centres that provide a range of support services to families with children under the age of five, and are often situated in disadvantaged areas. They aim to enhance the health and wellbeing of young children, and to reduce the transmission of inequalities in health, poverty and social exclusion (Belsky et al, 2006). Our inclusion criteria were women aged 18-45 years, and our participants ranged in age from 19 to 38 years (M = 26.2, SD = 6.8). Students at the host institution were offered course credit for participation. Participants from SSCCs were recruited during a mothers-only group educating mothers in childcare. All participants indicated that they routinely cooked meals for themselves.

Materials. Questionnaire packs were produced containing all three versions of the draft questionnaire, so that each participant could comment on all three response scales. Within each questionnaire pack the three versions of the draft questionnaire were presented in a randomized order. Each pack also included items assessing relevant background characteristics: age, educational attainment, ethnicity, number of children, whether the participant routinely cooked meals for themselves and/or others such as their family, and special dietary requirements.

Procedure. Individual audio-recorded, think-aloud interviews were conducted by XX. To familiarize participants with think-aloud procedures, they were asked to verbalise their thoughts as they answered ‘warm-up’ questions including ‘How many windows are there in your house?’ Participants were then instructed to complete the questionnaire pack while verbalising their thoughts. On completing the questionnaire pack, participants were asked open-ended questions to elicit their general impressions of the questionnaire and their views about the response scales, whether they found any material confusing, and what they perceived phrases such as ‘*on a regular basis*’, ‘*confidence*’ and ‘*a healthy diet*’ to mean. Recordings were transcribed verbatim.

Analysis. Transcripts were read repeatedly. All talk about each draft questionnaire item was collated, summarised, and reviewed, to identify potentially ambiguous or misleading items. Talk about other key features of the questionnaire (e.g. response scales, instructions) was similarly collated, summarised and reviewed to identify possible improvements.

Study 1: Pre-testing the draft questionnaire using expert panel methods

Participants. Academics at the host institution were invited by email to take part in the expert panel and six agreed. They were selected on the basis of their publications and practical research experience in the fields of self-efficacy, healthy eating, and questionnaire design and included one

professor of medical psychology, three post-doctoral health psychologists and two public health researchers each with at least 3 years' experience.

Materials. Each expert was provided with a questionnaire pack, and seven open-text fields for comments on item content, order, response scales, introductory text, response prompts, design, and any other issues they identified.

Analysis. Comments on each aspect of the questionnaire were collated, summarized and reviewed to identify possible problems with individual items and the other features of the questionnaire. Modifications to the questionnaire were made based on the insights gleaned from the combination of the think aloud interviews and the expert panel, producing the 8-SeED which was used in Study 2.

Study 2: Piloting the questionnaire

Participants. Participants were recruited from the same populations as Study 1 using the same inclusion criteria. Participants from SSCCs were recruited from five centres when they attended groups focusing on encouraging mother-and-child play.

Materials. Questionnaire packs were produced, each containing the 8-SeED (available in Supplementary Material 1) and validating scales. Two measures were included to assess convergent validity. First, a 5-item English version of a scale measuring self-efficacy for changing nutrition habits on a 4-point response scale (Renner & Schwarzer, 2005) used previously in the UK (Baird et al., 2014). Second, a single item assessing global dietary self-efficacy ("How confident do you feel that, if you wanted to, you could eat a healthy diet on a regular basis?"). To assess criterion validity, we included the validated 20-item Food Frequency Questionnaire (FFQ) (Crozier et al., 2010), which gives a prudent diet score where high scores indicates a diet characterized by high levels of consumption of wholemeal bread, fruit and vegetables, and low levels of consumption of sugar, white

bread, and red and processed meat. To assess discriminant validity, we included the validated International Short Form Positive and Negative Affect Scale (PANAS-SF) (Thompson, 2007) which comprises two five-item subscales measuring positive affect and negative affect. Participants' characteristics were assessed as for Study 1. The relative positions of the 8-SeED and the validating measures were randomized within each questionnaire pack to control for order effects between conceptually-related constructs.

Procedure. XX administered the questionnaire pack verbally to individual participants, reading each question aloud, showing the relevant prompt sheet, and recording participants' responses in writing.

Analysis. To determine the factor structure of the 8-SeED, Exploratory Factor Analysis (EFA) was conducted using Principle Axis Factoring with Promax (oblique) rotation (since any emergent factors were expected to correlate highly). The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (value = 0.741) and Bartlett's test of sphericity ($\chi^2 (28) = 139.6, p < .001$) confirmed that factor analysis was appropriate (Field, 2009). Factor solutions with an Eigenvalue greater than one were considered with reference to the scree plot and the internal consistency, distribution and interpretability of the suggested subscales. Internal consistency was assessed using Cronbach's Alpha according to published guidelines (Kline, 2000). Validity was assessed using Pearson's correlation between scores on the 8-SeED (computed as the mean score on constituent items) and the validating measures. In relation to convergent validity, we expected the 8-SeED scores would demonstrate significant positive correlations with scores on the measures of self-efficacy for changing nutrition habits (Renner & Schwarzer, 2005) and global dietary self-efficacy. In relation to criterion validity, we expected the 8-SeED scores would demonstrate significant positive correlations with the prudent diet score from the FFQ (Crozier et al., 2010). In relation to discriminant validity, we expected the 8-SeED would not correlate significantly with the PANAS-SF (Thompson, 2007) as mood and dietary self-

efficacy are conceptually dissimilar. A Bonferroni correction adjusted for multiple significance testing, retaining alpha at 0.05.

Results

Study 1: Pre-Testing the Draft Questionnaire

Individual questionnaire items. The expert panel suggested that double-barrelled items would be problematic and, indeed, the think-aloud participants often answered such items only partially. For example, for the item on one's ability to 'limit the amount of chips and roast potatoes you eat', participants typically only mentioned either chips or roast potatoes: "Um... Chips is a hard one for me" "I'd say 5, because... I quite like roast potatoes [laughs]".

Items which asked participants to 'choose' one food group over another were also problematic. Several think-aloud participants explicitly stated finding such items difficult to answer: "The two separate parts to my question, you know what I mean, whether it was like, you know, the no fat and low fat, or red meat and processed meat, like I say, they were two different things", "choosing is quite a specific thing, I didn't feel like I could be 100% telling the truth if I said 'very confident' or 'mostly confident' because it wouldn't sort of tally up, sort of thing".

Some items included ambiguous terms, which were highlighted by the expert panel and which the think-aloud participants interpreted in different ways. For example, participants did not know whether 'sugar' referred strictly to sugar they added to foods/drinks, or instead more broadly to all sugar in foods/drinks they had: "So, if you have sugar in tea or something, or..."; the term 'choose' sometimes caused confusion: "Um... [Pauses]. Oh... [Pauses]. I wanna say agree, but ... if it comes to a choice, I probably wouldn't wanna choose them"; the term 'on a regular basis' was interpreted in various ways, from occurring at every meal ("Um, on a regular

basis, to me, would mean every meal.”) to more often than not (“I would sort of consider it, doing it, more regular than not.”).

All seven items on the draft questionnaire were modified in response to the think-aloud and expert panel data. Table 1 summarizes these modifications and shows the final eight items included in the 8-SEeD.

Insert Table 1 Here

Response scales. The 5-point response scale garnered the most encouraging feedback and participants particularly liked having a mid-point and having labels for each option: “I think you can get it a bit more spot-on with that one [Scale 2]” and “Um... Probably that one [Scale 2]. Because it had all different confidence.” The 10-point scale polarised opinions. Some participants preferred more options: “Well partly for the reason really, if I was having to compromise between two different things, then that would make it easier to do.” Others did not feel that level of precision was appropriate: “It’s quite overwhelming when you’ve got to do, when it’s stretched out, sort of, into 10 [Scale 1]”. The 4-point response scale was not favored by any of the participants as they disliked having very few response options and not having a mid-point: “Umm... That one [Scale 3] was harder, the ... Because you’ve got less choice. There isn’t a middle ground.” The 5-point response scale was therefore selected for the 8-SEeD.

Other features of the questionnaire. Very few issues emerged with other features of the questionnaire, from either the expert panel or the think aloud participants. When asked directly about their opinions on item order, think-aloud participants were either ambivalent or in favour of the current order: “But yeah, I think the order is really good, it was really simple as well.” No

participant voiced any difficulty understanding the instructions, response prompts, or overall design.

Study 2: Piloting the questionnaire

Participants. Ninety-four women aged 19 to 40 years ($M = 27.0$, $SD = 5.9$) completed the survey. The majority were recruited from SSCCs ($n=68$, 72.3%) with the remainder recruited from the host institution ($n=26$, 27.7%). All participants indicated they routinely prepare their own meals, 66 (70.2%) had at least one child, 72 (76.6%) had post-school qualifications, and 19 (20.2%) reported a special diet (e.g. allergies or intolerances). Two participants who did not eat potatoes (and so did not complete the 8-SeED item pertaining to potatoes) were excluded from the factor analysis.

Factor structure and reliability. Three factors were identified with Eigenvalues above one. However, a one-factor solution was more interpretable than either two- or three-factor solutions. The one-factor solution produced a single eight-item scale that assesses self-efficacy for eating a healthy diet. The two-factor solution produced two subscales assessing self-efficacy for following a diet high in fruit and vegetables (items 1,5,6,7) and a diet high in healthier starch foods (items 2,4,8), but item 3 (assessing added sugar) did not load highly onto either factor. The three-factor solution produced two coherent subscales assessing self-efficacy for following a diet high in fruit and vegetables (items 1,6,7) and a diet high in rice/pasta and potatoes not cooked in oil (items 2,4), and a third subscale which was less coherent, comprising items related to eating a diet low in added sugar, high fat foods, and white bread (items 3,5,8).

The one-factor solution was also consistent with the scree plot and resulted in a scale that had higher internal consistency and a distribution that more closely approximated the Normal distribution (see Table 2). The balance of the evidence favoured the one-factor solution (for factor loadings see

Supplementary Material 2) and so a single scale score was computed (from the mean of all eight items) and used for the validity analyses.

Insert Table 2 Here

Validity. Table 3 shows Pearson's correlations among the 8-SeED and the validating measures. As hypothesized, the 8-SeED was significantly positively correlated with prudent diet ($r = .377$; $p < 0.01$) and global dietary self-efficacy ($r = .494$; $p < 0.01$). Women who had higher self-efficacy for eating a healthy diet according to the 8-SeED also reported actually following healthier diets according to the 20-item FFQ (Crozier et al., 2010) and reported higher self-efficacy for following a "healthy diet" in general. Also consistent with our hypotheses, scores on the 8-SeED were not significantly correlated with current mood as measured on the PANAS-SF (Thompson, 2007). Contrary to our hypothesis, scores on the 8-SeED were not significantly correlated with scores on the self-efficacy for changing nutrition habits scale (Renner & Schwarzer, 2005).

Insert Table 3 Here

Discussion

The 8-SeED was created specifically for use with women of a childbearing age. It was designed to assess self-efficacy for eating a healthy diet (as defined by previous research) and was developed with qualitative input from members of the target population and an expert panel. Problematic issues with the draft questionnaire identified in the development stage were addressed before the questionnaire was piloted in a sample of women predominantly recruited from SSCCs in the local community. Psychometric analyses resulted in a single-scale, 8-item, questionnaire. Scores on the 8-SeED were

approximately Normally distributed with no significant skew or kurtosis and demonstrated acceptable internal consistency, good evidence of criterion and divergent validity, and some evidence of concurrent validity in this sample.

The 8-SeED can be compared to other measures of self-efficacy for dietary behaviours. A very commonly-used scale for dietary self-efficacy, the Self-Efficacy for Diet and Exercise Behavior instrument (Sallis, Pinski, Grossman, Patterson & Nader, 1988) has demonstrated higher values for internal consistency (subscale Cronbach's alpha co-efficients ranging from .85 to .93, Sallis et al 1988) compared to the 8-SeED ($\alpha = .73$). However, some of its items are specific to the social and cultural context in which it was developed (e.g. it assesses self-efficacy to 'stay away from the buffet table at a party', and 13 of 61 items refer to dining out of the home or with guests) making it less suitable for use in the UK compared to the 8-SeED which was developed and validated with UK samples. The English version of the self-efficacy for changing nutrition habits (Renner & Schwarzer, 2005) was included in this study as a validating measure but in our sample it demonstrated low internal consistency ($\alpha = 0.58$) and, unlike the 8-SeED, did not correlate significantly with our measure of prudent diet. Overall, in comparison to other similar questionnaires, the 8-SeED seems to be a very promising measure of dietary self-efficacy particularly for use with UK women of childbearing age.

This study (and the resulting 8-SeED questionnaire) is strengthened by our use of qualitative think-aloud methods and an expert panel to refine questionnaire items before pilot-testing the questionnaire and investigating its psychometric properties using quantitative methods. The think-aloud study and the expert panel identified similar issues despite the very different backgrounds and perspectives of these two groups of participants, which suggests we successfully identified major threats to face and content validity in Study 1. In terms of limitations, the pilot study may have been slightly under-powered for exploratory factor analysis. Published recommendations regarding required

sample size vary but include: at least 10 participants per item (Everitt, 1975), no less than 100 participants (Gorsuch, 1983), and no less than 300 participants (Cattell, 1978). Only the former recommendation was met. The one-factor solution was preferred based on multiple considerations (including interpretability and resulting scale properties) but we acknowledge that it only accounted for 35% of the variance. We were unable to test some important additional psychometric properties of the 8-SeED in this study. Additional work is needed to test its stability (test-retest reliability), sensitivity to change, and predictive validity, and to confirm (using confirmatory factor analysis) that a one-factor solution is most appropriate. The 8-SeED may also be suitable for use in other populations and settings, pending pilot-testing.

In conclusion, the 8-SeED is a new measure of self-efficacy for eating a healthy diet which is suitable for use among women of a childbearing age. It has demonstrated promising psychometric properties in this first validation study. Future studies should test additional psychometric properties (in particular stability and sensitivity to change) before using the 8-SeED to assess changes in self-efficacy as part of interventions to improve healthy eating.

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Conflict of interests

The authors declare that they have no conflicts of interest.

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Table 1. Summary of Changes to Questionnaire Items from Study 1.

Original item	Amended item(s)	Evidence from think-aloud results supporting changes to item	Evidence from expert panel results supporting changes to item
eat 5 fruit and vegetables each day	eat 5 portions of fruit and/or vegetables each day?	Participants found this item easy to understand, and were comfortable with the goal to eat 5 fruits and/or vegetables in a day: <i>“probably a 9 on that, because I like my fruit and veg, so yeah”, “If I wanted to eat more, would I be able to? Um... I’m on about 4 so far”</i> .	The panel suggested the wording should be amended to reference "portions of fruit and/or veg" to be consistent with the wording of common public health messages.
limit the amount of chips and roast potatoes you eat	eat baked potatoes, boiled potatoes, or oven chips instead of fried potatoes, roast potatoes, or fried chips?	Participants would report their score alongside a reference to only one of the foods mentioned in the item (e.g. <i>“Um... Chips is a hard one for me”</i> ; <i>“I’d say 5, because... I quite like roast potatoes [laughs]”</i>). This highlights an issue with how vague the wording of the question was.	Several members of the panel commented that the use of the word 'limit' is ambiguous, as it does not suggest what level to limit consumption to, and thus should be rephrased to be more specific.

Original item	Amended item(s)	Evidence from think-aloud results supporting changes to item	Evidence from expert panel results supporting changes to item
limit the amount of sugar you eat	not eat or drink foods with added sugar, such as fizzy drinks, cakes, biscuits, pastries, and sugar added to hot drinks or cereal?	Participants interpreted what ‘sugar’ referred in different ways, resulting in different reasoning for the score they gave: (e.g. “I have sugar in coffee and stuff, so that might be a problem”; “it’s not as easy as stopping eating one product, but yeah, a whole change across your entire diet”).	As above, the use of the word ‘limit’ was criticised for being vague. Members of the panel suggested more specific item wording would overcome this. The panel also suggested the source of sugar intake the question aims to investigate was vague, and should be specified in more certain terms.
choose to eat rice or pasta dishes	eat rice or pasta often?	The response of one participant was affected by the ambiguous word ‘choose’ in the question (“ <i>Um... [Pauses]. Oh... [Pauses]. I wanna say agree, but ... if it comes to a choice, I probably wouldn’t wanna choose them</i> ”). More specific wording was recommended to overcome this issue.	The panel suggested the word ‘choose’ was open to a range of interpretations, and as such should be reworded to be more specific.
choose low-fat or no-fat products	eat or drink low-fat or no-fat products instead of high-fat or standard products?	Participants referred only to low(er) fat foods in their responses, with no mention of no-fat: (“ <i>I think so many things have got reduced fat anyway</i> ”; “ <i>A 9 on that, because I prefer the lower fat than the fatty stuff.</i> ”).	Again, the use of the word ‘choose’ was criticised, and suggested rephrasing the item was necessary.

Original item	Amended item(s)	Evidence from think-aloud results supporting changes to item	Evidence from expert panel results supporting changes to item
choose vegetable or white meat dishes instead of red or processed meat dishes	eat vegetable dishes or white meat (such as chicken or turkey) instead of red meat (such as beef, pork or lamb)? eat vegetable dishes or white meat (such as chicken or turkey) instead of processed meat (such as sausages, ham, pies, bacon, or chicken nuggets)?	The combination of red and processed meat in the item confused a number of participants, and resulted in their score being affected by another food group mentioned in the question: <i>“The processed meat, it’s not a problem, highly confident, but if it was to choose over the red meat, I would probably come down to a 6 or a 7”, “The processed meat I don’t really eat, because I don’t like it ... Probably be a 5 on that, because I wouldn’t... like to give up the red meat and stuff”</i> . As such, it was suggested this question was split into two, separate items.	As above, the use of the word ‘choose’ was criticised. Additionally, the panel commented the use of several conditional clauses in one question could be confusing to participants and thus elicit a wide range of interpretations. For both of these reasons, the panel suggested the item be split into separate items and rephrased so as to be easier to understand.
choose wholemeal bread instead of white bread	eat wholemeal bread (including 50/50 and <i>Best of Both</i>) instead of white bread?	Participants did not offer any different interpretations of this question, and no participant mentioned any difficulty trying to answer this question.	The use of the word ‘choose’ was criticised, and suggested rephrasing the item was necessary.

Original item	Amended item(s)	Evidence from think-aloud results supporting changes to item	Evidence from expert panel results supporting changes to item
eat a healthy diet	N/A	Participants offered a range of different interpretations as to what a ‘healthy diet’ entailed: <i>“Um, a lot of vegetables, no, no processed foods, um, not really eating out or anything, or no junk food like crisps or... Um. Like sweets”, “I guess less caffeine, less alcohol, and things like that”</i> . This range of interpretations suggests more specific item wording would be necessary.	The panel suggested that this item was much broader than the other items in the scale, and as such may reduce any individual differences in the overall scale scores. As such, the panel recommended the item was kept and used as a comparable measure of dietary self-efficacy, but not included as an item in the present scale.

Note. Italicised text represents quotations from transcripts of think aloud interviews.

Table 2. Comparing One-, Two-, and Three-Factor Solutions for the 8-SeED.

Characteristic	1-Factor Solution	2-Factor Solution		3-Factor Solution		
Variance accounted for	34.9%	52.0%		64.7%		
Subscales	1	1	2	1	2	3
Number of items	8	4	3	3	2	3
Internal consistency (Cronbach's alpha)	0.73	0.72	0.62	0.68	0.63	0.59
Normal distribution (Kolmogorov-Smirnov Z)	1.30	1.48*	1.67**	1.50*	2.04**	1.34
Mean	3.93	3.99	3.87	4.03	4.14	3.69
Standard deviation	0.65	0.77	0.79	0.81	0.90	0.91
Minimum	2.25	2.00	1.50	2.00	1.50	1.33
Maximum	5.00	5.00	5.00	5.00	5.00	5.00
Z ^a Skew	-2.47	-3.24	-3.43*	-2.74	-4.02*	-2.13
Z ^a Kurtosis	-0.50	0.35	0.72	-0.40	0.59	-0.87

*p<.05, **p<.01.

^a Critical value for samples 50<n<300 = 3.29 at p<.05 (Kim, 2013)

Table 3. Reliability, Mean, and Pearson's Correlations between Scores on the 8-SeED and the Validating Measures (n=94)

	Cronbach's alpa	M (SD)	1	2	3	4	5
1. 8-SeED	0.73	3.93 (0.65)	-				
2. Global dietary self-efficacy	N/A	4.07 (0.85)	.494**	-			
3. Self-efficacy for changing nutrition habits (Renner & Schwarzer, 2005)	0.58	14.17 (1.69)	.147	.338**	-		
4. FFQ prudent diet (Crozier et al., 2010)	N/A	0.00 (1.00) ^a	.377**	.254	.017	-	
5. PANAS-SF positive affect (Thompson, 2007)	0.64	18.08 (2.93)	.096	.144	.168	-.043	-
6. PANAS-SF negative affect (Thompson, 2007)	0.74	9.47 (2.95)	-.286	-.281	-.014	-.290	-.180

* p< 0.05. ** p< 0.01 (after Bonferroni correction)

^a FFQ score is computed as a z-score

Supplementary Material 1

The 8-Item Self-Efficacy for healthy Diet scale (8-SeED)

Below we have listed some behaviours related to a healthy diet. Many things can stop us eating a healthy diet, including how much different foods cost and what foods we like and don't like. We want to know your thoughts on eating different foods.

Please indicate on the scale between 1 and 5, as shown on the card, how confident you are that you could do the following things.

How confident do you feel that, if you wanted to, you could...				
1	eat 5 portions of fruit and/or vegetables each day?			
1	2	3	4	5
Not confident at all	A little confident	Quite confident	Mostly confident	Very confident
2	eat baked potatoes, boiled potatoes, or oven chips instead of fried potatoes, roast potatoes, or fried chips?			
1	2	3	4	5
Not confident at all	A little confident	Quite confident	Mostly confident	Very confident
3	not eat or drink foods with added sugar, such as fizzy drinks, cakes, biscuits, pastries, and sugar added to hot drinks or cereal?			
1	2	3	4	5
Not confident at all	A little confident	Quite confident	Mostly confident	Very confident
4	eat rice or pasta often?			
1	2	3	4	5
Not confident at all	A little confident	Quite confident	Mostly confident	Very confident
5	eat or drink low-fat or no-fat products instead of high-fat or standard products?			
1	2	3	4	5
Not confident at all	A little confident	Quite confident	Mostly confident	Very confident
6	eat vegetable dishes or white meat (such as chicken or turkey) instead of red meat (such as beef, pork or lamb)?			
1	2	3	4	5
Not confident at all	A little confident	Quite confident	Mostly confident	Very confident
7	eat vegetable dishes or white meat (such as chicken or turkey) instead of processed meat (such as sausages, ham, pies, bacon, or chicken nuggets)?			
1	2	3	4	5
Not confident at all	A little confident	Quite confident	Mostly confident	Very confident
8	eat wholemeal bread (including <i>50/50</i> and <i>Best of Both</i>) instead of white bread?			
1	2	3	4	5
Not confident at all	A little confident	Quite confident	Mostly confident	Very confident

Supplementary Material 2

Table 1. Item Factor Loadings for 1-Factor Solution

Item	Loading
How confident do you feel that, if you wanted to, you could...	
1. eat 5 portions of fruit and/or vegetables each day?	0.539
2. eat baked potatoes, boiled potatoes, or oven chips instead of fried potatoes, roast potatoes, or fried chips?	0.382
3. not eat or drink foods with added sugar, such as fizzy drinks, cakes, biscuits, pastries, and sugar added to hot drinks or cereal?	0.462
4. eat rice or pasta often?	0.441
5. eat or drink low-fat or no-fat products instead of high-fat or standard products?	0.664
6. eat vegetable dishes or white meat (such as chicken or turkey) instead of red meat (such as beef, pork or lamb)?	0.568
7. eat vegetable dishes or white meat (such as chicken or turkey) instead of processed meat (such as sausages, ham, pies, bacon, or chicken nuggets)?	0.521
8. eat wholemeal bread (including 50/50 and Best of Both) instead of white bread?	0.447