Research Article

Development and Validation of Green Eating Behaviors, Stage of Change, Decisional Balance, and Self-Efficacy Scales in College Students

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ABSTRACT

Objective: To develop and validate an instrument to assess environmentally conscious eating (Green Eating [GE]) behavior (BEH) and GE Transtheoretical Model constructs including Stage of Change (SOC), Decisional Balance (DB), and Self-efficacy (SE).

Design: Cross-sectional instrument development survey.

Setting/Participants: Convenience sample (n = 954) of 18- to 24-year-old college students from a northeastern university.

Analysis: The sample was randomly split: (N_1) and (N_2). N_1 was used for exploratory factor analyses using principal components analyses; N_2 was used for confirmatory analyses (structural modeling) and reliability analyses (coefficient α). The full sample was used for measurement invariance (multi-group confirmatory analyses) and convergent validity (BEH) and known group validation (DB and SE) by SOC using analysis of variance.

Results: Reliable ($\alpha > .7$), psychometrically sound, and stable measures included 2 correlated 5-item DB subscales (Pros and Cons), 2 correlated SE subscales (school [5 items] and home [3 items]), and a single 6-item BEH scale. Most students (66%) were in Precontemplation and Contemplation SOC. Behavior, DB, and SE scales differed significantly by SOC ($P < .001$) with moderate to large effect sizes, as predicted by the Transtheoretical Model, which supported the validity of these measures.

Conclusions and Implications: Successful development and preliminary validation of this 25-item GE instrument provides a basis for assessment as well as development of tailored interventions for college students.

Key Words: Green Eating, Transtheoretical Model, Stages of Change (*J Nutr Educ Behav*. 2014;46:324-333.)

Accepted January 2, 2014. Published online March 5, 2014.

INTRODUCTION

The food system encompasses the production, processing, packaging, distribution, preparation, consumption, and waste of food products.[1] Consumer demands for low-cost, convenient foods drive the supply, whereas the promotion and development of convenience foods by the food industry influence consumer choice.[2] Degradation of land and natural resources, as well as greenhouse gas emissions, can be attributed, in part, to some current food system production methods.[3-5]

As the population and demands for food increase, research on the role dietary behaviors have in contributing to environmental degradation is growing. For example, studies demonstrate that consuming a mostly plant-based diet is more environmentally sustainable than consuming a meat-based diet,[3,6,7] because of reduced use of fossil fuels and water.[1,2,6,7] Change in consumer eating patterns is the key to altering the food system,[8] but these changes may be difficult.[2] For example, although reducing meat consumption has beneficial environmental effects, consumers ranked reducing meat consumption as the least environmentally beneficial action they could take.[9]

The literature on sustainable eating behaviors, defined in this study as Green Eating (GE), is growing. Limiting consumption of red meat and following a predominantly plant-based diet,[10-13] reducing intakes of high-fructose corn syrup,[14] eating organic foods,[15] and shopping locally[16-18] are all eating behaviors associated with reduced environmental impacts, and most are consistent with the 2010 Dietary Guidelines for Americans[19] for healthy eating. Evidence supports the association between GE and improved dietary quality in young adults.[20,21]

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http://dx.doi.org/10.1016/j.jneb.2014.01.002

Pro-environmental practices are increasing among higher education institutions in the United States (US).[22] Over 700 US colleges and universities signed a pledge to reduce greenhouse gas emissions and establish a plan to integrate sustainable educational experiences into the curriculum.[23] Educating students about the environmental impacts of their food choices is one way to incorporate sustainability into the curriculum, but validated measures related to sustainability will be needed to assess educational outcomes. A critical step in moving from education to behavior change is to explore the motivational readiness of college-aged individuals to engage in GE.

The Transtheoretical Model (TTM) of behavior change[24] has been used to tailor interventions to improve a range of health behaviors.[25] The central organizing construct of the TTM is the Stages of Change (SOC) that reflect motivational readiness to change a behavior.[26-28] Two additional key TTM constructs are Decisional Balance (DB) and Self-efficacy (SE). Decisional Balance reflects the importance of various advantages (Pros) and disadvantages (Cons) in decisions to adopt a new behavior.[29-32] Situational SE reflects the level of confidence an individual has in engaging in the new behavior and/or maintaining that behavior across challenging situations.[33] Validated measures assessing SOC, DB, and SE provide the necessary foundation for development of TTM-tailored interventions[34]; however, to the authors' knowledge, no such measures have been published for GE.

The current food system is associated with environmental degradation. Moving consumer behavior toward more environmentally conscious eating can change the food system, and college students are an important target for such behavior change interventions. Transtheoretical–tailored interventions have been effective for changing behavior, but they require validated measures. This research aimed to use a sequential approach to measurement development[35] to develop brief, valid, and reliable measures to assess GE behaviors as well as SOC, DB, and SE for GE. Measurement development and validation provides an important foundation for future research and intervention development to promote GE as well as to measure learning outcomes related to sustainability in college curricula.

METHODS

Survey Development and Procedures

A literature review identified 3 common factors that influenced personal decisions to adopt "pro-environmental" or sustainable behaviors: (1) personal health, (2) environmental protection, and (3) social values. Items from existing instruments[9,15,21,36-41] were modified and new items were generated as necessary to reflect GE behavior related to these 3 themes. To assess understanding of the definition of GE, cognitive interviews with 20 college students evaluated the GE definition (see subsequent stage section).[42] These interviews determined that this GE definition was clear and understandable. The researchers generated an initial set of 11 GE items that was found to have good conceptual breadth and content validity by nutrition, psychology, and agricultural science experts at the University of Rhode Island (URI). Similar procedures were used to develop DB (n = 29) and SE (n = 9) items. This set of items was found to be acceptable in structure and format in a pilot survey of university students (n = 76). The URI Institutional Review Board approved all surveys and associated research procedures for human subject protections.

PARTICIPANTS

A 106-item online survey was administered to a volunteer convenience sample (n = 1,056) of students attending URI during October, 2011. All participants consented to the study online; most participants received class credit for survey completion. The current study limited age eligibility to 18–24 years, to reflect a college-aged sample; 73 out-of-age range participants were excluded. Subjects (n = 29) who were missing data for the SOC algorithm for GE (described subsequently) were also excluded. After these exclusions, the final sample size was n = 954.

Measures

Transtheoretical model measures. The researchers assessed SOC using a single self-classification item, consistent with other stage classification systems.[43] Green Eating was defined as "eating locally grown foods, produce that is in season and limited intake of processed foods, consuming foods and beverages that are labeled fair trade certified or certified organic and consuming meatless meals weekly and (if consuming animal products) selecting meats, poultry, and dairy that do not contain hormones or antibiotics." Participants read the definition and chose 1 of the following statements: (Precontemplation) "No, and I do not intend to in the next 6 months"; (Contemplation) "No, but I intend to in the next 6 months"; (Preparation) "No, but I intend to in the next 30 days"; (Action) "Yes, I have been, but for < 6 months"; or (Maintenance) "Yes, I have been for the past 6 months."

Scales reported here used anchored, 5-point, Likert-type response options. Figures 1–3 list items comprising the final scales. The GE Behavior (BEH) scale consisted of 11 items assessing the frequency of sustainable food-related behaviors. Response options included "barely ever to never," "rarely (25%)," "sometimes (50%)," "often (75%)," and "almost always." The DB scale consisted of 29 items reflecting the pros and cons of GE. Participants responded by assessing the importance of each item to their GE decisions, ranging from "not at all important" (1) to "extremely important" (5). Nine items in the SE scale reflected a range of challenging situations ranging from "not at all confident" (1) to "extremely confident" (5). Average scores for each scale were calculated to allow comparison of scales with different numbers of items.

Additional items. The researchers assessed 16 demographic and behavioral items used in previous research studies[43] examining dietary behavior among college students. Reported behaviors were assessed as follows: cups of fruits and vegetables per day: < 1 cup, 1 cup, 2 cups, 3 cups, 4 cups, 5 cups, 6 cups, or ≥ 7 cups; fast-food intake: never, 1–2 times/mo, 3–4 times/ mo, 2–3 times/wk, or every