

# Psychometric Validation of a Brief Self-report Measure of Diet Quality: The DASH-Q

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## ABSTRACT

**Objective:** The Dietary Approaches to Stop Hypertension (DASH) diet is recommended for primary and secondary prevention of cardiovascular chronic diseases. This study describes the development, internal consistency, and validation (predictive and convergent) of a population-based, self-report measure (the DASH Quality [DASH-Q]) to assess adherence to the DASH diet among adults.

**Design:** Cross-sectional online surveys to evaluate the psychometric properties of the DASH-Q.

**Participants:** US adults consisting of a national sample (n = 407) and a Southern university sample (n = 405).

**Main Outcome Measures:** Diet quality scores.

**Analysis:** Item and scale psychometric properties were examined using corrected item total correlations and principal component analysis. The authors validated the DASH-Q by examining associations with an existing self-report nutrition scale and other nutrition-related behaviors.

**Results:** The DASH-Q yielded acceptable internal consistency ( $\alpha = .77-.83$ ) in both samples. The DASH-Q scores correlated moderately to strongly with all nutrition-related criteria ( $P < .01$ ), suggesting evidence of predictive and convergent validity. Less than 15% of either sample reported high diet quality.

**Conclusions and Implications:** The DASH-Q had sufficient psychometric robustness for use as a population-based measure. The DASH-Q is recommended as an easily used measure of DASH adherence for populations that need to modify their diet to manage chronic illness.

**Key Words:** DASH, diet, population-based, psychometric, scale development (*J Nutr Educ Behav.* 2016; ■:1-8.)

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## INTRODUCTION

Eating a healthy diet is an essential protective factor for chronic disease onset and management.<sup>1,2</sup> The Dietary Approaches to Stop Hypertension (DASH) diet is a balanced diet designed to lower blood pressure. The DASH diet identifies specific nutrient goals (based on 2,100 cal/d) that include reducing total fat and saturated fat to 27% and 6% of calories, respectively and reducing sodium to 2,300 or 1,500 mg for high-risk individuals. The DASH diet also establishes targets for protein (18% of calories),

carbohydrates (55% of calories), cholesterol (150 mg), calcium (1,250 mg), potassium (4,700 mg), magnesium (500 mg), and fiber (30 g).<sup>3</sup> The DASH diet has been extensively researched in randomized clinical trials as to its effectiveness in improving blood pressure<sup>4</sup> and reducing the risk of type 2 diabetes,<sup>5</sup> other cardiovascular diseases,<sup>6</sup> cancer, and all-cause mortality.<sup>7</sup> However, high concordance with DASH guidelines may be necessary to reduce risk.<sup>8</sup> Because of the increasing prevalence of hypertension, diabetes, and cardiovascular diseases among adults,

it is essential to have a valid, population-based measure to assess DASH adherence.

To date, population-based data concerning dietary activities for chronic disease management are scarce and based on single-item measures. For example, the Behavioral Risk Factor Surveillance System asks respondents with hypertension<sup>9</sup> whether they are changing their eating habits to help lower or control high blood pressure and whether they are cutting down on salt to help lower or control high blood pressure. In response to their diagnosis of hypertension, 73.1% of US adults changed their diet and 72.8% reduced or eliminated the use of salt.<sup>9</sup> However, these data are insufficient to assess the spectrum and level of activities related to diet that may be needed to reduce blood pressure. Dietitians need accurate data to determine the nutritional value of food and the energy consumed. The most rigorous assessments use a 24-hour recall of all foods consumed reported on a detailed food-frequency questionnaire (FFQ), which is often

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followed by in-person collection of biomarkers such as blood or urine (eg, the National Health and Nutrition Examination Survey).<sup>10</sup> Existing measures to assess DASH diet concordance require an FFQ to establish diet adherence.<sup>8,11,12</sup> Although such measures might be ideal from a validity perspective, these dietary assessments are complex, costly to administer, and burdensome for participants.

To measure population-based dietary habits, it is necessary to have simple, easy-to-use tools that can assess diet quality among the 29% of adults in the US who have hypertension,<sup>13</sup> as well as measure change in response to public health interventions intended to improve diet and blood pressure management in this population. The purpose of this study was to report on psychometric analyses for a brief self-report measure of diet quality based on the DASH diet; the authors named this measure the DASH-Q for DASH Quality. This article reports on the development, reliability, and predictive and convergent validity of this measure.

## METHODS

### Previous Scale Development

The researchers had previously developed a comprehensive assessment of hypertension-related self-care behaviors based on the recommendations of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure,<sup>14</sup> the Hypertension–Self-care Activity Level Effects (H-SCALE) measure.<sup>15,16</sup> This tool consists of 31 items assessing the 6 self-care behaviors related to controlling blood pressure: medication adherence, weight management, engaging in physical activity, reducing alcohol intake, avoiding or ceasing tobacco consumption, and eating a healthy diet such as DASH. Each self-care domain forms a separate subscale.

The original DASH diet subscale consisted of 12 items.<sup>15,16</sup> It exhibited weak reliability in clinic- and community-based samples with hypertension. The original DASH subscale items measured intake of salty foods to the exclusion of other nutritional recommendations that are contained in DASH. Furthermore, the face validity of the scale was conceptually compromised by including items asking about practices related to reducing salt intake (eg, not salting food at the

table), as opposed to the frequency of consuming certain foods.

In a follow-up study, the researchers conducted cognitive interviews<sup>17</sup> with 20 adults employed at a large South-eastern university to identify problem items. Based on those findings, 4 items were deleted and 1 item was reworded to include a list of packaged bakery goods (eg, bread, doughnuts, cookies, cakes, or pies). Two items were added to clarify further levels of fruit and vegetable intake. An additional 7 items were developed to better reflect specific nutrition recommendations of the DASH diet (eg, alternate sources of protein). The resulting 17 items were fielded in this study.

### Study Design

The researchers administered an online cross-sectional survey to 2 samples in spring, 2013, with a total of 882 responses. Surveys that were missing responses on  $\geq 1$  items were excluded ( $n = 70$ ); the analytic samples consisted of university employees from the south-eastern US ( $n = 405$ ; here called university) and a national US sample using Amazon's Mechanical Turk (MTURK; [www.mturk.com](http://www.mturk.com)) facility ( $n = 407$ ; here called national). Data were collected using Qualtrics (Qualtrics, LLC; Provo, UT). The surveys were designed with identical formatting, items, response options, and sequencing. Study protocols were approved by the University of North Carolina Charlotte.

### Setting and Participants

To be eligible, participants were required to be aged  $\geq 21$  years, living in the US, and have reading literacy in English. MTURK workers are a large, diverse, online workforce paid a nominal fee for completing online tasks such as responding to marketing or research surveys.<sup>18</sup> A description of the survey task, identical to a recruitment description, is posted as a job. MTURK respondents received \$0.50 for completing the survey, which is consistent with other surveys available through MTURK. For the university sample, a recruitment e-mail was sent to all facilities and administrative staff (not faculty). Administrative staff can include deans and department chairs in addition to support staff. University

respondents received a chance to win 1 of 10 \$50 Amazon gift cards.

### Measures

The researchers collected data on 17 potential DASH subscale items. Two items were included based on the literature<sup>19</sup> but were excluded from these analyses because they asked about activities other than eating specific foods. The remaining 15 items assessed the frequency of eating foods that were consistent with the nutritional requirements of the DASH diet. An example item asked, How many of the past 7 days did you eat beans, peas, or lentils? Response options for all items ranged from 0 to 7 days.

The Dietary Survey Tool (DST)<sup>20</sup> is a validated, self-report screening questionnaire to assess diet quality and nutritional risk among older adults. It consists of 25 items; DST responses are summed and scores range from 0 to 105.

Two items assessed physical and emotional health. One item was: In general, would you say your physical health is ...? Response options range from excellent (5) to poor (1). Participants were also asked whether they had health problems that caused them to eat a restricted diet in some way. Response options were yes or no.

Participants were asked to rate their overall diet quality via a single item with response options ranging from excellent (5) to poor (1). Participants were also asked, How many of the past 7 days did you follow a healthy eating plan? Responses ranged from 0 to 7 days. Three items related to food shopping, nutrition, and cooking were included. The items, Do you do your own grocery shopping? and Do you read nutrition labels? had response options of never (1), sometimes (2), and always (3). The researchers asked, Who prepares your meals? Specifying that they meant assembling ingredients together, not just opening a box or heating something. Response options were: I cook all my own meals, I'm responsible for my meals but I don't cook, Someone else cooks my meals, and I eat out most meals. Responses were categorized into I cook all my own meals and other.

Basic demographic information was collected: age, gender (male or female),

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