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ORIGINAL ARTICLE

Construction of a short form of the healthy eating behaviour inventory for the Japanese population

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Summary
Introduction: The present study constructed a short form of the Healthy Eating Behavior Inventory suitable for use in the Japanese culture (HEBI-J) and confirmed the scale's preliminary reliability and validity.
Methods: In Study 1, Japanese adults ($N = 75$) completed a free-response questionnaire about healthy eating behaviours. Thematic analysis was used to identify three factors—balance, pattern, and restriction—associated with healthy eating behaviours and 12 items related to these healthy eating behaviours. In Study 2, Japanese office workers ($N = 784$) completed two questionnaires regarding 12 items of healthy eating behaviours and the dietary stages of change.
Results: Confirmatory factor analysis demonstrated that the three-factor model was appropriate (GFI = .94, AGFI = .90, CFI = .90, RMSEA = .08, SRMR = .53). Reliability was confirmed by alpha coefficients and the Spearman-Brown formula. Concurrent validity was confirmed by the relationship between the healthy eating stages.
Conclusions: This study demonstrated the preliminary reliability and validity of the HEBI-J.

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Introduction

A number of studies have constructed useful scales to assess healthy eating behaviours, including the Dietary Risk Assessment (DRA) [1], Three-Factor Eating Questionnaire (TFEQ) [2], Dutch Eating Behavior Questionnaire (DEBQ) [3], and Adolescent Food Habits Checklist (AFHC) [4]. As part of establishing validity, these scales have confirmed factor structures. The factors related to healthy and unhealthy eating behaviours in these assessment tools included concerning nutrition intake (fruits, vegetables, fibre, and fat) [1], and emotional or psychological eating (cognitive restraint eating, disinhibition, hunger, restrained eating, emotional eating, and external eating) [2,3]. Each tool has been widely used in basic nutrition research.

Further, in studies of primary prevention lifestyle behaviour-change interventions, it is often necessary for researchers to measure multiple health behaviours (e.g., physical activity, eating behaviours, drinking alcohol, smoking, and stress) to assess the impact of the intervention. Therefore, lengthy questionnaires are required to cover the variety of psychological and behavioural outcomes. However, Edwards et al. [5] found that using longer questionnaires negatively influenced the rate of return. In multiple behaviour change interventions, including nutrition studies, researchers have attempted to reduce the number of items required. For example, to assess the intervention effect of physical activity and nutrition behaviour changes, multiple single-item measures [6], using a portion of an existing scale [7], and combining part of items from several existing scales [8] have been used. These approaches were necessary to increase the response rate and reduce dropout. However, such actions may affect reliability and validity. In addition to concerns about the length of questionnaires, cross-cultural appropriateness has been questioned for some measures. Previous research indicates that eating behaviours and patterns differ by race [9] and country [10]. Thus, eating behaviour questionnaires should consider cultural background. Therefore, a valid, reliable, and culturally sensitive short assessment tool needs to be developed to measure healthy eating behaviour in the Japanese population.

This study was designed to construct a short form of the Healthy Eating Behavior Inventory, suitable for the Japanese culture (HEBI-J), and confirm its preliminary reliability and validity. Study 1 aimed to identify the factors and components of healthy eating behaviours through qualitative research methods; Study 2 aimed to confirm the scale's factor structure, reliability, and validity.

Study 1

Subjects, materials, and methods

Participants

Questionnaires were mailed to all of the households (4720) in the town of Tokigawa (Saitama prefecture, near the Tokyo area) and 90 were returned. Fifteen incomplete questionnaires were not included in the analyses. The 75 remaining questionnaires were from 26 men and 49 women (mean age = 66.37 years, SD = 11.58; range = 36—95).

Healthy eating behaviour measures

Healthy eating behaviour was assessed using the single, free response question, ''What eating behaviours do you engage in on a daily basis to maintain good health?''

Data analysis

To analyze the responses, we used thematic analysis [11], which identifies the key themes from qualitative data and can contribute to the construction of a new theoretical framework or evaluate the details of an existing model. Data analysis included six phases: (1) becoming familiar with the data, including a continuing review of the answers to create a subjective summary; (2) generating the initial coding categories; (3) searching for themes, including classifying recurrent codes; (4) reviewing the themes and reconfirming the relationship between the themes and each code; (5) defining and naming themes, including generating definitions; and (6) producing a scholarly report of the analysis.

Qualitative data analysis was conducted by a team that included three health psychologists, a primary care public health interventionist, a public health nurse, a national registered dietician, and doctoral students, representing the fields of nutrition and health behaviour change.

Internal and external homogeneity were considered based on the guidelines of thematic analysis [11]. Phases 1 to 3 included duplicate coding by the lead author (TS), who is a psychologist and expert in qualitative research, and a nationally registered dietician (YT). The minimum coding criterion was to extract specific healthy eating behaviours from the respondent's descriptions. In Phase 4, the coherent pattern that was emerging from the Phase 1 to 3 procedures was reviewed by TS and YT. In addition, to confirm internal homogeneity, TS re-read the entire data set to confirm the appropriateness of the themes and check for any additional themes that had been missed in the earlier coding process. After these processes, a public health nurse (MI)