



# A Test of Social Cognitive Theory on Fruit and Vegetable Intake in Indiana High School Students

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## Abstract #P18

**Background:** Bandura's Social Cognitive Theory (SCT) is commonly used to inform nutrition interventions in adolescents, yet relatively few studies have tested the structural paths of the constructs that guide behavior. It is important to test theoretical models, so theory can better inform the design of useful interventions.

**Objective:** To test the structural paths of SCT on self-reported consumption of fruits and vegetables in adolescents.

**Study Design, Settings, Participants:** Cross-sectional survey data were collected from 1,104 high school Family and Consumer Sciences students in Indiana.

**Measurable Outcome/Analysis:** Participants completed a 40-item questionnaire with 3 items about intake of fruits and vegetables and 37 items from validated SCT scales that assessed nutrition-related self-efficacy, intentions, behavioral strategies, outcome expectations, outcome expectancies, situation, and social support. Structural equation modeling was used to test relationships between constructs in SCT and eating fruits and vegetables.

**Results:** There were 707 (64.1%) girls and 397 (35.9%) boys that completed the survey. There were 896 students who self-identified as white (81.2%), 66 as black (6%), 45 as Asian (4.1%), and 98 as other (8.9%). Fit was good for the model (Comparative Fit Index=0.90; Root Mean Square Error of Approximation=0.06). Intentions ( $\beta=0.32$ ;  $P<.001$ ) and behavioral strategies ( $\beta=0.18$ ;  $P=.003$ ) directly affected intake of fruits and vegetables. Self-efficacy ( $\beta=0.37$ ;  $P<.001$ ), social support ( $\beta=0.17$ ;  $P=.001$ ), and outcome expectancies ( $\beta=0.34$ ;  $P<.001$ ) positively influenced intentions, indirectly affecting behavior. Situation did not have a significant effect on intentions ( $\beta=0.04$ ;  $P=.44$ ) or self-efficacy ( $\beta=3.96$ ;  $P=.26$ ).

**Conclusion:** Behavioral strategies and intentions directly influenced consumption of fruits and vegetables. These findings suggest that interventions aimed at high school students will be more successful if they focus on directly targeting behavioral strategies and focus indirectly on improving intentions by increasing self-efficacy.

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## Introduction

Few studies have tested the structural paths of the constructs in SCT that influence behavior. Testing theoretical models is imperative so theory can better guide the design of useful interventions. The aim of this study was to test the structural paths of SCT for the behavior of eating fruits and vegetables by Indiana high school students.

## Methods

This study was part of a larger cluster-randomized control trial conducted within Indiana high school. The Indiana Department of Education created a new nutrition curriculum for Family and Consumer Sciences teachers that included messages from the 2015-2020 Dietary Guidelines for Americans<sup>2</sup>. Their students were surveyed at 2 time points, pre and post intervention. The data used in this study were only collected once, as part of the post-test.

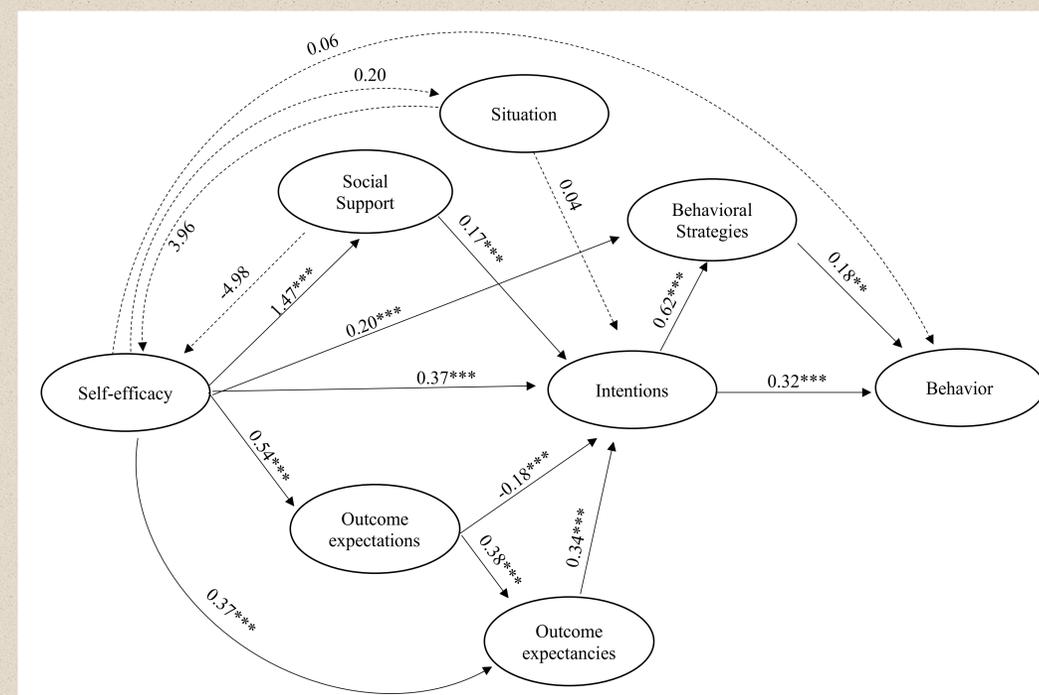
**Surveys:** A 37-item Social Cognitive Theory questionnaire validated by Dewar et al.<sup>3</sup> measured the following constructs: self-efficacy, intentions, situation, behavioral strategies, social support, outcome expectations, and outcome expectancies. The frequency of intake of fruits and vegetables was measured by 3 separate items validated by Hoelscher et al.<sup>4</sup>

**Statistical Analysis:** Cross-sectional data were collected. All students were included, and the treatment group was omitted as a covariate. Structural equation modeling estimated the relative amount that SCT variables interacted with each other and contributed to intentions to eat healthy food and the consumption of fruits and vegetables. Model fit: CFI  $\geq$  .90 and RMSEA  $<$  0.08

Study methods for human subjects were approved by Indiana University IRB, #1803757288

## Results

**Figure 1: Standardized parameter estimates of the structural paths of SCT variables and the consumption of fruits and vegetables (n=1,104)**



Significant paths are solid, nonsignificant paths are dotted, \* $P \leq .050$ , \*\* $P \leq .010$ , \*\*\* $P \leq .001$

## Results

Fit was good for the model with a Comparative Fit Index of .90 and Root Mean Square Error of Approximation of 0.06.

Intentions led to behavior. Adolescents who intended to eat healthier food reported eating more fruits and vegetables.

Intentions were affected by self-efficacy, outcome expectancies, and social support, but not by situation. Situation measured by the survey only captured availability of healthy food *at home*.

Behavioral strategies are a good predictor of behavior.

Self efficacy did not directly impact behavior, but it did influence intentions, outcome expectations, outcome expectancies, social support, and behavioral strategies, indirectly affecting behavior.

## Conclusions

The major strength of the study is the large sample size (n=1,104). The limitations of the study include that the measures of situation, social support, and behavior are limited by the survey questions and that it used cross-sectional data.

Behavioral strategies and intentions directly influenced consumption of fruits and vegetables among high school students in Indiana. Interventions could be more successful if they focus on improving behavioral strategies and self-efficacy. Teaching behavioral strategies can directly affect behavior, whereas increasing self-efficacy could in turn lead to an increase in most of the other constructs, indirectly influencing behavior.

To influence behavioral strategies, encourage shifting, tracking food intake, and planning meals.

To influence self-efficacy, Bandura suggests using mastery experiences (setting small incremental goals to experience success), vicarious experiences (seeing someone similar to you succeed), social persuasion (verbal encouragement), and changing emotional states.

## References

- Glanz K, Bishop DB. The role of behavioral science theory in development and implementation of public health interventions. *Annu Rev Public Health*. 2010;31(1):399-418.
- U.S. Department of Health and Human Services and U.S. Department of Agriculture. *2015 – 2020 Dietary Guidelines for Americans*. 8<sup>th</sup> Edition. December 2015. Available at <https://health.gov/dietaryguidelines/2015/guidelines/>.
- Dewar DL, Lubans DR, Plotnikoff RC, Morgan PJ. Development and evaluation of social cognitive measures related to adolescent dietary behaviors. *Int J Behav Nutr Phys Act*. 2012;9(1):36.
- Hoelscher DM, Evans A, Parcel GS, Kelder SH. Designing effective nutrition interventions for adolescents. *J Am Diet Assoc*. 2002;102(3 Suppl):S52-63.



## Introduction

Interventions based on theory or theoretical constructs are more effective than those that are developed without theory<sup>1</sup>. Bandura's Social Cognitive Theory (SCT) is one of the dominant theories of behavior change that is used in the development of intervention programs.

The central idea in this theory is that health behaviors can be understood in the context of reciprocal determinism, or the continuous interaction between personal factors, environmental influences, and behavior. The core set of determinants of behavior change are self-efficacy, outcome expectations, socio-structural factors, goals, and behavior. Self-efficacy is one's belief in his/her ability to perform a certain task, or behavior. Outcome expectations are the anticipated outcomes of enacting the behavior. Outcome expectancies are the personal value that a person puts on the expected outcome. Socio-structural factors are environmental factors and can act as either facilitators or barriers to the behavior. Goals are a person's intention to perform the health behavior.