Does Habit Strength Predict Junk Foods Consumption? An Extended Version of Theory of Planned Behavior

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ABSTRACT
This study examined the utility of adding habit strength to the Theory of Planned Behavior (TPB) in predicting the intention and behaviour of junk food consumption. A Cross-sectional data were performed on 271 high school boy that sampled randomly from ten high schools in Bandar Abbas, Iran. Participants completed measures of the TPB, habit strength and food frequency in relation to junk food consumption. Hierarchical multiple regression analysis was performed to test the predictive power of the model. The traditional model explained 15% and 10% of the variance in intention and behaviour, respectively. Subjective norm and PBC (Perceived Behavioral Control) emerged as significant predictors of intention. Also, PBC and intention revealed as a significant predictor of behaviour. The extended model accounted for 28% and 11.6% of the variance in intention and behaviour, respectively. Habit significantly increased the explained variance in both intention and behaviour and emerged as the strongest predictor. Also, subjective norm and PBC remained as a significant predictor of intention and behaviour, respectively. The intention was a non-significant correlate of junk food consumption. Junk food consumption is more controlled by habit and PBC, rather than intention.

Keywords: Junk Foods, Students, Habit, The Theory of Planned Behaviour

ABBREVIATIONS
PBC: Perceived Behavioral Control
TPB: Theory of Planned Behavior
SN: Subjective Norm
M: Mean
SD: Standard Deviation

INTRODUCTION
Evidence correlate with Iranian families' nutritional position showing that during the last two decades, dramatically changes occurred in their food intakes and Iranian community experience a nutrition transition period [1]. This nutrition transition can lead to various health problems including different diet related and chronic diseases [2]. It is well proved that many adolescents always don't meet healthy nutrition guidelines .for example they eat a low amount of fruits and vegetables and instead eat a large proportion of high energy dense foods [3]. Based on the findings of a national study, unhealthy eating habits (e.g., consumption of junk foods) were highly prevalent among Iranian students [4]. Junk food is defined as energy dense foods, contents high fat, salt and sugar [5]. Theory of Planned Behavior (TPB) is of the most employed theory framework in behavior study [6,7] and the investigators frequently used TPB to survey different health-related behavior [7-13] including dietary behavior [9.14-16] and unhealthy eating habit such as ready meals [6], fast foods [8] and junk foods [17]. Some studies showed that the TPB was the most appropriate theory to predict behaviour [18]. The TPB [19] suggested that both intention and perceived behavioural control (PBC) are the direct determinants

of behaviour. Furthermore, the intention is determined by three sets of consideration. First beliefs about the outcome of the behaviour as well as the importance or evaluations of these likelihood outcomes together formed the attitude toward behaviour. Second individuals beliefs in relation to important other expectations as well as the individuals motivation to comply with other desires and expectations, together shaping the subjective norm (SN) and finally beliefs' about the factors that either facilitating or impeding the behaviour as well as the strength of each of this belief that together produce PBC. The utility of this model for predicting intention and behaviour was proved by different studies. For example a meta-analysis on 185 TPB- based studies showed that this model accounted for 39% of the variance in intention and 27% of the variance in behavior [20].

The TPB was successfully applied by a number of researchers for explaining healthy food choices but relatively few studies used the model for determining the predictors of less healthy food choices and we are not aware of any published research that has used the TPB extended by the habit strength in explaining factors influencing adolescents junk foods consumption. Also, the role of habits has received little attention in the junks foods consumption field and there is a growing tendency for concentration on the role of habits in health behaviours [21-23]. This study highlights the role of habit strength for junk foods consumption in the framework of the theory of planned behaviour. Therefore The aims of the current study were to determine the utility of TPB construct for predicting junk food consumption intention and behaviour and to identify that to what extent the habit strength increased the predictive power of the TPB.

MATERIAL AND METHODS

Study Design, Recruitment, and Participants

The present study used a cross-sectional baseline data from a group of male adolescents as a part of an interventional trial to survey the effect of a TPB based intervention on reducing junk food consumption and intention among a group of 15-18 years old students. The ethical approve and study protocol for this investigation was obtained from the Iran University of Medical Science Ethics Committee. In a cross-sectional study in the path analysis of the correlation matrix, the number of samples was determined so that if the members of this matrix were more than 0.2, then statistical significance was statistically significant with 95% confidence and included in the analysis. Which was obtained from the following formula:

r= .2

$$w=\frac{1}{2} ln \frac{1+r}{1-r} = \frac{1}{2} ln \frac{1+0/2}{1-0/2} = 0.203$$

$$n = \frac{(z1 - \frac{\alpha}{2} + z1 - \beta)^2}{w^2} + 3 = \frac{(1.96+.84)^2}{(.203)^2} + 3 = 193$$

According to the cluster selection of samples, the effect of the sampling plan was considered 1.5. The sample volume for this research stage was as follows.

N*= 0/93 * 1/5 = 290

The final stage of this study was a comparison of the mean score of the behaviour of unhealthy snacks in the experimental and control groups. Therefore, the number of samples was determined so that if the mean difference in these two groups was 10, then 95% confidence and 80% test power were statistically significant. The questionnaire for frequency snacks consumption has 25 questions and the range of total score is between 0 and 25. Based on this, the standard deviation was considered 42 ($\frac{250}{6}$) and the following formula was used to calculate the number of students needed in each group.

$$d = \frac{10}{42 \times \sqrt{2}} = 0/17$$

$$n = \frac{(1/96 + 0/84)^2}{(0/17)^2} = 271$$

Finally 271 students, randomly sampled from 10 boys high school (that also randomly selected from all 40 boys high schools) in Bandar-Abbas (A city located in the south of Iran). The inclusion criteria were Aged 14 to 15 years old and studying in second to third grade guidance at boys' undergraduate schools in Bandar Abbas, student's willingness to study and have parent's consent and the exclusion criteria were unwillingness to participate in the study, parents' dissatisfaction, lack of responsiveness of the students to more than 20% of the questions of the questionnaire and more than two time absence in the educational sessions in case group. After coordination with the heads of elected schools, a letter of invitation and study presentation sent to relevant student parents, in that voluntary participation emphasized. Also, they assured that their child responses and information remained confidentially. In the first step, 290 students were selected to participate in the study but finally, 19 students don't answer the study questions because of unwillingness or parents dissatisfaction. Therefore the final samples were 271 students (M age=16, SD=1.03) by the participation rate of 93.4%. Answering the questionnaire items was done during school hours and the investigators were present during filing the forms by students to an answer any question. All questionnaires were checked immediately after completion by students to identify incomplete questions and asked them to response to the omitted question at that time.

Data Collection

Junk foods consumption was assessed based on a validated food frequency questionnaire [24]. The FFQ consisted of 26 food items that contribute to most regular junk foods in the Iranians adolescent diet. A panel of specialist reviewed the instrument and proposed some revision for a better understanding of the questionnaire. Then the instrument pilot tested among 50 students (correlation between baseline measurement and 1 month follow up was 0.7) and again some trivial changes, based on students opinions, executed. The participants were asked how often consumed each type of these foods (e.g, Candy, chips, cake, biscuit, puffs …) during the past week (answers were range from never, 1, 2, 3…7 and more than 7 times per week). The sum of all junk foods consumption considered as weekly total junk food consumption.

We used an indirect measure (belief-based) of TPB and model variables were constructed by relevant beliefs to the each of attitude, subjective norm and PBC. Intention was measured by three questions: I plan to eat junk food during the next week (extremely agree=7, extremely disagree=1), for the next week I intend to eat junk food (extremely likely=7, extremely unlikely=1), I am sure I will eat junk food during the next week (strongly agree=7, strongly disagree=1). The mean score of these three questions considered as intention score in the subsequent analysis. Cronbach alpha for this scale was 0.73. In order to elicit the most commonly salient beliefs (behavioral, normative and control beliefs) regarding the junk food consumption, according to the Ajzen [25] and Francies [26] recommendations, initially we wanted 50 boys high school student to write advantages or disadvantages, factors that facilitate or difficult and individuals or groups that approve or disapprove junk food eating freely in an open-ended questionnaire. In the second step, we analyzed this information content, listed themes in order of frequency, labelling them and selected the most frequent themes. Finally, a questionnaire was developed based on Ajzen [25] and Francies [26] instructions. The questionnaire reviewed by 5 faculty member expert in TPB and scale development and based on their recommendation some changes were made to the instrument. The instrument items were again pilot tested among 20 students from the relevant population for survey the readability and clarity. Some questions reworded or modified in the final version.

Regarding behavioral beliefs, student indicated on a 7 point likers scales (extremely likely=7; extremely unlikely=1) whether they think that eating junk food would: (1) Cause them to illness; (2) Give them pleasure sense; (3) Cause them to teeth cavity; (4) Cause them to bone emptiness; (5) Make them obese; (6) Help them gain energy; (7) Cause them don't eat main meals(r=0.72). Outcome evaluations were measured by: for me: (1) Illness; (2) pleasure sense; (3) Teeth cavity; (4) Bone emptiness ;(5) obesity ;(6) Gain energy; (7) don't eat main meals; is (extremely important=7; extremely unimportant=1) (r=0.93).

Normative beliefs' was measured by: (1) my friends think that I(should=7; should not=1) consume junk foods, (2) my parents (approve=7;disapprove=1) my junk food consumption, (3) my sibling (do=7;do not=1)consume junk food themselves(r=.76).

Motivation to comply was measured by: (1) what my friends think I should do matters to me, (2) parents approval of my junk food consumption is important to me, (3) doing what my sibling do is important to me(very much=7; not at all=1) (r=.75).

Control beliefs strength was measured by (1) junk foods are always available for me, (2) when I have enough money I eat more junk foods, (3) I am accustomed to consuming junk foods(strongly agree=7; strongly disagree=1) (r=.8).

Control beliefs power was measured by: (1) when junk foods are available, it is difficult for me don't eat them, (2) when I have enough money, it is difficult for me don't buy them, (3) since I accustomed to consume junk foods, it is difficult for me don't eat them(more likely=7; less likely=1), (r=.73).

Students were given a definition and examples of junk foods (e.g., chips, candy, pop, sweets, and cakes) on each survey to ensure that they understood the mentioned behaviour. In order to create overall attitude, subjective norm and PBC, each behavioural belief were multiplied by outcome evaluation and the resulting products were summed over all behavioural outcomes, normative beliefs multiplied by motivation to comply and the resulting product were summed over all regarding beliefs and each control beliefs strength were multiplied control belief power and the resulting product were summed over all relevant beliefs. Then relevant attitude, subjective norm and PBC scores divided by a number of questions.

Habit strength regarding junk foods consumption was assessed by applying the self-report habit index, developed by Verplanken and Orbell in 2003 [27]. The validity and reliability of this index have been established by several studies [27-29]. students were presented with the stem: Junk food consumption is something: I do frequently, I do automatically, I do without having to consciously remember, that makes me feel weird if I do not do it, I do without thinking, that would require effort not to do it, that belongs to my routine, I start doing before I realize I'm doing it, I would find hard not to do, I have no need to think about doing, that's typical "me", I have been doing for a long time. Then asked them to say to what extent they agreed or disagreed (completely agree = +2;

completely disagree=-2) this sentence. The mean of these 12 items considered as an overall score of habit strength. The instruments take approximately 40 minutes to complete.

Data Analytic Strategy

Data were analyzed using the statistical package for social science for windows (SPSS, Version19). Simple descriptive statistics such as frequencies, means and standard deviation obtained for all study variables. Pearson correlations were used to assess the simple association between main study variables (TPB constructs, habit strength and junk foods consumption). A significant level of $p<0.05$ was employed. Finally, two hierarchical multiple regressions were conducted to identify the predictors of intention and junk foods consumption and test the additive effect of habit strength to predict intention and behaviour. First analyze regression, to predict intention was performed in two steps. In step 1, attitude, subjective norm and PBC and in step 2 habit strength were entered to the equation as the independent variables. Second, analyze regression to predict junk food consumption was performed in two steps. In step 1, intention and PBC and in step 2 habit strength were entered to the regression as the independent variables.

RESULTS

As can be seen in table 1, demographic variables were included students age and class level, parent's literacy level and employment status. Class level was distributed with 28.4%, 29.2%, 21.8% and 20.7% in the 9, 10, 11 and 12 grade levels respectively. Most of students father were employed in nongovernmental section (43.2%) and 39.9% and Major of student's mothers was housekeeper (86.3%). the dominant educational level of parents was high school (31% of father and 28.4% of the mother)

The participants averagely consumed 29 times per week (almost 4 times per day) junk foods (any type). The score of intention to consume junk food was above mid-scale (4.49±1.57), suggesting that participants had a positive intention to consume junk food. Mean and standard deviation for other TPB variable and habit strength are presented in table 2. Bivariate correlation showed Positive significant correlations between junk food consumption and all TPB variables (with the exception of attitude) and habit strength. This means that those who had a more positive intention, subjective norm, perceived behavioural control and habit strength consumed more junk foods. Also, TPB variables (with the exception of attitude) and habit strength were positively correlated with intention. Habit strength was the stronger correlates of both intention($r=0.485$, $p<0.01$) and junk foods eating($r=0.301$, $p<0.01$). The highest correlations were found between PBC($r=0.562$, $p<0.01$) and intention($r=0.485$, $p<0.01$) and habit strength, respectively. The relationship between attitude and intention and junk foods consumption was negative and adolescents with a more negative attitude toward junk foods had the lower intention and junk foods consumption (however these relations were not significant).

Table 1: demographic characteristic of the sample

Characteristic	N	%
Age range		
15	77	28.4
16	75	27.7
17	63	23.2
18	56	20.7
Class standing		
1th	77	28.4
2th	79	29.2
3th	59	21.8
4th	56	20.7
Father's education		
Primary	52	19.2
Secondary	59	21.8
High school	84	31
Academic	76	28
Mother's Education		
Primary	74	27.3
Secondary	63	23.2
High School	77	28.4
Academic	57	21
Father's Job		
Governmental employment	108	39.9
Non-govermental empolyment	117	43.2
Unemployment	46	17
Mother's Job		
Housekeeper	234	86.3
Employment	37	13.7

Table 2: The bivariate correlation, mean and standard deviation of study variables

Variables	Mean	SD	1	2	3	5	6
1. Junk food consume	28.9	17.94	-.216**	-.233**	.293	.056	.085
2. Intention	4.49	1.57	-	-.133*.	.455**	.299**	.5**
3. PBC	5.65	1.05	-	-	--.132*	-.024	-.034
4. Attitude	3.63	1.36	-	-	-	.442**	.343**
5. Subjective norm	4.07	1.51	-	-	-	-	.305**
6. Descriptive	3.82	1.49	-	-	-	-	-

*Correlation is significant at the .05 level

**Correlation is significant at the.01 level

Note: A high mean value for intention, subjective norm and attitude indicate that this variable in favour of junk food consumption for PBC a high mean indicates the lower perceived control to avoid junk food consumption.

Results from the first hierarchical linear regression analysis for determine the relative importance of TPB variables(attitude, subjective norm, Perceived control) and habit strength to predict intention(see table 3), showed that in step 1, TPB variables together accounted for 15% of variance in intention (R^2=0.15, F (3, 267) =15.65, P<0.01). PBC (β=0.308, p<0.01) and subjective norm (β=0.213, p<0.01) were significant predictors of intention. The addition of habit in step2 produced significant increase (12.9%) in the explained variance in intention (R^2=0.279, F (4, 266) =25.71, P<0.01).habit was the strongest predictor of intention (β=0.435, p<0.01). also, subjective norm remained a significant predictor at this step (β=0.201, p<0.01), while attitude (β=-0.006, p<0.05) and PBC (β=-0.065, p<0.05) were not.

A second hierarchical multiple linear regression was performed to determine the predictor of junk foods consumption (see table 4). In the first step both PBC (β=0.242, p<0.01) and intention (β=0.137, p<0.05) were the significant predictors of behaviour and model accounted for nearly 10% of the variance in junk food consumption (R^2=0.099, F (2, 268) =14.76, P<0.01). Adding habit strength in the second equation significantly increased the amount of explained variance in behaviour (R^2=0.116, F (3, 267) =11.66, P<0.01). Habit strength was the most significant predictor of behaviour (β=-0.169, p<0.05). Also, PBC remained an independent predictor (β=-0.166, p<0.05), while the intention was a non-significant predictor of junk food consumption (β=-0.08, p<0.05).

Table 3: Summary of hierarchical regression (R^2, F and β) analysis for predicting intention to consume junk food.

step	predictor	βstep1	R^2	F	βstep2	R^2	F
1			.225	25.84**			
	Attitude	.39**					
	Subjective norm	.124*					
	PBC	-.078					
2						.351	35.97**
	Attitude				.29**		
	Subjective norm				.05		
	PBC				-.08		
	Descriptive norm				.384**		

*p<.05
**p< .01
the β= standardized regression coefficient

Table 4: Summary of hierarchical regression (R^2, F and β) for predicting junk food consumption.

step	predictor	βstep1	R^2	F	βstep2	R^2	F
1			.089	13.11**			
	Intention	.189**					
	PBC	-.208**					
2						.139	8.552**
	Intention				.118		
	PBC				- .185**		
	Attitude				.27**		
	Subjective norm				- .08		
	Descriptive norm				- .04		

*p<.05
**p<.01

DISCUSSION

Our finding showed high consumption rate of low quality and junk foods among Iranians adolescents.in line with our finding, Results of earlier study among Iranian students, also, indicated the prevalence of unhealthy dietary behaviour including consumption of junk foods among adolescents [4]. Supported by this fact unhealthy dietary behaviours such as junk foods consumption, especially by adolescents, is an obvious target for behaviour intervention.

Perception of the target behaviour and factors that influencing perform or impede this behaviour, is an essential precondition to design effective intervention strategies.

Thus, the present study aimed to understand the factors influencing junk food consumption in the framework of TPB. Furthermore, we explore the additive role of habit strength in the explanation of junk food consumption intention and behaviour. To our knowledge, it is the first study that explored the additive effect of habit strength in the explanation of junk food consumption in adolescents.

Traditional TPB model predicted 15% of the variance in intention, with the subjective norm and perceived behavioural control emerging as significant predictors. Perceived behavioural controls were the strongest predictor of intention. Although most of the TPB studies e.g., Armitage and Conner in 2001[30] found that the subjective norm was a weak or non-significant

predictor of intention, over results showed that subjective norm had a determinant role in predicting junk food consumption intention in adolescents. In fact, the effect of different TPB constructs is variant across various studies [31]. Although it is not surprising that adolescents be under influence of social pressure, because adolescence period is of the utmost times that social norm influence the behaviour of human [32] and expectations and desires of reference groups (e.g., parents, household, siblings, peers and friends) may influence the perceptions and behaviours of individual through observation and imitation [33].

Although our findings were in line with earlier evidence [34] that showed only subjective norm and perceived behavioural control (but not attitude) were a significant predictor of intention toward fast food consumption among a group of middle school students. Also, the study showed that the PBC was the strongest predictor of intention. Also, results of another study on soft drink consumption in adolescents, showed PBC was the strongest correlate of intention to limit soft drink consumption, while attitude was not a significant correlate of intention.[35]Another study to increase fruit and vegetable consumption showed subjective norm and PBC, but not attitude, was a significant predictor of fruit and vegetable consumption [36].

Also in line with TPB hypothesis traditional model predicted about 10% of behaviour, with both intention and perceived behavioural control emerging as a significant predictor. Howbeit, according to Ajzen statements [13], the influence of TPB variables on intention and behaviour is supposed to vary among different populations, behaviours or situations.

Notwithstanding, in our study, TPB predict fewer variance in intention and behaviour, in comparison with other TPB-based studies e.g., Armitage and Conner in 2001[30], yet, our findings demonstrate the moderate-sized effect in social science [37]. Indeed, Predictive power of TPB, between various studies, is different [31]. In one hand some evidence showed that the predictive power of the TPB is weaker when applied to dietary behaviours e.g., Ried and Hammersley in 2001 [38] and Williams *et al.* in 1993 [39] than for others behaviours. This may be explained, to some extent, by the complex nature of dietary behaviours [16].

In another hand because surveyed behaviour in our study (junk foods) was a wide behavioural domain, cognitions measure did not have a high degree of specificity, this may have decreased the predictive validity of TPB in our study. When we survey a complex behaviour the predictive power of the model may decreases because based on Fishbein and Ajzen recommendation [40] behaviour needs to be specific. Thus, whatever behaviour is more specific (e.g., chips or candy instead of junk foods) the TPB is stronger in predict behaviours. For example results of a study on junk foods consumption showed that the TPB predicted only 28% and 12% of explained variance in intention and behaviour, respectively [41]. Nonetheless, some other evidence in this field supports our finding in relation to TPB predict power in unhealthy behaviors. For example results of a study for predicting saturated fat consumption showed that perceived behavioral control and intention together explained only 8% of the variance on behavior [42]. Also, the results of another study showed that TPB explained 10% of the variance on intention not to drink and drive.[43]

Habit strength significantly increased the amount of the explained variance in both intention and behavior at the second steps of regression analysis (13% and 1/7% respectively). The habit was the strongest predictor of intention and behavior in the extended model. In the second step for predict intention, subjective norm remained a significant predictor of intention and, PBC remained a significant predictor behavior. Intention did not emerge as a significant predictor of junk food consumption at this step, suggesting that junk food consumption in adolescents is more under control of habit and PBC, but not the intention. Also, habit may play a mediational role between intention and behavior. In the other hand when behavior is habitual, the intention is less determinant for behavior [44]. Many studies have shown that the utility of intention in behavior prediction diminish when the behavior has a strong habitual nature [45, 46]. This finding is in line with a growing body of studies that support the role of habit strength in dietary behaviors [32,42,47,48].

Since results showed high consumption of junk foods in adolescents, it is not strange that repetition of this behavior, during a long time, causes forming a habit and consequently behavior executing unconscious and less intentional.

Parents always give spending money to their child's and since junk foods are cheaper than other healthy foods and readily available in the city stores and Cafeterias in schools, they have easy access to this kind of foods. Adolescent regularly buys and eat this food during school times and leisure times, therefore it maybe form a habit and become routine behavior. According to Triandis, in stable contexts and familiar situation (for example school cafeterias) behavior chiefly will be guided by habit and intention will have trivial or non-significant effect 49].

If unhealthy behavior proceeds without deliberate intention then using such strategies that target motivations may become unsuccessful [50]. It has been shown that for repetitive behavior in a stable

context the influence of traditional interventions (information based) attended to less success.[76]
Dietary behavior often become habitual and in such case, the intention – behavior relationship decreased and rational decisions didn't play important role in predict behavior [51-52].
Effective habit change interventions that target the environmental cues of a specific habitual behavior or self-regulation techniques may be effective. These include techniques such as stimulus control [53], vigilant monitoring [54] and implementation intention.[55]
Also perceived behavioral control over refrain from junk food consumption should be increased.
Although the present study provides noteworthy insight into a determinant of junk foods consumption, few limitations of this study should be noted. First, we used cross-sectional data so causality cannot be inferred. Also, we used the self-report measurement of junk food consumption and as a result, the participant may underestimate or overestimate the behaviour. Although TPB based study often used this method [17, 56] because measuring actual behaviour intake is very laborious.
Despite these limitations, overall, our results revealed that Junk foods consumption in adolescents was more under habit control than cognitive control. Then Junk food consumption is more habitual behaviour than intentional and also facilitators or inhibitor factors influence behaviour and finally including habit strength in the framework of the TPB enhanced the explanatory value of the model in predict intention to consume junk food and actual behaviour.
This finding may be unique to junk foods consumption by adolescents, although our finding adds to the recent empirical evidence that showed the importance of habit in behaviours prediction.

CONCLUSION

When researchers want to plan for decreasing unhealthy snacks consumption, especially in adolescent boys, considering and working on subjective norms and perceived behaviours control is very important. Also adding habit strength to the TPB and considering influential factors on habitual behaviour, while we want to implement the intervention in this field, can an effective role in reducing unhealthy snacks consumption.

ETHICAL ISSUE

Ethical issues have been completely considered by the authors

CONFLICT OF INTEREST

The authors have declared that there are no conflicts of interest

Author CONTRIBUTION

All authors equally participated in drafting, revising and approving of the manuscript.

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