RESEARCH
Original Research

Beverage Choices of Adolescents and Their Parents Using the Theory of Planned Behavior: A Mixed Methods Analysis

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ARTICLE INFORMATION

Article history:
Submitted 25 June 2015
Accepted 22 October 2015
Available online 11 December 2015

Keywords:
Adolescents
Parents
Sugar-sweetened beverages
Sugary drinks
Theory of Planned Behavior

Supplementary materials:
Table 2 is available online at www.andjrnl.org

http://dx.doi.org/10.1016/j.jand.2015.10.019

ABSTRACT

Background Added sugar intake in the form of sugar-sweetened beverages (SSBs) has been considered a contributor to weight gain and cardiometabolic dysfunction in adults and youth. Adolescents are some of the highest consumers of added sugars, taking in ~16% of their total calories from added sugars with ~40% of these calories coming from SSBs. Food preferences and self-regulation of dietary intake by youth can be influenced by parents.

Objective To evaluate the effectiveness of the Theory of Planned Behavior (TPB) in understanding and predicting adolescents' SSB consumption, identify which constructs are the most important when evaluating SSB consumption in adolescents, and determine whether and how adolescents' beverage choices are influenced by parents' reactions to their beverage choices.

Design Measurements for this cross-sectional study included four record-assisted 24-hour dietary recalls and responses to an SSB-specific TPB questionnaire from 100 adolescents. Consenting parents completed a beverage intake questionnaire, a TPB questionnaire, and the Parent Response to Beverage Choice Questionnaire.

Results The TPB explained 34% of the variance in adolescents' and parents' intention to limit SSBs to <1cup/day. Parents' perceived behavioral control (b=1.35; P=0.002) and adolescents' subjective norms (b=0.57; P=0.001) were the strongest predictors of intention, and intention was the strongest predictor of SSB consumption in both adolescents and parents (b=−37 [P=0.026] and b=−49 [P=0.003], respectively). The TPB explained more variance in parent SSB consumption (R^2=0.38) than adolescents (R^2=0.22). Parents did more discouraging of SSBs and encouraging of non-SSBs. Adolescents' intention to limit SSB consumption moderated the relationship between parents' reactions encouraging SSBs and adolescents' predicted SSB consumption (P=0.021).

Conclusions The TPB explained a small but significant amount of variance in adolescents' SSB consumption. When addressing adolescent SSB intake, people in addition to parents may influence their intentions and SSB consumption.
J Acad Nutr Diet. 2016;116:226-239.

ADOLESCENCE IS A TIME CHARACTERIZED BY DRAMATIC changes psychologically, socially, and physiologically.[1] Despite adolescents' attempts to become autonomous,[2] with greater freedom and responsibility, parents remain primary sources of nourishment physically and emotionally by providing food, economic support, and empathy.[1] More specifically, during adolescence there is greater consumption of energy-dense foods and conventional eating patterns can be shunned,[2,3] potentially resulting in overweight and obesity.

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About one-third of US youth are overweight or obese,[4] and excessive weight gain in youth may track into adulthood and contribute to cardiovascular risk.[5] The development of overweight and obesity in youth may result from overconsumption of added sugars, specifically sugar-sweetened beverages (SSBs),[6] which are beverages that contain added caloric sweeteners and include sugar-sweetened carbonated beverages (soda), energy drinks, sweet tea, sport drinks, and fruit drinks.[7] Ervin and colleagues[8] found that children aged 2 to 18 years consume about 16% of total energy from added sugars with approximately 41% of these calories coming from SSBs.[8] However, the Scientific Report of the 2015 Dietary Guidelines Advisory Committee has recommendations for limiting added sugar intake, which includes SSBs, to a maximum of 10% of daily calories.[9] In adolescents, excessive SSB intake has been

associated with increased risk of diabetes[10] and cardiovascular disease risk.[11]

Youth aged 2 to 19 years consume approximately 155 kcal—about 12 fl oz soda—per day from SSBs,[12] which is in excess of the American Heart Association recommendation of 450 kcal/wk from added sugars.[13] Whereas consumption of soda, previously the highest contributor to SSB intake in adolescents,[14] has recently decreased,[12] 100% fruit juice,[15] sweetened coffee and tea, and sport and energy drink[12] consumption has increased. Sport and energy drink consumption has increased threefold since 1988[14] and continues to rise, especially in adolescents.[12] Sport drink consumption has also been associated with increases in youth body mass index (BMI).[16] The American Academy of Pediatrics recommends that sport and energy drinks not be consumed regularly by adolescents because these beverages can contribute to excessive energy intake.[17]

Parents are known to help mold youth attitudes and beliefs about food and eating practices.[18] Modeling overconsumption and parent feeding practices that are controlling or restrictive have detrimental effects on child BMI[19] and food regulatory behaviors and preferences.[20] Thus, parents may play a crucial role influencing food beliefs and behaviors in adolescents.[21]

Theory-based models for predicting health behaviors may be more successful when examining health behavior change, compared with those not grounded in theory.[22] The Theory of Planned Behavior (TPB)[23] is one psychosocial theory that can be used to address adolescent eating behaviors. According to the TPB, behavioral action occurs from the influence attitude, subjective norm, and perceived behavior control have on intention, the most proximal determinant of behavior.[23] TPB has been successful in predicting and understanding many health-related behaviors,[24-26] and the information gained from application of the TPB can help create customized, relevant, and possibly more effective interventions.[25] A recent review of use of TPB in predicting and understanding youth's diet-related behaviors identified eight publications that investigated sugary drink intake; however, many were conducted outside the United States, have limitations on SSB consumption assessment, and did not directly measure parents' responses to their child's sugary beverage consumption.[27]

The purpose of this investigation was to evaluate the ability of TPB to predict adolescents' and parents' SSB consumption, identify which constructs are the most important when evaluating SSB consumption in adolescents and parents, and determine the degree to which adolescents' beverage choices are associated with parents' reactions to their beverage choices. Also explored was the mediating role TPB played when examining the potential relationship between parental response and adolescent SSB consumption. It is hypothesized that all TPB constructs will be correlated to adolescents' intention, attitude will be the strongest predictor of adolescents' behavioral intention, behavioral intention will be the strongest predictor of adolescents' behavior (ie, SSB intake), adolescents and parents will have different TPB constructs emerge as the most predictive of intention to limit SSB intake, and adolescents' attitudes and intentions will moderate the relationship between parental responses to beverage choices and SSB consumption.

METHODS

A convenience sample of 102 adolescents aged 12 to 18 years was recruited through e-mail listservs, community newspapers, paper flyers, and word of mouth for participation in this cross-sectional investigation. A sample of this size can provide adequate power to detect associations between an individual's nutrient intakes and have the greatest statistical precision when each participant provides 3 days or more of dietary information.[28] Interested adolescents were included once parental permission was obtained and whether they met the specified age criteria; could read, write, and speak English; and were willing to comply with study procedures. Adolescents were targeted in this investigation due to their obesity prevalence rate[4] and known high added sugar and SSB consumption.[8] Furthermore, in the National Health and Nutrition Examination Survey[29] adolescents do not need proxy reporters (ie, parents) when disclosing their dietary intake. Parents accompanying children were also invited to participate and completed questionnaires at their child's first study visit.

This investigation was part of a larger, ongoing dietary assessment trial that included randomizing visit sequences; thus, adolescent participants were randomized to one of two visit sequences, and completed four laboratory sessions within a 1- to 3-week period (Figure 1). During the entire study duration, adolescents completed four 24-hour dietary recalls (24HRs), the TPB questionnaire at two separate visits, a health history questionnaire, and had their height and weight measured. Consenting parents completed a health history questionnaire, the beverage intake questionnaire (BEVQ-15),[30] the TPB tool,[31] the Parent Response to Beverage Choice Questionnaire (Par-B-Q), and had their height and weight measured. For both adolescents and parents, height was measured and recorded in centimeters without shoes using a wall-mounted stadiometer (model 216, Seca), and body weight was measured in light clothing without shoes, to the nearest 0.1 kg using a digital scale (Scale-Tronix). BMI and BMI-for-age percentile were calculated for each adolescent,[32] and BMI was calculated for each parent. Study procedures and questionnaires were pilot tested with three adolescents and their parents; modifications were made according to their feedback. The Virginia Polytechnic Institute and State University Institutional Review Board approved the study protocol. Adolescent participants provided written assent or informed consent depending on age (younger or older than age 18 years, respectively) and parent participants provided informed consent before any data collection.

Adolescent and Parent Beverage Intake Assessment

Adolescents had a record-assisted 24HR administered at each study session. Adolescents' dietary intake is known to vary from day to day[33]; thus, four 24HRs were collected because this has been identified as optimal for examining usual intake of most nutrients and foods in youth.[34,35] Recalls were obtained on nonconsecutive days using the Automated Multiple Pass Method, similar to procedures used in National Health and Nutrition Examination Survey.[29] The Automated Multiple Pass Method provides a more accurate diet recall with decreased subject burden[36] when administered by a trained individual. Participants were provided with a food-recording booklet that was to be used the day before each study