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Identifying the key components of a diet and lifestyle screener for people living with and beyond cancer: an e-Delphi study

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ABSTRACT

Objectives There are currently no validated screeners that evaluate diet and lifestyle of people living with and beyond cancer (PLWBC). The purpose of this study was to reach a consensus among an international expert panel on the essential items to include in this type of instrument.

Design A scientific committee developed the initial list of items, which were presented to an expert panel in a two-round-modified electronic Delphi. Panellists were asked to rate the adequacy, relevance and feasibility of self-reporting each item. Qualitative assessments were encouraged.

Setting Four countries (Spain, UK, USA and Portugal).

Participants Experts working in a cancer-related health profession or cancer-related research were recruited.

Main outcome measures Items were initially categorised into seven domains (body composition, physical activity, diet, alcohol, smoking, sleep and psychosocial distress). A content validity index per item (CVI-i) and a scale-level CVI (S-CVI) were calculated (acceptable≥0.78). All items with a CVI-i≥0.78 were submitted to a final consensus meeting.

Results A total of 108 items were proposed to the panel. In Round 1, 77 items were accepted, 10 items were excluded and 6 new items were proposed. During Round 2, 4 items were accepted and 19 were excluded. Diet and alcohol were merged into one domain. The final consensus meeting decided on 61 items categorised into six domains (S-CVI:0.94): body composition, physical activity, diet and alcohol, smoking, sleep and psychosocial distress.

Conclusions We identified the main items to be considered when developing a screener to evaluate diet and lifestyle in PLWBC in a clinical setting, and the results obtained will guide the content of the screener in the following validation study.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This electronic Delphi study engaged a group of experts from four different countries, with the intention to determine a set of items as standardised as possible.

⇒ Experts presented a wide range of expertise (clinical, research and governmental) in people living with and beyond cancer.

⇒ The response rate in Round 1 was high (93%), whereas it was lower in Round 2 (56%). However, representation regarding expertise was maintained.

BACKGROUND

The rate of cancer survivorship is increasing, mainly due to an ageing population and advances in screening programmes and treatments.[1 2] Traditionally, follow-up of people living with and beyond cancer (PLWBC) has focused on the detection of cancer recurrence or new cancers, but often it does not fully address behavioural and psychosocial elements, which could improve the quality of life (QoL) and decrease the risk of recurrence or second primary tumours,[3 4] and thus may miss important survivor concerns and needs.[5] Therefore, implementing more effective models of care, which support patients and detect their needs, is key in future survivorship care plans.[3]

Although evidence is still not strong enough to make specific recommendations, guidelines issued by the World Cancer Research Fund and the American Institute for Cancer Research (WCRF/AICR) state that, in terms of nutritional and lifestyle factors (body weight, physical activity, diet, alcohol intake and smoking), PLWBC should follow cancer prevention guidelines.[6] These are in line with other recommendations published.[7] In this sense, studies have shown that PLWBC has similar rates of obesity, physical inactivity and unhealthy diets to those without cancer.[8–12] Other modifiable lifestyle considerations are emerging, such as sleeping behaviour and psychosocial distress, whereby a growing body of studies shows that PLWBC often report poor sleep quality and can suffer from varying degrees of mental health issues long after finishing their treatment.[13–17] Thus, it is imperative to work towards creating and implementing effective strategies within the healthcare system to accommodate this increasing need among cancer survivors to ensure adequate long-term follow-up and treatment where required.[2] Although health professionals have acknowledged that patients need guidance on healthy lifestyles, they may not always follow-up on this or do not know how to provide such advice.[18 19]

The European Organisation for Research and Treatment of Cancer QoL Group has developed a 73-item questionnaire (QLQ-SURV100), which assesses physical, mental and social health-related QoL of cancer survivors.[20] Furthermore, similar research into tools able to identify difficulties experienced by PLWBC is being carried out.[21–23] However, to our knowledge, there are currently no validated tools, which measure the main lifestyle modifiable factors (body composition, physical activity, diet and alcohol) and other relevant issues, which may be affected after cancer treatment and can impact QoL.

Thus, we propose the creation of a validated screening tool with the aim to be employed in clinical settings to evaluate diet, lifestyle, sleep and mental health in PLWBC (study protocol published elsewhere[24]). Given the amount of lifestyle factors to be considered, and the need for the screener to be as standardised and universal as possible, it is important to reach a consensus on the items that should be included. For this, we conducted a two-round-modified electronic Delphi (e-Delphi) survey among an international expert panel on the most relevant items to include to ensure an effective screening evaluation of lifestyle behaviours in PLWBC. The results of this study will be of great value to guide the content of the screener.

METHODS

Study design

A scientific committee was set up, which included members with expertise in cancer, nutritional epidemiology and psychometric procedures (AC, LP, JW, DR and AS-A). Collaborative work in several sessions led to the initial list of items proposed for the screener, based on the literature and expert's input (described below in '*Item selection*'). We then administered a two-round-modified e-Delphi survey to collect the opinions of a panel of experts in cancer survivorship to identify consensus on the inclusion and exclusion of items. The Delphi method is widely used in healthcare research and in the development of health-related competencies, with the intention to collect group opinions or judgements to aid informed decision-making.[25 26] The study is presented based on previously published reporting guidelines for Delphi techniques.[27]

Expert panel recruitment

Considering Delphi participant guidelines (including between 15 and 60 participants),[28] the scientific committee organised an international panel by intentional sampling and a total of 29 experts in the field of cancer survivorship working in the USA, UK, Portugal and Spain were invited. Selection criteria included: experts from both genders currently working in a cancer-related health profession (clinical staff and patient organisation) or cancer-related research (research institution, university and government) with a background in body composition, physical activity, diet, alcohol consumption, smoking habits, sleep and mental health. The aim was to obtain opinions and consensus from a range of perspectives to ensure the validity of the items proposed.[25] Experts were invited by email to participate in the study and those who accepted the invitation were directed to the questionnaire via a link included in the email. Panel members were given 2 weeks to answer, and a follow-up reminder was sent 1 week after to maximise participation. A brief demographic questionnaire was administered to all participants to collect information on gender, age, current work and years of experience in the field. Anonymity between panel members was maintained throughout the process.

Patient and public involvement

At this stage of the study, no patients were included. However, the next steps of the research project (face and content validity) will include PLWBC.[24]

Item selection

The initial items (n=108) proposed to be included in the screener were divided into seven domains relating to lifestyle factors: body composition (19 items, eg, body weight history and muscle mass loss); physical activity (seven items, eg, fatigue and physical activity levels); diet (14 items, eg, appetite and diet quality); alcohol intake (six items, eg, type of alcohol and drinking patterns); smoking habits (seven items, eg, past and current smoking habits and secondhand smoking); sleep (19 items, eg, hours of sleeping and medication used) and psychosocial distress (36 items, eg, stress levels, overall mental health and social support). The items proposed were based on the WCRF/AICR Cancer Prevention Recommendations (regarding body weight, physical activity, diet and alcohol and smoking),[6] and on previously published instruments,[29–32] and experts' (oncologists and oncology dietitians) input. All references were made available to the panellists. Furthermore, a set of patient demographic indicators (nine items, eg, age and sex) was also considered. These indicators are not intended to be a part of the screener itself but as accompanying information. The scientific committee validated the initial list, which was sent out to the panel of experts.

Delphi method

A two-round Delphi consultation process was carried out among panellists using a Jotform online survey to collect data (February–March 2024). Participants were informed that the Delphi would be carried out in English, yet translations were available if needed. In each round, panel

Table 1 Statements used to measure level of adequacy, relevance and feasibility of each item

Measurement	Statement
Adequacy	Do you consider that the following items can capture the basic information needed to determine (item) in the context of cancer survivorship?
Relevance	Do you consider asking for the following items that are relevant and important in a short screener aimed at cancer survivors?
Feasibility	Do you consider asking a patient to self-report about the following items that are feasible?

members received an email with a link to the survey, which included a list of items according to their area of expertise together with a six-point Likert scale ranging from 1 (strongly agree) to 6 (strongly disagree). Panellists were asked to rate the adequacy, relevance and feasibility of asking patients to self-report each item proposed in the context of a screener aimed at evaluating aspects, which affect the QoL of cancer survivors (table 1). An open question (text box) was included after each domain; so, experts could provide qualitative assessments (observations) in both rounds, which enabled discussion and the generation of new items. This was particularly important due to the lack of specific instruments for cancer survivors, and thus, qualitative observations were essential to determine the adequacy and feasibility of items in this population. Observations and suggestions received during the first round were used to revise the items and were included in the following round for all panellists to review. In the second round, panellists who participated in the first round received the average ratings of the items, which did not reach consensus together with all the comments made and were asked to rate them again considering the results presented. Ratings were mandatory in both rounds.

Analysis

Responses obtained in each Delphi round were exported and analysed using descriptive statistics (% of each of the six-point Likert scale). Items were either retained or excluded based on agreement consensus, which was decided using the content validity index for each item (CVI-i) considering adequacy, relevance and feasibility. The CVI-i was calculated by dividing the number of experts rating the inclusion of an item (1: strongly agree and 2: agree) by the total number of experts. A scale-level content validity index (S-CVI) was obtained by averaging all the CVI-i scores. A CVI-i and S-CVI score of ≥0.78 was considered acceptable.[33] Items receiving a rating of 3 (slightly agree) or 4 (slightly disagree) underwent further rating, and those receiving a 5 (disagree) or 6 (strongly disagree) were not included in the final list of items. Quantitative (% agreement) and qualitative (observations) data of both rounds were discussed in a consensus meeting with the scientific committee, and a final list of items was constructed.

RESULTS

Geographical and professional characteristics of the expert panel

A total of 29 individuals were invited to participate in the study. The professional background of invited panel members was grouped as follows: epidemiologist (nutrition and cancer; n=2); researcher (physical activity, smoking, sleep, behaviour and cancer; n=8); physical activity expert/physiotherapist (n=9); clinical psychologist (n=8) and clinical dietitian (n=2). Further information can be found in online supplemental table 1. Of these, 27 experts participated in Round 1 (93% response rate) and 15 completed Round 2 (56% response rate). In both rounds, approximately, 80% of the panel members were women, aged between 18 and 59 years old, and the country of main work was Spain, followed by the USA, the UK and Portugal. Half of the participants worked in a clinical setting (47%–56%), followed by a research institution/university (22%–26%), at a patient organisation (13%–15%) or in a government position (7%–13%). In both Round 1 and Round 2, half of them had over 10 years of work experience in their field (41%–53%) (table 2).

Round 1 results

Overall, 108 items were proposed to the panel as indicators of diet, lifestyle and psychosocial distress in PLWBC during the first round. These were initially classified into seven domains, each referring to an individual modifiable lifestyle factor (body composition; physical activity; diet; alcohol intake; smoking; sleep and psychosocial distress). The complete flowchart of the e-Delphi process and item selection is presented in figure 1. Panellists were also asked to give their opinion on clinical characteristics, which could be considered as accompanying information when completing the screener. These items were not considered as a part of the screener, and are, therefore, not included in the overall analysis.

Clinical characteristics

Nine items regarding individual and clinical characteristics (age; sex; gender; cancer and treatment history) of patients were presented, whereby seven obtained a CVI-i of ≥0.78 (0.85–0.96). 'Sex' (CVI-i=0.74) and 'Gender' (CVI-i=0.55) showed lower agreement as to their importance to be included in the screener. Relevant references[34] regarding the use of sex and gender as two separate variables in research were offered during Round 2 to aid the expert panel.

Body composition

For body composition assessment, a total of 19 items were proposed. 12 items referred to body weight history, including individual measurements (weight, height, waist

Table 2 Demographics of the e-Delphi expert panel members

	Round 1 (n=27)	Round 2 (n=15)
Gender	n, (%)	n, (%)
Woman	21 (77.8)	12 (80)
Man	6 (22.2)	3 (20)
Age range, years	n, (%)	n, (%)
18–29	2 (7.4)	3 (20)
30–39	14 (51.9)	7 (46.7)
40–49	7 (25.9)	3 (20)
50–59	4 (14.8)	2 (13.3)
Country of main work	n, (%)	n, (%)
Spain	20 (74)	10 (66.7)
USA	5 (18)	3 (20)
UK	1 (4)	1 (6.65)
Portugal	1 (4)	1 (6.65)
Main current area of work	n, (%)	n, (%)
Research institution/ university	6 (22.2)	4 (26.4)
Clinical staff	15 (55.6)	7 (46.7)
Government	2 (7.4)	2 (13.3)
Patient organisation	4 (14.8)	2 (13.3)
Years of experience	n, (%)	n, (%)
<2	0 (0)	1 (6.67)
2-<5	6 (22.2)	5 (33.3)
5-<10	10 (37.0)	1 (6.67)
>10	11 (40.8)	8 (53.3)

e-Delphi, electronic Delphi; UK, United Kingdom; USA, United States of America.

and hip circumference) and body composition indicators (body mass index, % weight change and anthropometric ratios), and 7 items referred to muscle mass loss. Panellists were reminded that patients would be asked to self-report all questions and no measurement instruments would be used (such as a scale to measure body weight). Overall, 11 items concerning body weight history reached consensus for inclusion in Round 1. 'Current hip circumference' (CVI-i=0.42) was excluded in this round. Although 'Current waist circumference' showed a high CVI-i (0.83), concerns regarding the feasibility of asking patients to self-report it were raised by some panel members and were shared in Round 2. All seven items regarding muscle mass loss (strength loss, difficulty walking and balance) presented a CVI-i of ≥0.78 (0.83–1).

Physical activity

This section was divided into two categories: physical activity (intensity and frequency of physical activity; and motivation, intention and ability to carry out physical activity; five items) and cancer-related fatigue (energy levels and tiredness levels; two items). Four items achieved consensus to be included in the screener (CVI-i=(0.85–0.96)) during the first round. No agreement was reached for the other three ('ability to carry out physical activity' (CVI-i=0.59); 'motivation to carry out physical activity' (CVI-i=0.67) and 'intention to carry out physical activity' (CVI-i=0.74)) and was excluded due to concerns raised by the panel regarding their relevance and feasibility to self-report. Furthermore, a new item was suggested ('body aches and pains'), which was included in Round 2, as well as put forward in the final consensus meeting.

Diet

Diet- and eating-associated issues specific to cancer survivors were explored in Round 1. The initial list of items (n=14) aimed to determine whether the patient presented any substantial difficulties with their dietary habits (difficulties eating or feeding oneself; persistent side effects; changes in appetite and emotional eating) and briefly capture diet quality (intake of specific food groups), mainly based on the WCRF/AICR Cancer Prevention Recommendations.[35] An additional seven questions were included to obtain qualitative observations regarding the grouping of items in the screener (grouping of specific foods; focusing only on cancer-associated food items; specific dietary patterns (eg, Mediterranean and vegetarian); chrononutrition and quantitative vs qualitative assessment of food intake). In the first round, 12 items obtained a high CVI-i (0.92–1), whereas the two remaining ones ('difficulty feeding oneself' (CVI-i=0.75) and 'emotional eating' (CVI-i=0.75)) were carried on to Round 2. Furthermore, five new items ('food insecurity', 'cooking facilities', 'energy to prepare meals', 'frequency of preparing food at home' and 'protein-rich foods') were suggested and were presented to the panel in Round 2. Both the new items and answers to the seven qualitative-type questions were discussed in the final consensus meeting.

Alcohol

A list of six items was compiled with the intention to capture alcohol intake in PLWBC, as well as whether it should be asked together with diet or as a separate factor. These referred to current and past alcohol intake, type of alcohol, patterns of alcohol intake, reasons for drinking and motivation to stop drinking. Three obtained a high CVI-i (0.83–0.92). The remaining three items ('reasons for drinking alcohol'; 'motivation to stop drinking alcohol' and 'past alcohol intake') obtained lower CVI-i scores due to concerns regarding relevance and feasibility to be self-reported, and were, thus, excluded at this point. Furthermore, panellists agreed on including alcohol in the diet section and not as a separate element of the screener.

Smoking

Seven items to assess smoking habits were presented to the panellists in Round 1 (current and past smoking

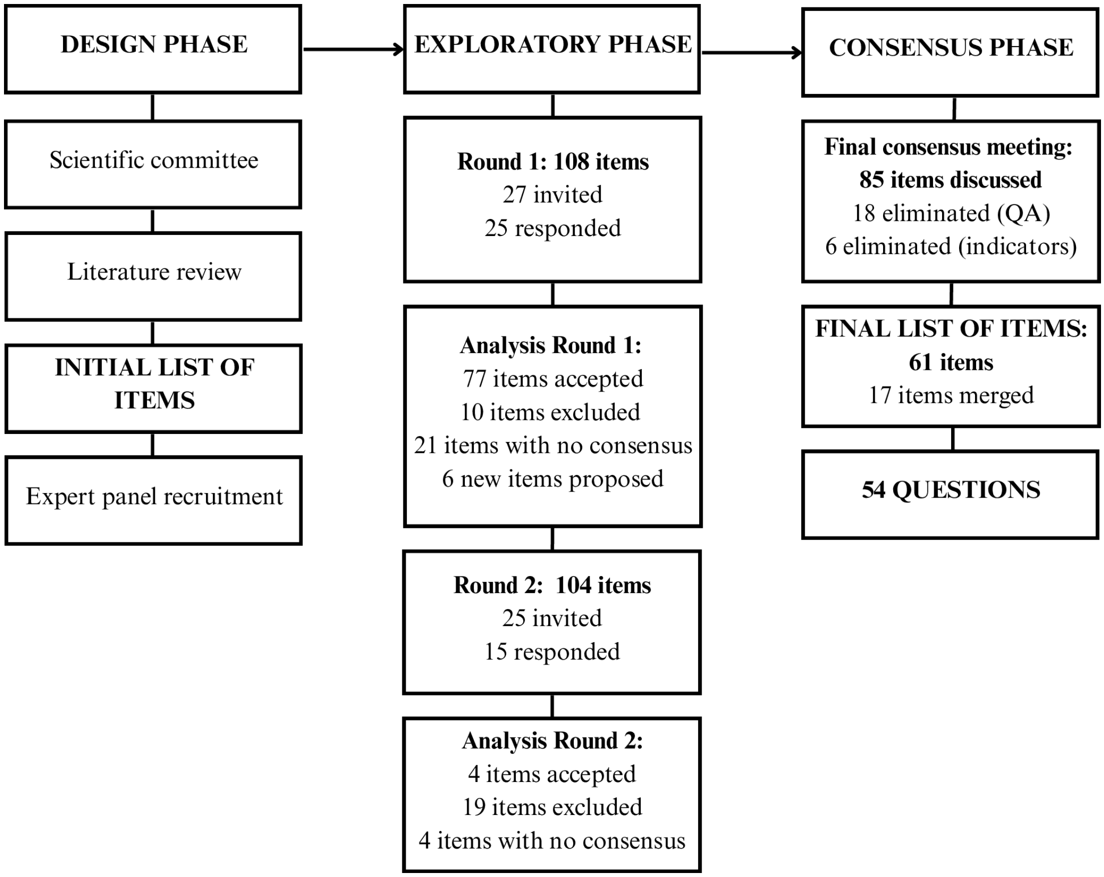

Figure 1 Three phases were involved in the e-Delphi consultation process: design of the questionnaire, item exploration and evaluation through two rounds and a final consensus meeting to review items. e-Delphi, electronic Delphi; QA, qualitative assessment.

habits; type of tobacco; reasons for smoking; motivation to stop smoking and secondhand smoking). Consensus to include was reached for four items, whereas the rest ('reasons for smoking' (CVI-i=0.45); 'motivation to stop smoking' (CVI-i=0.56) and 'secondhand smoking' (CVI-i=0.44)) were not considered relevant for the instrument and were, therefore, excluded.

Sleep

To evaluate sleeping behaviour, 19 items were sent to the expert panel (sleep quality; trouble falling asleep; restlessness and pain during the night; waking up, confusion; difficulty breathing, snoring; medication; trouble staying awake during the day; bed/wake-up times and sleeping partners). Of these, nine were considered acceptable (CVI-i=(0.89–1)) during Round 1 in terms of adequacy, relevance and feasibility. However, the following components were very heterogeneous in rating: 'involuntary movements while sleeping' (CVI-i=0.44); 'episodes of confusion during the night' (CVI-i=0.40); 'difficulty breathing while sleeping' (CVI-i=0.74); 'coughing during the night' (CVI-i=0.66); 'apneas' (CVI-i=0.66); 'snoring' (CVI-i=0.63); 'feeling hot or cold during the night' (CVI-i=0.66); 'sleeping partners' (CVI-i=0.63); 'overall time of actual sleep' (CVI-i=0.63) and 'overall time spent in bed' (CVI-i=0.63). These ten items were carried on to Round 2, together with the qualitative observations made by the panel.

Psychosocial distress

This last domain had the highest number of items due to the nature of its scope (stress, mental health and social support). A total of 36 items were presented, whereby 14 referred to perceived stress levels (feeling worried about the future; not feeling in control; feeling nervous, stressed, irritated and angry; unable to cope and feeling positive/on top of things); 12 to mental health (interest in doing things; feeling down/depressed; difficulties sleeping/sleeping too much; appetite; self-image; intimacy issues and self-harm) and 10 to a patient's social support network (family and friends; emotional support; external sources of support and living arrangements). In terms of stress, nine items reached consensus (CVI-i=(0.79–1)) as to their inclusion. The remaining five ('feeling upset when unexpected events occur' (CVI-i=0.67); 'feeling positive' (CVI-i=0.67); 'feeling irritated easily' (CVI-i=0.67); 'feeling on top of things' (CVI-i=0.46) and 'feeling angry about things that are outside one's control' (CVI-i=0.75)) were carried on to Round 2. Regarding mental health, 11 items reached consensus (CVI-i=(0.79–1)). The only component which had a lower score was 'moving slowly or very quickly' (CVI-i=0.75) and was rated very differently among the panel, and therefore, it was sent again in Round 2. Finally, within the section of social support, 7 out of 10 items received a high consensus level (CVI-i=(0.88–1)), except for 'asking if they have someone, which helps them make decisions' (CVI-i=0.71), 'asking where the support comes from' (CVI-i=0.75) and 'living arrangements' (CVI-i=0.46), which were included in Round 2.

Round 2 results

In the second round, only items that did not reach consensus for their inclusion in the screener during Round 1, together with all the qualitative observations provided, were sent to the panel.

Clinical characteristics

We asked the panel to review the items 'sex' and 'gender' together with the references provided and panellists' comments. The component 'sex' was highly rated to be included (CVI-i=1), whereas although agreement to include gender as an item in the screener increased slightly (CVI-i=0.67), it did not reach the consensus cut-off.

Body composition

Panellists maintained low ratings regarding the feasibility of asking for 'current waist circumference' during Round 2 (CVI-i=0.33), and the item was, thus excluded.

Physical activity

Consensus regarding the inclusion of the new item proposed ('body aches and pains') was agreed on (CVI-i=0.8) in this round.

Diet and alcohol

Diet proved to be the section with most comments in Round 1, with a total of five new items being proposed to the expert panel in Round 2, together with two items ('difficulty feeding oneself' and 'emotional eating'). 'Difficulty feeding oneself' was accepted (CVI-i=1), whereas 'emotional eating' did not reach an acceptable rating (CVI-i=0.67) and was excluded. Of the five new items proposed, two items ('food insecurity' and 'protein-rich foods') received a CVI-i=1, and the remaining three items ('cooking facilities', 'energy to prepare meals' and 'frequency of preparing food at home') presented lower ratings (CVI-i<0.78). All five items were discussed at the final consensus meeting. Since items regarding alcoholic intake did not receive any comments, panellists were presented with the results from Round 1 and were invited to make any additional qualitative assessments. No further suggestions were received. The same occurred for the smoking domain.

Sleep

Ten items regarding sleeping behaviour were sent again to panel members. Of these, only one reached consensus in Round 2 ('overall time spent in bed', CVI-i=0.8) and no agreement was found among others and was, thus, excluded.

Psychosocial distress

Out of the nine items regarding perceived stress, mental health and social support, which were carried on from Round 1, only one was maintained ('feeling on top of things' (CVI-i=0.8)) and the rest were excluded due to low agreement (CVI-i<0.78).

Final consensus meeting

A final consensus meeting was set up with the scientific committee to present quantitative data (consensus of items per round) and qualitative observations (online supplemental table 2) from panellists during both rounds. A list detailing retained and excluded items in broad terms, per round and at the final consensus meeting, can be found in online supplemental table 3, and a flowchart mapping item selection throughout rounds can be found in online supplemental figure 2. From the initial 108 items presented, a total of 10 were excluded in Round 1 and 19 in Round 2. Together with the six new items proposed, 85 items were discussed at the final consensus meeting. The scientific committee decided to eliminate 18 after a qualitative assessment. This included considerations, such as an item being too specific (eg, alcohol intake patterns), not culturally appropriate (eg, food insecurity) or could be assessed in other domains (eg, eating or sleeping patterns overlapped in diet, sleeping behaviour and mental health sections). Of the remaining 67, 6 items were considered indicators (to be calculated from other items) and were, thus, eliminated (eg, body mass index, which is derived from body weight). From the remaining 61, an S-CVI was calculated (S-CVI:0.94). Following this, 17 of these items were merged or grouped (eg, by formulating a question, which included two or more items). This led to a final list of 54 questions (online supplemental table 4) categorised as follows: (1) body composition (n=4); (2) physical activity (n=5); (3) diet and alcohol (n=22); (4) smoking (n=1); (5) sleep (n=7) and (6) psychosocial distress (n=15). A total of five items regarding clinical data (age, sex, type of cancer, year of diagnosis and whether the individual has finished treatment) were suggested to be included as accompanying information.

DISCUSSION

With the rising rate of cancer survivorship,[1 3 5] there is an increasing urgency to offer effective lifestyle strategies to help patients navigate life after cancer. Many survivors face significant physical and psychological side effects, which can profoundly affect their QoL.[20] The range of issues affecting PLWBC is wide, making it complex to assess in the limited time clinical settings offer. This e-Delphi study allowed us to determine the most relevant components to consider when designing a tool aimed at screening diet and lifestyle factors affecting PLWBC and also revealed uncertainty in some of the items presented. Three evaluation criteria were used by experts to assess each item: relevance, adequacy and feasibility. Overall, out of the original 108 items listed, a total of 61 were deemed important to effectively assess diet, lifestyle and psychosocial distress in PLWBC in a screening tool.

The Delphi method is widely used in healthcare research to develop consensus among experts[26] by means of iteration, controlled feedback, group response and, in the case of an e-Delphi, anonymity, which increases reliability of opinions. Our study includes the nine qualitative evaluation points in four main stages, which have been previously suggested by Nasa *et al*.[26] (1) We identified the problem area (lack of validated screening tools for PLWBC regarding diet and lifestyle behaviours impacting QoL) by means of literature review and group discussion with the pre-established scientific committee. (2) Panel selection was done using predefined criteria and an effort was made to ensure heterogeneity (regarding expertise field—research, clinical staff, education and government; geographical distribution; age and sex). One of the downfalls of an e-Delphi is that the acceptance rate to participate can somewhat be low[26]; however, considering Delphi participant guidelines (including between 15 and 60 participants),[28] we were able to initially engage 29 experts. (3) The e-Delphi herein presented included: anonymity of panellist members throughout the process; controlled feedback, whereby we presented collected data in the form of bar charts and the comments provided by the panel, with any relevant clarifications suggested and iterative discussions using a two-round-modified Delphi protocol, to obtain qualitative observations and consensus. In this sense, the panel involved in this study provided many insightful comments and greatly shared their expertise, which has been invaluable for the decision-making process. (4) The predefined consensus criteria (≥78%) were decided by the scientific committee at the beginning of the study, and panel members were also informed of this cut-off point.

Our study also presents some limitations. The use of an e-Delphi can sometimes result in low participation after only one or two rounds, as previously discussed elsewhere.[25 36] In our study, participation between Rounds 1 and 2 decreased (93% vs 60% participation, respectively), even though reminders to complete the survey were sent to panellists. This reduced attrition could be due to less engagement with the panel, as well as to the burden of questionnaire answering, whereby studies that include a high number of items, such as the present study (108 items), have significantly lower response rates.[37] The reasons for dropping out throughout Delphi rounds are still unclear[36]; however, it presents as an important issue for the validity of the results. It has been suggested that individuals with minority opinions drop out first, leading to an overestimation of consensus.[37] In this sense, the reduced number of panellists in Round 2 could have had an impact on the acceptance of some of the more controversial items, even though the panel was equally distributed in terms of sex, age group, country of work, professional background and years of experience in both rounds. However, it is important to state that all accepted items, together with those new ones put forward by panellists, were discussed in the final consensus meeting and the screener will undergo a content validity study in PLWBC[24] to further validate item relevance.

Items presented to the panel in this study were based on WCRF/AICR recommendations on nutrition and lifestyle for cancer prevention and for PLWBC, together with other components regarding smoking, sleeping behaviours and mental health. These are less explored areas, which are emerging as relevant (modifiable) lifestyle behaviours in PLWBC, but for which there are no standardised guidelines available. Identifying the most relevant items of these less-studied domains is crucial for the effective design of tools for clinical use to effectively evaluate relevant modifiable lifestyle factors to help guide an intervention to improve their lifestyle. Thus, the e-Delphi allowed us to explore and identify the necessary items to include in such an instrument, particularly for those domains for which there are less established recommendations, and confirmed the importance of including sleeping patterns and psychosocial distress in clinical tools for PLWBC. Furthermore, suggestions from the expert panel gave an insight into the organisation of said items when designing the future screener. The next steps include a study in which content validity, construct validity and test–retest reliability will be analysed in PLWBC.[24] A qualitative study involving health professionals, patient organisations and patients (end-users) will inform on key aspects of the screener, such as its perceived usefulness, preferred format (digital and paper) and implementation (clinical settings and patient organisations).[24] Following this, a feasibility–implementation study will be required to determine how to best integrate such a tool in the chosen setting. Furthermore, it is important to note that the future screener may need to be adapted and cross culturally validated for its use in other countries since certain items may not be culturally relevant (eg, food insecurity and food groups) or wording may need to be adapted. In this sense, a simple design of the screener is warranted to facilitate these adaptations.

In conclusion, our study identified 61 items as crucial to be included in a screener to effectively evaluate diet, lifestyle and psychosocial distress in PLWBC. These can be categorised into six domains: body composition, physical activity, diet and alcohol, smoking, sleep and psychosocial distress. Furthermore, insightful suggestions were provided by panel members, which, altogether, will help guide the content of the future screener. Further work will entail the validation of the tool in PLWBC and its subsequent implementation into clinical settings.

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REFERENCES

1 Miller KD, Nogueira L, Devasia T, *et al*. Cancer treatment and survivorship statistics, 2022. *CA Cancer J Clin* 2022;72:409–36.
2 Lagergren P, Schandl A, Aaronson NK, *et al*. Cancer survivorship: an integral part of Europe's research agenda. *Mol Oncol* 2019;13:624–35.
3 Jefford M, *et al*. Cancer Survivorship 2 Improved models of care for cancer survivors. 2022. Available: www.thelancet.com
4 Han X, Robinson LA, Jensen RE, *et al*. Factors Associated With Health-Related Quality of Life Among Cancer Survivors in the United States. *JNCI Cancer Spectr* 2021;5:pkaa123.
5 de Rooij BH, Park ER, Perez GK, *et al*. Cluster Analysis Demonstrates the Need to Individualize Care for Cancer Survivors. *Oncologist* 2018;23:1474–81.
6 Diet and cancer report. WCRF International. Available: https://www.wcrf.org/diet-and-cancer/ [accessed 11 Oct 2021]
7 Rock CL, Thomson CA, Sullivan KR, *et al*. American Cancer Society nutrition and physical activity guideline for cancer survivors. *CA Cancer J Clin* 2022;72:230–62.
8 Mititelu M, Licu M, Neacșu SM, *et al*. An Assessment of Behavioral Risk Factors in Oncology Patients. *Nutrients* 2024;16:2527.
9 Hawkins ML, Buys SS, Gren LH, *et al*. Do cancer survivors develop healthier lifestyle behaviors than the cancer-free population in the PLCO study? *J Cancer Surviv* 2017;11:233–45.
10 Gregory K, Zhao L, Felder TM, *et al*. Prevalence of health behaviors among cancer survivors in the United States. *J Cancer Surviv* 2024;18:1042–50.
11 Zhang FF, Liu S, John EM, *et al*. Diet quality of cancer survivors and noncancer individuals: Results from a national survey. *Cancer* 2015;121:4212–21.
12 Cortés-Ibáñez FO, Jaramillo-Calle DA, Vinke PC, *et al*. Comparison of health behaviours between cancer survivors and the general population: a cross-sectional analysis of the Lifelines cohort. *J Cancer Surviv* 2020;14:377–85.
13 Alanazi MT, Alanazi NT, Alfadeel MA, *et al*. Sleep deprivation and quality of life among uterine cancer survivors: systematic review. *Support Care Cancer* 2022;30:2891–900.
14 Divani A, Heidari ME, Ghavampour N, *et al*. Effect of cancer treatment on sleep quality in cancer patients: A systematic review and meta-analysis of Pittsburgh Sleep Quality Index. *Support Care Cancer* 2022;30:4687–97.
15 Dai S, Mo Y, Wang Y, *et al*. Chronic Stress Promotes Cancer Development. *Front Oncol* 2020;10.
16 Mehnert-Theuerkauf A, Hufeld JM, Esser P, *et al*. Prevalence of mental disorders, psychosocial distress, and perceived need for psychosocial support in cancer patients and their relatives stratified by biopsychosocial factors: rationale, study design, and methods of a prospective multi-center observational cohort study (LUPE study). *Front Psychol* 2023;14:1125545.
17 Mitchell AJ, Ferguson DW, Gill J, *et al*. Depression and anxiety in long-term cancer survivors compared with spouses and healthy controls: a systematic review and meta-analysis. *Lancet Oncol* 2013;14:721–32.
18 Tuinman MA, Nuver J, de Boer A, *et al*. Lifestyle changes after cancer treatment in patients and their partners: a qualitative study. *Support Care Cancer* 2024;32:248.
19 Koutoukidis DA, Lopes S, Fisher A, *et al*. Lifestyle advice to cancer survivors: a qualitative study on the perspectives of health professionals. *BMJ Open* 2018;8:e020313.
20 van Leeuwen M, Kieffer JM, Young TE, *et al*. Phase III study of the European Organisation for Research and Treatment of Cancer Quality of Life cancer survivorship core questionnaire. *J Cancer Surviv* 2023;17:1111–30.
21 Agbejule OA, Hart NH, Ekberg S, *et al*. Development of a self-management support practice framework for addressing cancer-related fatigue: a modified Delphi study. *J Cancer Surviv* 2024;18:972–82.
22 Polo KM, Romero J, Seccurro D, *et al*. Building a Screen for Cancer Survivorship-Occupational Therapy Services (SOCS-OTS): a classical Delphi study. *J Cancer Surviv* 2024;18:1723–31.
23 Duivon M, Lange M, Binarelli G, *et al*. Improve the management of cancer-related cognitive impairment in clinical settings: a European Delphi study. *J Cancer Surviv* 2024;18:1974–97.
24 Chaplin A, Wordsworth J, Prohens L, *et al*. Validation and pilot feasibility study of a novel screener to assess diet, lifestyle and mental health in people living with and beyond cancer: Study protocols. *PLoS ONE* 2025;20:e0323671.
25 Niederberger M, Spranger J. Delphi Technique in Health Sciences: A Map. *Front Public Health* 2020;8:457.
26 Nasa P, Jain R, Juneja D. Delphi methodology in healthcare research: How to decide its appropriateness. *World J Methodol* 2021;11:116–29.
27 Spranger J, Homberg A, Sonnberger M, *et al*. Reporting guidelines for Delphi techniques in health sciences: A methodological review. *Z Evid Fortbild Qual Gesundhwes* 2022;172:1–11.
28 Research guidelines for the delphi survey technique. PubMed; 2024. Available: https://pubmed.ncbi.nlm.nih.gov/11095242/

29 Remor E. Psychometric properties of a European Spanish version of the Perceived Stress Scale (PSS). *Span J Psychol* 2006;9:86–93.
30 Calderón C, Ferrando PJ, Lorenzo-Seva U, *et al*. Multidimensional Scale of Perceived Social Support (MSPSS) in cancer patients: psychometric properties and measurement invariance. *Psicothema* 2021;33:131–8.
31 Cano-Climent A, Oliver-Roig A, Cabrero-García J, *et al*. The Spanish version of the Fatigue Assessment Scale: Reliability and validity assessment in postpartum women. *PeerJ* 2017;5:e3832.
32 Sánchez-Rodríguez D, Marco E, Dávalos-Yerovi V, *et al*. Translation and Validation of the Spanish Version of the SARC-F Questionnaire to Assess Sarcopenia in Older People. *J Nutr Health Aging* 2019;23:518–24.
33 Pedrosa I, Suárez-Álvarez J, García-Cueto E. Evidencias sobre la Validez de Contenido: Avances Teóricos y Métodos para su Estimación. *Acción Psicológica* 2013;10:3–18.
34 Gendered innovation 2: how inclusive analysis contributes to research and innovation.
35 World Cancer Research Fund/American Institute for Cancer Research. Diet, nutrition, physical activity and cancer: a global perspective. 2018. Available: https://dietandcancerreport.org/ [Accessed 05 Mar 2024].
36 Schifano J, Niederberger M. How Delphi studies in the health sciences find consensus: a scoping review. *Syst Rev* 2025;14:14.
37 Gargon E, Crew R, Burnside G, *et al*. Higher number of items associated with significantly lower response rates in COS Delphi surveys. *J Clin Epidemiol* 2019;108:110–20.