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Health literacy

International application of health literacy measures: Adaptation and validation of the newest vital sign in The Netherlands

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ABSTRACT

Objective: The newest vital sign assesses individual reading and numeracy skills. The aim of this study was to create a Dutch version (NVS-D) and to assess its feasibility, reliability, and validity in The Netherlands.
Methods: We performed a qualitative study among experts ($n = 27$) and patients ($n = 30$) to develop the NVS-D and to assess its feasibility. For validation, we conducted a quantitative survey ($n = 329$). Reliability was assessed by Cronbach's alpha. Construct validity was examined by analyzing association patterns. Receiver operating characteristic (ROC) curves determined optimal cut-off scores.
Results: Cronbach's alpha was 0.76. In accordance with a priori hypotheses we found strong associations between NVS-D, general vocabulary, prose literacy and objective health literacy, and weaker associations between NVS-D and subjective health literacy. A score of $\geq$4 out of 6 best distinguished individuals with adequate versus inadequate health literacy.
Conclusion: The results suggest that the NVS-D is a reliable and valid tool that allows international comparable health literacy research in The Netherlands.
Practice implications: The NVS-D can be applied in research on the role of health literacy in health and health care, and the development of interventions. The methods can be applied in cross-cultural adaptation of health literacy measures in other countries.

1. Introduction

1.1. Health literacy

Health literacy (HL) has been defined as the individual's capacity to assess, understand, and use health information [1]. Inadequate HL is regarded as a common barrier in patient and public health education. It is associated with inadequate understanding of written information, and poor communication with health care professionals [2–4]. In comparison with individuals with adequate HL, those with inadequate HL generally have less knowledge of diseases and treatments, often lack the skills to negotiate the healthcare system, exhibit suboptimal self-management, and have worse health outcomes [5–9].

1.2. The newest vital sign

Appropriate and valid objective measurement of HL is essential for research into the effect of low HL on individual's health and healthcare use, and for investigations of the potential differential effectiveness of (preventive) health care and targeted interventions. Brief and easy-to-use HL measures have been developed in English, including the 'newest vital sign (NVS)', a six-question tool to assess individual's ability to find and interpret information (both text and numerical information) on an ice cream nutrition label [10] (**Box I**). The NVS has been widely used in the US and has recently been validated for use in the UK [11].

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1.3. Cross-cultural applicability of health literacy measures

Cross-cultural adaptation of measurements is important for the development of feasible, reliable and valid HL assessment instruments that allow internationally comparison. We previously translated the NVS into Dutch (NVS-D) and evaluated the applicability of this pilot version among cardiovascular and diabetic patients in The Netherlands [12]. Although the pilot NVS-D appeared to have sufficient psychometric properties, respondents experienced several problems during the assessment. In particular, they did not recognize the nutrition label as one they would find on a container of food in The Netherlands. They also had difficulty calculating quantities of food in "portions," rather than grams, the latter being the standard measure in The Netherlands. Furthermore, ice cream is eaten less often in The Netherlands than in the United States, and we had concern that some patients might not identify with the subject of the test.

Based on that initial study, we concluded that using a simple formal forward-backward translation procedure, as was done in that study, was not sufficient and that the NVS-D needed to be culturally adapted so that its content and format was appropriate for use in The Netherlands [12].

1.4. Objectives of this study

The objectives of the current study, therefore, were (a) to create a new Dutch version of the NVS (NVS-D) that has a format and content suitable for use in The Netherlands, but which also maintains international comparability, and (b) to assess the feasibility of use, reliability, and validity of that new NVS-D.

2. Methods

In the development of the NVS-D we used the protocol that was successfully applied in validation of the UK NVS which consisted of three stages: (1) development of the nutrition label and associated questions; (2) cognitive testing among patients; (3) and validation [11].

2.1. Stage 1: Development label

2.1.1. Selection of the nutrition label

From 10 candidate nutrition labels, we selected two candidate nutrition labels that met the following criteria: (a) the food product is known both in The Netherlands and in other countries; (b) the label should adhere to European guidelines for nutrition labelling; (c) the label should provide numerical values in units that are commonly used in The Netherlands; (d) the amount of information in the label is comparable to the amount of information on the original NVS-US. To be similar to the content of the original NVS, we selected one label from a container of ice cream. To address the concern that patients might not fully identify with an ice cream label, we also selected one label from a container of yoghurt. The two selected nutrition labels were adapted to conform to current Dutch food labelling guidelines, while maintaining the comparability to the NVS-US nutrition label. Questions associated with the labels, similar in content and calculations to those in the original NVS, were developed as well.

2.1.2. Delphi study

We invited expert nutritionists, primary care clinicians, public health specialists, literacy specialists, dieticians and health trainers to participate in a web-based Delphi study. The aim of the Delphi study was to obtain recommendations and advice of a group of experts on the two preliminary NVS-D labels and questions. Members of the expert group were asked to what extent they felt that the proposed labels were accurately recognizable as a current Dutch food label. They were invited to provide suggestions for modification to improve clarity and lay-out, under the restriction that the NVS-D must on the one hand be as Dutch as possible, and on the other hand resemble the US original to allow for international comparability.

Specifically, the experts were asked to indicate (on a 5-point Likert scale) the extent to which the NVS-D questions were clear and comprehensible and matched the questions on the original NVS-US, and whether the numbers in the label and questions were appropriate (e.g. whether the numerical values are suitable for both simple and complex calculations). The experts were also asked to give their preference for the ice cream or yoghurt label. Based on the scores and suggestions from the experts, modifications of the nutrition labels and questions were made and a second round of the web-based Delphi study was performed with the same group of experts.

2.2. Stage 2: Cognitive testing

In this phase we explored the ease of understanding and acceptance of the ice cream and yoghurt labels and associated questions through three series of face-to-face interviews with patients. The respondents were recruited form the outpatient clinic of the Academic Medical Centre in Amsterdam. We used the Three Step Test Interview method to test the NVS-D by observing actual interaction between the instrument and respondents [13].

In the first step, we asked the participant to "think aloud" while completing the NVS-D. We observed and made notes of potential problems experienced in interpreting the questions. In step two, we asked participants to discuss their responses, which yielded information in addition to that obtained in step one. Finally, we asked the participants to answer additional specific questions to assess which product (yoghurt or ice cream) is most recognisable to them (e.g. which product do they eat more often and do they most often see in supermarkets) and which nutrition label they prefer to use in the NVS-D.

After every round of interviews with ten participants, the two nutrition labels and questions were reviewed and revised and another round with ten interviews was conducted. After three rounds, the interviews did not yield new information, and the candidate labels were reduced to one label and six questions. Since both experts and patients did not report any preferences for either the yoghurt or ice cream label, we decided to use the ice cream label for the NVS-D to maintain concordance with the NVS-US and NVS-UK.

2.3. Stage 3: Validation

2.3.1. Procedure

The NVS-D was validated by an online survey and interviews by telephone. Participants for this validation study were drawn from an online test panel of The Netherlands Institute for Health Services Research [14]. Panel members that met the inclusion criteria (age 18–75 years, and ability to read, write and converse in Dutch) were invited for the online survey and telephone interview by participants that agreed to participate in both parts received a link to the online survey and were contacted by telephone after they completed the survey. We chose not to send the NVS-D and SAHL-D by post, since participants could then read the materials beforehand. During the telephone interview participants received an email with the NVS-D and another HL measure (Short Assessment of Health Literacy in Dutch, SAHL-D, see Section 2.3.2) attached as pdf files. This required a certain level of computer skills, but the Adult Literacy and Life Skills Survey