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Social-cognitive determinants of fruit and vegetable consumption among Rafsanjan female students, 2018-19: Application of social cognitive theory

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ABSTRACT

Healthy eating habits in childhood and adolescence prevent many chronic diseases and some types of cancer in adulthood. The aim of this cross-sectional study was to investigate factors affecting fruit and vegetable consumption among female students in Rafsanjan (Southern Iran), based on the social cognitive theory (SCT). This study was performed on 516 female students (7th-9th grade) in 2018. The data collection tools included a demographic information questionnaire and fruits and vegetable consumption behavior assessment and its determinants based on SCT. Data were analyzed by SPSS-16 software and independent t-test, one-way ANOVA, Pearson correlation test, and multivariate regression analysis at a significant level of 0.05. The average fruit intake was 3.55±1.88, and vegetable consumption was 3.99±2.60 units per day. The results show a significant positive correlation between SCT and fruit and vegetable consumption (p<0.01). Based on the multivariate regression analysis, Behavioral skills (B=0.163, p<0.001) and understanding of the environment (B=0.201, p<0.001), were the most important predictor of consumption of vegetables and fruit, respectively. More than half of the students consumed less than 4 units of fruit and vegetable per day. Therefore, designing, implementing, and evaluating evidence-based interventions with a focus on social determinants is recommended.

1. Introduction

Many behavioral habits of adults, especially their eating habits, are formed during childhood and adolescence and are less likely to change during later life (1). In addition, healthy eating habits in childhood and adolescence delay complications such as diabetes, cardiovascular diseases, hypertension, low self-esteem, depression, exposure to negative labels and social isolation, and some types of cancer (2-4). One of the consequences of unhealthy dietary habits is obesity, which is the fifth leading cause of death worldwide, and each year over 4 million people die as a result of being obese or overweight (5, 6). Obesity, as a multifactorial disease, has many causes including adopting a Western lifestyle, reduced fruit and vegetable consumption, reduced fiber intake,

genetics (7, 8), metabolic diseases such as hypothyroidism (9), decrease in physical activity, and an increase in sedentary activities including watching television, playing computer games, etc. (10). According to World Health Organization nutritional recommendations, children and adolescents should consume five portions of fruit and vegetable daily (11). Researches point to inadequate intake of fruit and vegetable in adolescents (12, 13). In the United States, 74.1% and 83.8% of 6 to 11-year-olds do not eat enough fruit and vegetable (12). In the study by Ramezankhani et al. (14), the average fruit and vegetable intake among the adolescents of Chaharmahal and Bakhtiari was reported to be 1.45 and 1.47, respectively, which is undesirable compared to the specified standards. Also, in the study by Moeini et al. (15), fruit and vegetable consumption by female students was 3.4 times daily. Nutritional education

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plays an important role in improving nutritional behaviors and promoting fruit and vegetable consumption in students (16). One of the most effective theories used to predict and express healthy behaviors is the social cognitive theory (SCT), which provides a framework for a better and more comprehensive understanding of these behaviors. It can also be used as a guide for the selection of strong determinants of behavior (17). SCT is an interpersonal behavioral theory that demonstrates the psychosocial effects of behavior and reveals the path to behavior change. This theory holds that there are mutual interactions between personal cognitive, behavioral, and physical and social environment as three important factors in the formation of healthy behaviors; knowledge, self-efficacy, outcome expectations, outcome values, environment, self-regulation, situational understanding, and emotional adjustment are the constructs of this theory (18, 19). Accordingly, fruit and vegetable consumption among children depends on Individual factors such as preferences and external factors such as fruit and vegetable availability (17). Given the role of the constructs of this theory with individual and environmental determinants of fruit and vegetable consumption, the present study aims to determine the factors that affect fruit and vegetable consumption based on SCT in female junior high school students in Rafsanjan (Southern Iran).

2. Materials and methods

In this descriptive cross-sectional study, 516 female students of five public junior high schools (7th, 8th, and 9th grade) in Rafsanjan were selected by using a random cluster sampling method. Inclusion criteria included: having 12 to 15 years of age, consent to participate in research, and voluntary student participation. Exclusion criteria included: unwillingness to continue participation, incomplete response to more than 20% of the questions, and reporting more than three standard deviations of behavior. The data collection tool was a three-part questionnaire from the Rakhshanderou research (20), that included nine demographic questions, fruit and vegetable intake during the past seven days, and SCT constructs. Full details about the data collection tool are provided in the appendices and all mean scores are reported out of 100. After coordination with the education department and school authorities, the questionnaire was provided to the students and, after providing complete explanations on how to answer the questions, the weight and height of the students were measured by the researcher with a calibrated scale. The students filled out the questionnaire in the presence of the researcher in 30 to 45 minutes. Data were analyzed using version 16 of the SPSS. At first, the Kolmogorov-Smirnov test was used to test the normality of the data. The collected data were analyzed using independent t-tests, one-way ANOVA, Pearson correlation, and linear regression. The significance level was less than 0.05. In order to comply with ethical considerations, a code of ethics was obtained from the Ethics Committee under IR.RUMS.RED.2017.157 and research project Code 96130 of the Vice Chancellor for Research and Technology at Rafsanjan University of Medical Sciences. In order to avoid disrupting the teachers' work, administrators, and students' curriculum, the necessary coordination was done with the school principal.

3. Results

516 female students from five selected schools with an average age of 14.24±8.14 participated in this study. As results are shown in Table 1, the family size of the students' household was 4.84±1.16 people, and 39.34% of families consisted of four people. 36.7% of the fathers and 33.5% of mothers had a high school diploma. 54.9% of the students' fathers were self-employed, and 79.9% of their mothers were housewives. Almost half of the students described their family income as sufficient. The body mass index (BMI) of the students was 21.12±4.46, and 48.1% had a normal weight and 18.4% were obese and overweight. The mean and standard deviation (SD)

Table 1. The correlation coefficient between fruit and vegetable consumption with SCT constructs.

Factors	Constructs	Mean± SD	Fruit The correlation coefficient (P-value)	Vegetable The correlation coefficient (P-value)
Personal cognitive factors	Knowledge	75.30±15.03	r=0.080 (p=0.08)	r=0.094 (p=0.04)
	Behavioral ability	69.18±11.37	r=0.165 (p=0.0001)	r=0.187 (p=0.0001)
	Outcome expectation	83.73±10.75	r=0.107 (p=0.01)	r=0.215 (p=0.0001)
	Outcome valuation	84.26±9.66	r=0.191 (p=0.0001)	r=0.231 (p=0.0001)
Socioenvironmental factors	Self- efficacy	65.54±13.71	r = 0.151 (p=0.0001)	r=0.239 (p=0.0001)
	Understanding the environment	77.65±9.79	r=0.255 (p=0.0001)	r=0.195 (p=0.0001)
	Observational learning	74.48±10.33	r=0.214 (p=0.0001)	r=0.248 (p=0.0001)
Behavioral factors	Behavioral skills	64.78±15.34	r=0.217 (p=0.0001)	r=0.257 (p=0.0001)
	Social reinforcement	69.81±14.94	r=0.178 (p=0.0001)	r=0.237 (p=0.0001)

fruit consumption was 3.55±1.88 units, and the vegetable consumption was 3.99±2.60 units per day. Less than half of students (42.2%) consumed fruit and 45.6% consumed vegetables more than 4 units per day. There was a significant relationship between mean fruit and vegetable consumption with the father's higher education (p=0.016), father's job (self-employed) (p=0.004), and higher family income (p=0.0001). Other demographic variables such as educational grade, family size, mother's education and occupation, type of housing, and body mass index were not significantly correlated (p>0.05). The mean (SD) of SCT constructs is based on three categories of personal cognitive, behavioral, and physical and social environment factors presented in Table 1. There was a direct and significant correlation between the constructs of SCT with fruit and vegetable consumption, except for knowledge with fruit consumption (p=0.08, r=0.08). Understanding the environment, behavioral skills, and outcome valuation directly predicted 14.5 percent of fruit consumption behaviors. The outcome valuation affecting the understanding of the environment, also indirectly affected the behavior of fruit consumption (Fig. 1).
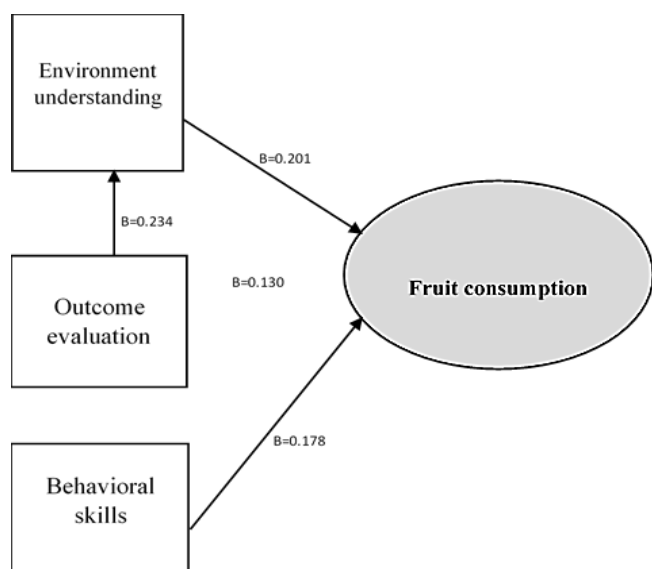

Fig. 1. Influential constructs of SCT on fruit consumption based on linear regression analysis.

Behavioral skills, self-efficacy, and social reinforcement constructs directly predicted 15 percent of vegetable consumption behavior. Changing a score on self-efficacy increased the behavioral skill score by 22 percent, and this variable indirectly affected vegetable consumption by affecting behavioral skills (Fig. 2).

4. Discussion

The average unit of fruit and vegetable consumption in adolescents was lower than recommended by the World Health Organization. Less than half of students consumed fruit and vegetables more than 4 units per day. In other studies, this the amount was lower than recommended (12, 14). There was a significant relationship between the average fruit and vegetable consumption with family income status, and father's job type (self-employed), meaning that students who described their family income status as high had a higher average for fruit and vegetable consumption. In a study by Singh, et al (21),
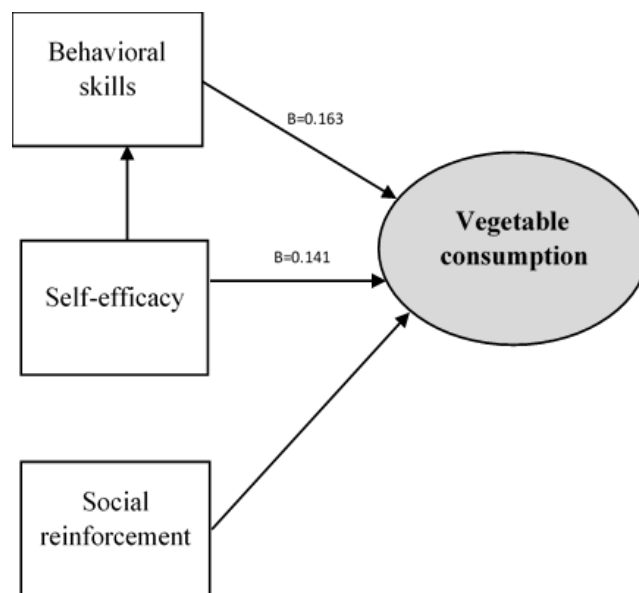

Fig. 2. Influential constructs of SCT on vegetable consumption based on linear regression analysis

household economic status was related to the amount of fruit and vegetable consumption. Environmental factors including the physical and social conditions surrounding the student such as the provision of fruits and vegetables at home, sufficient family income to provide fruit and vegetables with access, and permission for the juvenile to use fruit and vegetables was measured through questions such as: "Are fruit and vegetables available at your home?". This construct had a significant correlation with students' access to fruit and vegetables. Understanding the environment was the strongest predictor of fruit consumption. Various studies confirm the impact of availability on the consumption of healthy food options such as fruit and vegetables (22). In the study by Rakhshanderou (20), the environment was the second important determinant of fruit and vegetable consumption among adolescents. For this reason, it is recommended that authorities make fruit and vegetables available to students at a lower cost, for example, by giving students fruit and vegetable snacks or subsidizing fruit and vegetables for school buffets. Behavioral ability is defined as the knowledge and behavioral skills required to perform the behavior (19). Adolescents' behavioral ability was evaluated through questions such as "Which diseases can be prevented by taking fruit and vegetables?" and "Have you ever washed fruit and vegetables at home yourself?" There was a significant positive correlation between behavioral ability with fruit and vegetable consumption. Behavioral skills were also the first-factor predicting vegetable intake. In Hass and Hartmann's study (23), awareness and cognition of fruit and vegetables were the most important and determining factor for

fruit and vegetable consumption. It is suggested that educational courses on fruit and vegetable consumption are conducted or this content is added to the student's lifestyle lesson so that their knowledge and behavioral skills will be improved. The outcome expectation and valuation are adolescent's expected results of consuming fruit and vegetables, which was assessed through questions such as "Eating fruit and vegetables reduces the risk of cancer in people." Also, these constructs have a significant correlation with fruit and vegetable consumption. Mirkarimi et al. also found a significant positive correlation between outcome expectation and fruit and vegetable consumption (24). The value of the consequence was the third structure influencing fruit consumption. It is suggested that educational classes be held to emphasize the positive effects of fruit and vegetable consumption on the students' academic performance. Observational learning is learning to consume fruit and vegetables by observing the behavior of parents and peers, which was evaluated through questions such as, "When I am with my family members, we eat vegetables every day (breakfast, lunch, dinner)." In many cases, the behavior of parents and peers is considered as a stimulus for similar behavior on the part of the students. Hass and Hartmann's study on German school students showed that the role of parental role model and peer influence had a significant positive relationship with students' fruit and vegetable consumption (23). Considering the effective role of peers in learning to consume fruit and vegetables, it is recommended to be considered the time for fruit and vegetable consumption in schools. Social reinforcement is the encouragement and punishments that teens receive from their parents and peers for fruit and vegetable consumption. The construct was assessed through questions like, "My parents encourage me to eat fruit and vegetables and get upset when I don't". The mean social reinforcement score was 69.81, which was in a relatively desirable condition. similar to the study by Baghernia et al. (25) indicated the relationship between social support and fruit and vegetable consumption. It is recommended to provide a suitable setting for fruit consumption in schools. In this study, self-efficacy refers to adolescents' confidence in their ability to consume fruit and vegetables. Students' self-efficacy in two areas of self-efficacy in difficult situations and self-efficacy in choosing fruit and vegetables in the presence of other items, including snacks and fast foods, was evaluated and tested through questions like, "I can eat even the fruit and vegetables that I don't like". In addition to the correlation with fruit and vegetable consumption, this variable was the second predictor of vegetable consumption. Self-efficacy was the third leading determinant of fruit and vegetable consumption in Rakhshanderou 's study (20). Also, the models presented in the study by Lubans et al. (26) have shown that self-efficacy has a positive relationship with healthy eating behaviors and inversely correlate with unhealthy nutrition. In the study by Woo and Lee on South Korean adolescents, self-efficacy was one of the strongest determinants of vegetable preference and consumption (27). It is recommended measures such as giving snacks and fruit and subsidizing schools for fruit and vegetables in the school buffet be taken so that fruit and vegetables can be made available to students. The most important limitation of the study was the completion of the self-report questionnaire. Also, data collection a week ago maybe a recall of bias. It is suggested that in future studies, the frequency of consumption be collected one week later by checklist. The most important strength of the study was the preparation of a complete list of fruits and vegetables on the market in the fall and the guidance of the consuming units at the time of completing the questionnaire.

5. Conclusion

In addition to the correlation of theoretical constructs with fruit and vegetable consumption, Behavioral skills, self-efficacy, and social reinforcement were the three predictors of vegetable consumption, respectively. Understanding the environment, behavioral skills, and Outcome valuation were also predictors of fruit consumption, respectively.

Acknowledgments

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