



ORIGINAL ARTICLE

Using Social Cognitive Theory in Predicting Meal Frequency in Overweight and Obese Iranian Adolescents

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ABSTRACT

Prevalence of overweight and obesity among children and adolescents has increased to a concerning level in both developing and industrial countries. Social cognitive theory (SCT) is one of the most popular theories used to predict and combat adolescent obesity. Thus, the aim of this study was to use SCT to predict nutritional behaviors in adolescent girls in Iran. In this cross-sectional study, valid and reliable questionnaires about nutritional regarding SCT constructs (Self-efficacy, Social support, Outcome expectations and Outcome expectancies) and meal frequency were filled by 172 overweight and obese girl adolescents. The mean of age and BMI were 13.4 ± 0.6 and 28.2 ± 3.6 , respectively. BMI was inversely related to eating breakfast, morning and afternoon snacks ($p < 0.001$). Nutritional self-efficacy and social support were significant predictors for eating breakfast, morning and evening snacks ($p < 0.001$). Furthermore, outcome expectation was a significant predictor for eating breakfast and afternoon snack ($p < 0.05$). Social cognitive theory offers a useful framework for designing primary prevention interventions to reduce skipping breakfast among obese adolescents. Most of SCT constructs were found to be important for eating breakfast. In future, more studies must be carried out in order to better explain predicting prevention behaviors of obesity in Iranian adolescents.

Keywords: Obesity, meal frequency, breakfast consumption, Adolescent, Social Cognitive Theory

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INTRODUCTION

Nowadays, adolescent obesity is known as one of the most rapidly increasing nutritional problems in both developing and industrial countries, and it has become the main public health problem[1]. One fifth of entire world populations are adolescents. Of which most, nearly 85%, live in developing countries, and others live in developed countries[2]. The prevalence of childhood and adolescent overweight and obesity has significantly increased since 30 years ago and has doubled[3]. Islamic Republic of Iran has about 70 million people of which nearly 27%, 18 million, are adolescents[4]. Evidence has shown that according to the International Obesity Taskforce (IOTF) cut-offs more than 14% of children and adolescents (6-18 years) are overweight and obese[5]. Childhood and adolescents' overweight and obesity have a specific importance because these problems usually remain in adulthood. The probability that a four-year old child becomes an obese adult is 20% while the probability of being an obese adult is 80% by adolescent obesity[6].

One of the most important factors considered as a cause of childhood obesity is skipping breakfast consumption[7]. Although it has been shown that eating breakfast regularly has several positive outcomes for children and adolescents[8-10], only 37.7% of US adolescents ate breakfast on all 7 days of week[11]. Previous studies have shown that increasing meal frequency can have a positive effect on reducing BMI values in children and adolescents[12,13].

Studies have shown that there are several factors which can affect healthy eating in adolescents. Adolescents with lower self-efficacy for eating healthy foods and high support of peers for eating unhealthy foods, eat more unhealthy foods[14]. Unsupportive family is considered the most important obstacle for changing lifestyle by Iranian overweight and obese adolescents[15]. Another factor that can influence eating habits in adolescents is perceived benefits of doing a healthy practice. Adolescent girls who had better attitudes about eating low fat foods and who perceived more benefits about following a diet with less fat, ate significantly less fat in their diets[16].

While previous researches have shown that parental support may increase intake of breakfast among children and adolescents[17,18], to our knowledge, there are a few study to evaluate the association between social support and other important factors such as self-efficacy and perceived benefits and meal frequency among children and adolescents.

Although in developed countries overweight and obesity causing behaviors have been studied, few studies have been done in developing countries such as Iran[1,19]. It seems that in this kind of study, for predicting meal frequency in Iranian adolescents, SCT is practically useful. SCT suggests that human behavior is the result of dynamic interactions between personal, behavioral and environmental factors. The most important part of this theory is self-efficacy. According to this theory, self-efficacy is considered as human capability for taking a special action. Social support is the other part of SCT. It has been shown supports from family and peers have an important role in taking health actions. Another important part of SCT is outcome expectation, or perceived benefits about practicing a specific behavior. Expectations are people's predictions about positive or negative consequences of a special behavior[20-22].

Thus, the aims of this study were to assess the relationship between four constructs of SCT (self-efficacy, social support, outcome expectations and outcome expectancies) and meal frequency and eating breakfast regularly and understanding which of these constructs of theory may predict breakfast consumption among overweight and obese adolescent girls in Shahinshahr in Iran.

Methods

This cross sectional study is a part of a large protocol of a longitudinal study for implementing nutritional and physical activity intervention on overweight and obese adolescent girls. The whole protocol was accepted and founded by Tehran University of Medical Sciences. The study was approved by the ethics committee of Tehran University of Medical Sciences. The whole protocol was registered in Iranian Registry of Clinical Trials, www.irct.ir, (IRCT2013103115211N1).

Setting

Among all twenty four girls' middle schools in Shahinshahr, the city near Isfahan city which is located in center of Iran, with the same social background, eight schools were randomly selected. Six state schools were chosen from a total of eighteen state schools and two private schools were chosen from a total of six private schools. In each school, after checking students' health records, we selected only the overweight and obese adolescents (between 12-16 years of age). Both parents and students were asked to fill the consent form before participating in the study. Finally, from all 1500 students who were studying in these eight schools, a total of 172 students who studied in seventh and eighth grades, and according to World Health Organization 2007 table[23] were overweight and obese (those whose BMI values are equal or more than 85th percentile) and also their parents and they themselves agreed to take part (both of them filled the written consent form), participated in the study.

Measurement and instrumentation

Weight and height were measured by a well-trained nutritionist. Weights were measured in subjects without shoes and with minimal clothes by Seca digital scale and recorded to nearest 0.1 kilogram. Heights were measured without shoes and recorded with 0.1 centimeter accuracy by Seca stadiometer.

Valid and reliable questionnaire about SCT constructs was translated into Persian by a bilingual researcher[24]. Then, five nutritionists, health education specialist and exercise experts who are fluent in English, assessed questionnaire, revised and modified it. Questionnaire was translated into English by a native English speaker who lived in Iran. Then, we conducted a pilot study in 20 separated overweight and obese students (more than 10 percent of all students who must participate in the study), to test and retest; then, Cronbach's alpha and test retest reliability coefficients were calculated and they were in acceptable range for all constructs of the final questionnaire >0.7.

In addition, we used dietary practice questionnaire which asked about meal frequency to obtain number of days per week which students consume breakfast, lunch, dinner and morning and afternoon snacks[25].

Statistics and analysis

All data were analyzed by Statistical Package for the Social Sciences (SPSS), version 18. Liner Regression was used for assessing associations between variables. Nutritional behaviors including consuming main meals and snacks were considered as a dependent variable and BMI values, nutritional and physical activity constructs of SCT (self-efficacy, social support, outcome expectation and outcome expectancy) were considered as predictors ,independents, variables. P value less than 0.05 were considered as a statistically significant level.

Results and Discussion

A total of 172 adolescent girls participated in the study of which 83 (48.3%) were studying in grade 7 and 89 (51.7%) were studying in grade 8. Students were varied between 12-15 years of age. 25 (14.5%) of students were overweight (85th≤ BMI <95th) and 147 (85.5%) were obese (95≤ BMI). The minimum and maximum BMI values were 21.2 and 46.11, respectively. The mean and standard deviation of age and BMI were 13.4 (0.6) and 28.2 (3.6), respectively.

53 (30.8%) of subjects ate breakfast 0 days a week and 74 (43%) ate breakfast 7 days a week. 72 (41.9%) of students ate morning snacks 0 days a week and 45 (26.2%) ate evening snacks 0 days a week. 32 (18.6%) of students ate neither morning nor evening snacks all 7 days of week. Table 1 shows frequency (percent) of meal intake including main meals and snacks by students.

Means (SD), medians, minimums and maximums scores of SCT constructs about nutritional behavior is shown in table 2.

Table 1. Population distribution, Frequency (Percent), Means (SD) of Meal Pattern of Subjects (n=172)

Meal (Per Day)	0	1	2	3	4	5	6	7	Mean(SD)
Break Fast	53 (30.8%)	1 (0.6%)	8 (4.7%)	11 (6.4%)	10 (5.8%)	12(7%)	3 (1.7%)	74 (43%)	3.9 (3)
Morning Snack	72 (41.9%)	3 (1.7%)	12 (7%)	11 (6.4%)	13 (7.6%)	12 (7%)	2 (1.2%)	47 (27.3%)	2.9 (2.9)
Lunch	1 (0.6%)	1 (0.6%)	0	0	0	4 (2.3%)	3 (1.7%)	163 (94.8%)	6.8 (0.7)
Evening Snack	45 (26.2%)	3 (1.7%)	9 (5.2%)	10 (5.8%)	10 (5.8%)	13 (7.6%)	8 (4.7%)	74 (43%)	4.2 (2.9)
Dinner	14 (8.1%)	1(0.6%)	0	5 (2.9%)	11 (6.4%)	11 (6.4%)	3 (1.7%)	127 (73.8%)	5.9 (2.1)

Table 2. Means (SD), Median, Minimum and Maximum scores of Social Cognitive Theory Constructs (n=172)

Constructs	Mean (SD)	Median	Min-Max
Nutritional Self-Efficacy	22.5 (5.3)	22	12-37
Nutritional Social Support	10.3 (2.9)	10	4-20
Nutritional Outcome Expectations	18.5 (5.3)	19	5-30
Nutritional Outcome Expectancies	16.1 (2.9)	17	5-20

Table 3. Liner Regression for assessing relationship between variables (Behavior considered as a dependent and Variables considered as predictors, independent, variables)

Behavior	Variables	B #(95% CI)±	Beta#	P Value
Breakfast	Body Mass Index	-.38 (-.48 ; -.29)	-.45	.000
	Nutritional Self-efficacy	.15 (.08 ; .21)	.26	.000
	Nutritional Social Support	.22 (.10 ; .34)	.22	.000
	Nutritional Outcome Expectation	.09 (.00 ; .17)	.16	.036
	Nutritional Outcome Expectancy	.06(-.09 ; .21)	.06	.425
Morning Snack	Body Mass Index	-.34 (-.44 ; -.25)	-.42	.000
	Nutritional Self-efficacy	.17 (.1 ; .24)	.30	.000
	Nutritional Social Support	.26 (.14 ; .38)	.26	.000
	Nutritional Outcome Expectation	-.01 (-.09 ; .08)	-.01	.914
	Nutritional Outcome Expectancy	.10 (-.05 ; .26)	.10	.192

Lunch	Body Mass Index	.02 (-.01 ; .05)	.09	.206
	Nutritional Self-efficacy	2.06 (-.02 ; .02)	.00	.999
	Nutritional Social Support	-.01 (-.05; .03)	-.05	.512
	Nutritional Outcome Expectation	.00 (-.03 ; .03)	.01	.916
	Nutritional Outcome Expectancy	.02 (-.03 ; .07)	.08	.409
Evening Snack	Body Mass Index	-.25 (-.36 ; -.15)	-.31	.000
	Nutritional Self-efficacy	.16 (.09 ; .24)	.29	.000
	Nutritional Social Support	.23 (.11 ; .36)	.24	.000
	Nutritional Outcome Expectation	.10 (.01 ; .19)	.18	.031
	Nutritional Outcome Expectancy	.01 (-.16 ; .17)	.01	.942
Dinner	Body Mass Index	.06 (-.03 ; .14)	.10	.202
	Nutritional Self-efficacy	.06 (-.00 ; .12)	.15	.068
	Nutritional Social Support	.02 (-.08 ; .13)	.03	.662
	Nutritional Outcome Expectation	-.04 (-.11 ; .04)	-.10	.312
	Nutritional Outcome Expectancy	-.02 (-.16 ; .12)	-.03	.783

† Regression Coefficient; ± 95% Confidence Interval; # Standard Regression Coefficient

BMI values were inversely related to eating breakfast and morning and evening snacks ($B = -.38, -.34, -.25$, respectively; $p < 0.001$). Most of the SCT constructs were found to be significant predictors for eating breakfast. Table 3 shows variables of SCT for predicting meal frequency eating in subjects.

The main findings of the present study are that most of the SCT constructs used in the current study including self-efficacy, social support and outcome expectation were predictors of consuming breakfast. To our knowledge, this is the first study to evaluate the associations between the meal frequency and SCT variables in Iranian overweight and obese adolescent girls.

Results of this study show that 30.8 % of subjects did not eat breakfast on any day of the week. In addition, BMI values were inversely related to eating breakfast. These findings indicate the importance of eating breakfast regularly during adolescence to prevent overweight and obesity. Results of this study are in line with the recent study, which showed 31.5 % of US adolescents were breakfast skippers and they had significantly higher BMI values than other adolescents[26]. Likewise, a recent systematic review found that consuming breakfast regularly can be protective against becoming overweight and obese among European children and adolescents[27].

With respect to the results of self-efficacy and eating breakfast in the current study, it should be noted that self-efficacy is the most important construct of SCT which reflects a person's beliefs about his or her ability to perform specific behavior. Indeed, It is necessary to overcome barriers of healthy actions and initiate and maintain these behaviors [21,22]. It seems that if students have more confidence in eating breakfast regularly, they will be more likely to consume breakfast every day. Similar to our findings, Mullan et al found eating breakfast in young women as a significant factor predicted by self-efficacy[28]. However, Martens et al in their study found there was no significant correlation between eating breakfast and self-efficacy in 12-14-year-old Dutch students[29].

Regarding the result obtained from our study, significant association found between social support and eating breakfast, could explain that it seems the role of parents in providing breakfast and encouraging their children to consume it regularly is necessary. In addition, if parents be at home in the morning and consume breakfast and encourage their children to eat breakfast, they will be more likely to eat breakfast. Although our results are in contrast with Martens and colleagues' study in which the breakfast consumption did not predicted by social support in Dutch students[29], these are in consistent with the previous study which found if one parent be at home in the morning, adolescents are significantly more likely to eat breakfast[17]. Similarly, recent systematic review found living in a two parent family and parental eating breakfast, were both associated with consuming breakfast among adolescents[18].

With regard to the results found in the current study about outcome expectation and consuming breakfast, it is important to consider if adolescents perceive benefits about eating breakfast, they may increase this healthy behavior. Nevertheless, if they perceived negative expectation about eating breakfast, they would decrease this healthy behavior. Similar to our results, in their study, Reddan et al found children who perceived benefits such as "eating breakfast provides more energy and enhances the ability to pay attention at school" were significantly correlated with eating breakfast[30]. On the other hand, it has shown negative expectations such as "becoming fat if eating breakfast" can make girl students breakfast skippers[30,31].

In the case of outcome expectancy and eating breakfast, there was not any relationship. It should be noted that although just 43% of students ate breakfast on 7 days of the week, the mean of nutritional outcome expectancy score was 16.1, which was near the maximum range. It could be explained that although

overweight and obese girls have an appropriate expectancy, most of them cannot eat breakfast regularly. It might be due to other factors, which cause adolescent breakfast skipping such as lack of appetite in the morning or lack of time for eating breakfast. Consistent with our findings, Mullan et al found outcome expectancies were not predictors for eating breakfast among young women[28].

Another finding of the present study is lack of consuming morning and afternoon snacks by 18.6% of subjects. Eating morning and afternoon snacks were inversely related to BMI values. In addition, self-efficacy and social support were found to be significant predictors of eating morning and evening snacks. Furthermore, outcome expectation was a significant predictor of eating afternoon snacks.

With regard to results found about the percentage of students who ate morning and afternoon snacks 0 days a week and relationship between eating snacks and BMI values, it is considered that eating healthy snacks can be protective against increasing BMI values. Recent study, which analyzed data of National Health and Nutrition Examination Survey (NHANES) in US adolescents, showed that 18.6% of adolescents consumed no snacks per day. In addition, overweight and obesity among adolescents significantly decreased with increasing both frequency of eating snacks and percentage of energy obtained from snacks[32].

Regarding self-efficacy for eating snacks, it might be inferred that students who have more ability to follow health behaviors, eat more snacks per day. However, to our knowledge, no specific study has been done in related matter assessing relationships between self-efficacy and eating snacks among adolescents.

With regard to social support and eating snacks, it seems when parents provide health snacks and encourage their teenagers to eat; for example, when parents provide fruits for school recess time, children are more likely to eat healthy snacks. Utter et al found that frequency of family meals and support of parents are significantly associated with positive nutritional practice in their children[33].

Results of this study found outcome expectation as a predictor of eating afternoon snacks. This could explain the fact that when students perceived benefits about eating afternoon snacks; for example, ability to do homework better, they were more likely to increasingly participate in such a behavior. Results of this study showed outcome expectation for eating morning snack and outcome expectancy for eating morning and afternoon snacks were not found to be significant predictors. To our knowledge, no specific study assessed the relationship between these SCT variables and eating snacks among adolescents. However, the average score for nutritional outcome expectation was 18.5, which is in the middle range; and the average score for nutritional outcome expectancy was 16.1, which was near the maximum. It might be explained although overweight and obese girls had an appropriate expectation and expectancy, just 23.3% of them eat morning and afternoon snacks on 7 days of the week. It might be due to other factors, which caused adolescents to eat irregular snacks such as lack of knowledge about eating healthy snacks and lack of feeling of hunger. Another finding of the current study showed that frequency of eating lunch and dinner was associated with neither BMI values nor SCT variables. Results revealed that 94.8% of our sample ate lunch on 7 days of the week and 73.8% of them ate dinner on 7 days of the week. These results could explain that overweight and obese adolescents consume lunch and dinner without considering social and cognitive variables for satisfying their feelings of hunger and for following Iranian family customs believing that it is really important to eat lunch and dinner with each other.

Limitations

This study was not without any limitations. Data were obtained by self-report questionnaires, which showed measurement bias. Furthermore, as mentioned before, the current study was cross-sectional, as a result, like other cross-sectional studies, determining the cause and effect relationship is not possible.

CONCLUSIONS

Social cognitive theory offers a useful framework for designing primary prevention Interventions to reduce skipping breakfast among overweight and obese adolescents. Constructs of self-efficacy, social support and outcome expectation were found to be important for eating breakfast. This study provides basic data for designing a health education program influencing meal frequency for this group of population but more studies especially longitudinal studies must be done in order to better explain this challenge.

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