

Reducing Fast Food Consumption in Students Using a Parent-Teacher Participation-Based Intervention: An Experimental Approach

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Abstract

Background: Fast food consumption among students is increasing dramatically. This study aims to evaluate the effect of an intervention based on the Theory of Planned Behavior (TPB) in reducing fast food consumption among high school students.

Method: 160 high school students from Iran were randomly recruited and assigned to experiment or control groups. The intervention was conducted over three consecutive weeks, consisting of four, 45-minute teaching sessions. Parameters were assessed on three occasions: pretest, posttest, and follow-up. In these stages, participants responded to a scale on fast food consumption which measures the beliefs and behaviors toward fast food.

Results: findings revealed a statistically significant difference in the posttest between experiment and control groups in the major components of fast food consumption including behavioral beliefs ($t = 5.1, p < 0001$), evaluation of behavioral outcomes ($t = 5.3, p < 0001$), normative beliefs ($t = 2.3, p < 05$), motivation to comply ($t = 5.5, p < 0001$), control beliefs ($t = 4.4, p < 0001$), perceived power ($t = 3.3, p < 0001$), and behavioral intention ($t = .68, p < 0001$). Similar results were obtained in the follow-up stage.

Conclusion: The findings suggest that the parent-teacher participation based intervention can be used to reduce fast food consumption amongst high school students both cognitively and behaviorally. Moreover, this intervention can be further customized to increase healthy food consumption in school students and other age groups beyond the context of school.

Highlights

- The proposed parent-teacher participation-based intervention was found to be an applicable, timely and efficient way to reduce fast food consumption.
- When students receive consistent and simultaneous messages from both parents at home and teachers at school regarding the negative impacts of fast food consumption on their health, they become more pliable to possess negative attitudes towards fast food.
- Although high school students are mature enough to understand the difference between harmful and healthy foods, their actual attitudes and behaviors can still be influenced and altered by parents and teachers.

Background

Over the past two decades changes in lifestyle have considerably changed food consumption patterns. One of the most prominent trends is the increase in fast food consumption (Alsabieh et al., 2019; Krieger, Chan, Saelens, Solet, & Fleming, 2013; Schröder, Fito & Covas. 2007; Bowman & Vinyard, 2004). Fast foods are quick to prepare, easy to access, moderately inexpensive, and favored by individuals of most age groups (Askari, Solhi, & Montazeri, 2016). Fast food consumption may have immediate and lasting harmful effects

on the health of children. Scientific evidence shows that children who eat fast food have a higher intake of energy, fat, saturated fat, sodium, carbonated soft drinks, and a lower intake of vitamins A and C, milk, fruit, and vegetables compared to those who do not (World Health Organization, 2017; ALFaris, Al-Tamimi, Al-Jobair, & Al-Shwaiyat, 2015; Paerataku, Ferdinand, Champagne, Ryan, & Bray, 2003; Timperio, Ball, Roberts, Andrianopoulos, & Crawford, 2009).

According to recent studies, the highest consumers of fast food are adolescents and children. Nearly one-third of these young aged children, use ready-made foods on a daily basis (Bowman, Gortmaker, Ebbeling, Pereira, & Ludwig, 2004; Paeratakul, Ferdinand, Champagne, Ryan, & Bray, 2003). Consistent with the global interest in fast foods, recent studies have shown that fast food consumption is rapidly increasing in Iran. For example, in two separate studies conducted in two large cities of Iran, Tehran, and Isfahan, scientists found that fast food consumption is remarkably growing among high school students (Ghaffari, Sherizadeh, Rakhshandehroo, & Ramezankhani, 2015; Yarmohammadi, Sharifirad, Azadbakht, Morovati Sharifabad, & Hassanzadeh, 2011). Increase of the consumption of high-energy and unhealthy foods (i.e., high sugar content drinks and fast food) has been linked to diabetes, hypertension (Seo, Lee, & Nam, 2011), greater cardiometabolic risk (Davies, Richardson & Stevenson, 2017) becoming overweight and/or obesity (Babbey, Jones, Yu, & Goldstein, 2009; Gibson, 2008; Malik, Schulze, & Hu, 2006; Rosenheck, 2008). Obesity as the popular outcome of fast food consumption is affecting more than half a billion individuals around the world (Bhurosy & Jeewson, 2014). Global statistics show that over 340 million children and adolescents aged 5–19 were overweight or obese in 2016 (World Health Organization, 2018). A similar study amongst an Iranian sample ages 12 to 17 revealed that 51% of children consume fast foods in the form of prepackaged snacks, packaged juice and soda, weekly (Dehdari & Mergen, 2012). In addition, a similar study on an Iranian sample found that 20% of adolescents and 10% of adults consumed sandwiches as a fast food at least three times a week (Faghih & Anousheh, 2008). Students who compose a significant percentage of the population are highly vulnerable to physical, psychological and social detriments, and desirable nutrition is a prerequisite for maintaining their health (Ghaffari et al., 2015).

Young adulthood is a critical time for developing healthy behaviors, as habits formed during this time tend to persist throughout life (Hammar, 2017). It has been suggested that changing eating habits may be done through changing attitudes towards them (Ogden, Karim, Choudry, & Brown, 2007). With further research needed for understanding the link between attitudes and eating behaviors, there is a reliance on theories to provide substantial guidance for creating healthy behaviors (Ghaffari, Esfahani, Rakhshanderou, Hosseini Koukamari, 2018; Davis, Campbell, Hildon, Hobbs, Michie, 2015). The Theory of Planned Behavior (TPB) developed by Ajzen and Fishbein (1980) has been widely used to examine the attitudes and beliefs associated with food choices. TPB predicts the occurrence of a specific behavior that an individual tends to engage in. In fact, TPB assumes that human behaviors are determined by behavioral intention to consume fast food affected by attitude, subjective norms, and perceived behavioral control. In relation to fast food use, the *attitude* would be the personal positive/negative feelings about the consumption of fast food. *Subjective norms* would be the degree to which an individual desires to respect and follow the opinions of individuals who are important to him or her. *Perceived behavioral control* would be an individual's perceived capabilities and beliefs in the use or disuse of fast food in a given environment (HS, Lee, & Nam, 2011). Several studies have applied this theory to explain how eating habits and behaviors are formed (Ajzen &

Madden, 1986; Dunn, Mohr, Wilson, & Wittert, 2011; Kassem, Lee, Modeste, & Johnston, 2003; Maddock, Silbanuz, & Reger-Nash, 2008; Peng, 2009, Sharifirad, et al, 2011; Chitsaz, Javadi, Lin, Pakpour, 2017) and it has been successfully applied across a wide range of age groups (De Bruijn, Kroeze, Oenema, & Brug, 2008). Thus, we attempt to change the nutritional beliefs and behaviors of students, by reducing fast food consumption, through designing and testing an experimental intervention, in turn, preventing the prevalence of obesity and associated diseases. As such, the main hypotheses of this study are:

Hypothesis 1. There will be a significant reduction in fast food consumption between intervention and control groups in posttest

Hypothesis 2. There will be a significant reduction in fast food consumption of students between intervention and control groups in follow-up

Method

Participants

The present study follows an experimental longitudinal research design including intervention and control groups with pretest, posttest and follow-up stages. Participants consisted of 160 male students from four public high schools located in Khoy City, Iran. Primary recruitment was completed through the use of a multi-stage cluster sampling where 38 high schools were initially proposed and four were chosen at random selection. In the next step, two high schools were randomly selected for recruiting students for the intervention group and the other two were randomly selected for recruiting students for the control group. Next, from the first two high schools 80 male students were randomly selected and assigned to the intervention group and from the second two high schools 80 students were randomly selected to be assigned to the control group. Figure 1 shows the steps in selecting schools and students, and assigning them randomly into intervention or control groups. Only students in the intervention group received the intervention. Students in the control group received no intervention.

The same method as the previous studies was used to collect data (e.g., Alizadeh, keshavarz, Jafari, & Ramezani, 2013), using sampling formula ($\alpha = 1.96$ and $\beta = 1.28$), with an expectation of a 10% reduction in the sample, at least 80 participants were required for each group. Inclusion criteria consisted of: 1) participant must be a high school student (grade 11 in Iran), and 2) each participant must participate in this study voluntarily. Exclusion criteria included: 1) parents who refused their child to participate, and 2) students who refused to participate in all stages completely (pretest, posttest, and follow-up). According to the inclusion and exclusion criteria, 160 people were randomly assigned to experimental or control groups (80 students in each group). Before the intervention, both groups were compared in terms of confounding variables such as parent's education, parent's employment and socioeconomic status. As [Table 1](#) shows, no significant differences were found between the groups and, therefore the two groups are comparable.

Table 1
Demographic information of the parents of students in control and experiment groups

Variables	Level of education	Control group (<i>n</i>)	Experiment group (<i>n</i>)
Education level of father	Illiterate	22	29
	Primary school	20	23
	High school diploma	23	18
	Bachelor degree	15	10
Education level of mother	Illiterate	35	44
	Primary school	26	25
	High school diploma	19	11
Employment status of father	Self-employed	41	31
	Employee	39	39
Economic status of family	Weak	6	9
	Average	38	41
	Good	36	30

Procedure

This study was submitted to the ethics board of the Medical Science University of Shahid Beheshti in Iran and an ethics approval was granted. The consort checklist reporting the randomized trial can be seen in appendix 1. In accordance with this ethics approval, the research team contacted four randomly selected high schools in the city of Khoy, Iran to negotiate the possibility of conducting this study in these schools. All four high schools were informed and agreed to participate in this study subject to the voluntary nature as well as signed written consent from the parents of students before the students could participate in the study. Following informed consent, the research team distributed the self-report survey to the students in both the intervention and control groups. Students were informed that they could ask any questions during the study and had the right to withdraw from the study at any point in time. In all, 160 students in the intervention and control groups completed the self-report survey during the pretest stage. Immediately after conducting the intervention, the same number of students completed the self-report survey at the first post-

test stage. Two months after the intervention, the same students responded to the same survey to conclude data collection for the follow-up stage.

The experimental intervention was developed based on TPB propositions and consisted of 4 teaching sessions of 45 minutes each with the time interval of 5 days between sessions and lasted within 3 consecutive weeks. The first training session was conducted in the staff room for the school manager, principals, and teachers. They were trained to talk about the harmful effects of fast food and the advantages of healthy food for the intervention group on a daily basis (5 days per week). They were also asked to clearly share with the students their positive attitudes and beliefs of healthy foods and their negative attitudes and beliefs of fast food. This session lasted for 45 minutes. The second training session was conducted for the parents of the intervention group. They were invited to the respective school to participate in a training session in which the research team briefly talked about the extent to which parent's attitudes towards fast food or healthy food can influence their children's attitudes and beliefs. The parents were trained to openly share with their children the extent to which they disagree with the consumption of fast food and their favour of consuming healthy food. During the session there was a question and answer period. In the end, parents were asked to share their attitudes with their children on a daily basis. This session lasted for 45 minutes. Students were invited to the third training session which was comprised of the following: a roundtable question and answer period on the topic of fast food and healthy food, pamphlets about fast and healthy food were provided and video clips were shown depicting the advantages of healthy food and the disadvantages of fast food. The last training session was called "the fast food week", and all teachers, students and parents of students were informed about this week in advance. During this week the parent-school virtual communication system of the school sent out a total of eight text messages to the parents of the participating students. The messages were related to fast food consumption and contained topics such as the definition of harmful foods and their negative impact on health, along with available solutions to reduce fast food consumption within families and schools. The messages aimed to influence the current norms of students and to relay the message of parental dissatisfaction and overall negative attitudes toward fast food consumption of the students. Furthermore, during this week messages were delivered to students during morning rush [a routine morning program that students gather for 30 minutes, listen to the principal and teachers speeches and pray together] aimed at informing students that their teachers and principals do not have positive attitudes towards the consumption of fast food and they are encouraged to replace fast food consumption with consuming healthier foods. This was matched with the aim of the study to inform the students that both parents and teachers are in favor of consuming healthy foods and avoiding the consumption of fast food. At the end of this week, the students were asked to cook and bring in healthy foods and judges (three nutrition teachers) selected students who presented the best healthy foods in the competition. Winners of the competition were announced and received awards and rewards from the manager of the school. The overarching goal was to enhance the behavioral commitment of students to healthy foods versus fast foods.

Parameters assessed were measured on three occasions: before the intervention (pretest), immediately after intervention (posttest), and two months after the intervention (follow-up). In these stages, participants responded to a scale on fast food consumption which measures the beliefs and behaviors of individuals toward fast food consumption.

Measures

Fast Food Consumption Scale. This scale was developed by Ebadi, Rakhshanderou and Ghafari (2018) based on the propositions of Theory of Planned Behavior (Ajzen & Fishbein, 1980) and includes the six components as follows: demographic characteristics (6 items), actual behavior (1 item), behavioral intention (2 items), attitude towards fast food consumption (24 items), subjective norms (15 items), and perceived behavioral control (18 items). Content Validity Index (CVI) and Content Validity Ratio (CVR) values were higher than .80 and .70 respectively. Responses are recorded on a Likert response scale from 1 (completely disagree) to 5 (completely agree). The higher score indicates the higher tendency to fast food consumption in the total score and each of its components. This scale was used in pretest, first posttest and second posttest.

Data analysis

The collected data was analyzed using IBM SPSS version 22 statistical package. Data analysis included two steps: 1) Descriptive statistics analyses which included frequencies, mean standard deviations, standard deviation and X^2 , and 2) Advanced statistics which included T-tests and ANOVA tests for comparing the pretest, posttest and follow-up stages. More specifically, for descriptive analyses, absolute frequencies were calculated for categorical variables, and mean and SD for continuous variables. An ANOVA analysis was used to test for within-group differences from baseline to the end of the intervention. The type I error was set to 5% (two-sided). We used t and p estimates to confirm or refuse the research hypotheses. The method and procedure of this experiment was reviewed and confirmed by the Ethics Board of Shahid Beheshti University of Medical Science [ID number of 6727].

Results

Demographic information of the parents of participants is presented in Table 1. A total of 160 high school students participated in this study. Table 2 shows the descriptive statistics of the scale across different components in control and experiment groups in pretest, primary posttest and secondary posttest.

Table 2
Basic information on component and subcomponents of fast food consumption scale ($n = 160$)

Component	Number of item	Pretest		Posttest 1		Posttest 2	
		Cronbach Alpha		Cronbach Alpha		Cronbach Alpha	
		Control	Experiment	Control	Experiment	Control	Experiment
Actual behavior	1	--	--	--	--	--	--
Behavioral Intention	2	0.60	0.70	0.50	0.60	0.70	0.53
Attitudes toward fast food	24	0.80	0.77	0.59	0.54	0.64	0.52
Subjective norms	15	0.50	0.60	0.51	0.45	0.45	0.44
Perceived behavioral control	18	0.76	0.76	0.74	0.65	0.72	0.64
Total	60	0.88		0.85		0.83	

Table 3 compares the changes between pretest and primary posttest. As the table shows the mean scores of behavioural beliefs ($t = 1.12, p = 0.262$) and evaluation of behavioral outcomes ($t = 1.85, p = 0.066$) had no significant difference between groups, while this difference appeared between the two groups immediately after the intervention for behavioral beliefs ($t = 5.10, p < 0.0001$) and evaluation of behavioral outcomes ($t = 5.35, p < 0.0001$). Moreover according to Table 4 this difference appeared two months after the intervention for behavioral beliefs ($t = 4.27, p < 0.0001$) and evaluation of behavioral outcomes ($t = 4.62, p < 0.0001$). Also, mean scores of normative beliefs ($t = 0.73, p = 0.464$) and motivation to comply ($t = 1.46, p = 0.144$) had no significant difference between groups before intervention; while this difference appeared between the two groups immediately after the intervention for normative beliefs ($t = 2.32, p = 0.021$), and for motivation to comply ($t = 5.56, P < 0.0001$). According to Table 4, this difference also was observed two months after the intervention for normative beliefs ($t = 2.78, p = 0.006$) and for motivation to comply ($t = 5.81, p < 0.0001$).

Table 3
Inter- and intra groups comparisons of TPB constructs in pretest and first posttest ($n = 160$)

Component	Subcomponent	Group	Pre-intervention ($M \pm Std$)	Immediately after intervention ($M \pm Std$)	<i>P</i> -value
Actual behavior	-	Experimental	4.14 \pm 1.56	4.46 \pm 1.37	$p = 0.001$
		Control	4.35 \pm 1.32	4.31 \pm 1.40	
		P. value	$P = 0.354$	$P = 0.494$	$p = 0.259$
		t-test	0.93	0.68	
Attitudes toward fast food consumption	Behavioural Beliefs	Experimental	52.25 \pm 7.27	54.77 \pm 5.21	$p < 0.001$
		Control	50.86 \pm 7.87	50.13 \pm 6.23	$p = 0.380$
		P. value	$P = 0.262$	$P < 0.0001$	
		t-test	1.124	5.100	
	Evaluation of Behavioral Outcomes	Experimental	31.65 \pm 3.88	33.43 \pm 33.52	$p < 0.001$
		Control	30.46 \pm 4.22	30.20 \pm 4.36	$p = 0.098$
		P. value	$P = 0.066$	$P < 0.0001$	
		t-test	1.85	5.35	
Subjective norms	Normative Beliefs	Experimental	34.08 \pm 5.05	35.88 \pm 4.34	$p < 0.001$
		Control	34.62 \pm 4.15	34.30 \pm 4.30	$p = 0.008$
		P. value	$P = 0.464$	$P = 0.021$	
		t-test	0.73	2.32	
	Motivation to Comply	Experimental	18.38 \pm 3.51	20.35 \pm 2.95	$p < 0.001$
		Control	17.61 \pm 3.15	17.65 \pm 3.17	$p = 0.782$
		P. value	$P = 0.144$	$P < 0.0001$	
		t-test	1.46	5.56	
Perceived behavioral control	Control Beliefs	Experimental	33.73 \pm 5.87	37.47 \pm 4.44	$p < 0.001$
		Control		32.25 \pm 5.78	

Component	Subcomponent	Group	Pre intervention $P = 0.134$ ($M \pm Std$) 1.50	Immediately after intervention $P < 0.0001$ ($M \pm Std$) 4.50	$P =$ 0.575 value
		P. value			
		t-test			
	Perceived Power	Experimental	27.31 \pm 4.08	29.98 \pm 3.53	$p <$ 0.001
		Control	27.11 \pm 4.45	27.05 \pm 4.64	$p =$ 0.771
		P. value	$P = 0.768$	3.31	
		t-test	0.29		
Behavioral Intention	-	Experimental	5.77 \pm 1.89	6.51 \pm 1.75	$p <$ 0.001
		Control	5.52 \pm 1.71	5.61 \pm 1.68	$p =$ 0.252
		P. value	$P = 0.383$		
		t-test	0.87		
				$P = 0.001$	
				0.68	

Table 4

Inter- and intra groups comparisons of TPB constructs in pretest and second posttest ($n = 160$)

Component	Subcomponent	Group	Pre-intervention ($M \pm Std$)	2 months after intervention ($M \pm Std$)	<i>P</i> value
Actual behavior	-	Experimental	4.14 \pm 1.56	4.69 \pm 1.30	$P = 0.001$
		Control	4.35 \pm 1.32	4.35 \pm 1.37	$P = 1$
		P. value	$P = 0.354$	$P = 0.112$	
		t-test	0.93	1.59	
Attitudes toward fast food consumption	Behavioural Beliefs	Experimental	52.25 \pm 7.27	54.30 \pm 6.09	$P = 0.007$
		Control	50.86 \pm 7.87	50.12 \pm 6.25	$P = 0.590$
		P. value			
		t-test	$P = 0.262$	$P < 0.0001$	
	Evaluation of Behavioral Outcomes	Experimental	31.65 \pm 3.88	33.25 \pm 3.44	$P < 0.0001$
		Control	30.46 \pm 4.22	30.57 \pm 3.85	$P = 0.181$
		P. value	$P = 0.066$	$P < 0.0001$	
		t-test	1.85	4.62	
Subjective norms	Normative Beliefs	Experimental	34.08 \pm 5.05	35.81 \pm 4.44	$P < 0.0001$
		Control	34.62 \pm 4.15	33.86 \pm 4.40	$P = 0.001$
		P. value	$P = 0.464$	$P = 0.006$	
		t-test	0.73	2.78	
	Motivation to Comply	Experimental	18.38 \pm 3.51	20.7 \pm 3.04	$P < 0.0001$
		Control	17.61 \pm 3.15	17.91 \pm 3.01	$P = 0.143$
		P. value		$P < 0.0001$	
		t-test			

Discussion

This study aimed to reduce fast food consumption using a parent-teacher interaction-based intervention program amongst high school students in Iran. Results of the current study indicate that there was a significant difference between the intervention and control groups in regards to behavioral beliefs and evaluation of behavioral outcomes, immediately and two months after the intervention. These changes indicate that the training intervention is effective for increasing students' negative beliefs and attitudes towards fast food consumption which is consistent with previous studies (Mohammadi Zeidi & Pakpour, 2013; Soofy, Gharibi, & Zarei M, 2013; Gheysvandi, Eftekhari Ardebili, & Azam, 2015; Kothe, Mullan, & Butow, 2012).

Subjective norms as the second effective factor on an individual's intention include the perceived social pressures an individual may experience to perform or not perform the desired behavior; in other words, it reflects the impact of social influence on an individual's behavior (Glanz, Rimer & Viswanath, 2008). In this study, a training session was conducted for parents and teachers of students to influence the student's subjective norms. Moreover, the parents received nutritional short messages on a daily-basis. Findings demonstrated that by involving parents and teachers in this intervention this could positively influence the student's perceived subjective norms. This is consistent with previous findings that parents play an important role in adolescent's food choices along with parental cooking styles, and expectations, influencing the development of their children's eating habits (Savage, Fisher, & Birch, 2007; Wellard, Chapman, Wolfenden, Dodds, Hughes, & Wiggers, 2014). In doing so, the unhealthy food patterns within a family can negatively affect the nutritional status of children, and subsequently increase the incidence of obesity and/or other chronic diseases among children (Dadkhah Piraghaj, Amini, Hushyarv Rad, Abdolahi, Zogi, & Eslami, 2008). This finding can also be supported by Social Cognitive Theory (Bandura, 1986), which provided solid support for the study of Carson (2010) in which teacher modeling was an effective method to encourage youth to accept certain foods. In addition, our results matched similar studies in other countries (e.g., Kothe, Mullan, & Butow, 2012; Anderson, Porteous, Foster et al, 2005). Not to mention, there are further studies that highlight the importance of the role of family and peer groups on changing dietary behaviors (Klomegah, 2006; Perez-Escamilla, Hromi-Fiedler, Vega Lopez, Bermudez-Millan, & Segura-Perez, 2008; Ribel, Estabrooks, Dunsmore et al, 2015; Zendeh talab, 2012).

Another concept of TPB is perceived behavioral control. That is the perception of an individual regarding how much he/she has control over his/her behavior (Glanz et al., 2008). As our findings indicate, there were significant differences between the control and experimental groups in terms of control beliefs and perceived power immediately after intervention and 2 months later in the follow-up stage. This demonstrates that the intervention could improve student's self-efficacy to choose healthy foods as well as to show greater control over what they actually choose. This finding is consistent with previous studies that suggested perceived behavioral control can considerably shape behaviors associated with healthy foods (Armitage, 2005; Martin, Oliver, & McCaughy, 2007) as well as improved perceived behavioral control can predict intention for fruit and vegetable consumption (Bogers, Brug, Assema, & Dagnelie, 2004). There are similar studies that have used different interventions to improve perceived behavioral control amongst students and provide further support for our findings (Gratton, Povey, & Clark-Carter, 2007; Kothe et al., 2012).

We found a significant difference between the intervention and control groups for intention to consume fast food in posttest and follow-up stages. These findings can be explained by the TPB theory. According to TPB, the intention is the most important determinant of human behavior. Recent researchers claim that intention could also be an important element of optional behaviors (Ebadi, Rakhshanderou, & Ghaffari, 2018). Therefore, any change in the intention for fast food consumption may directly influence the actual behaviors associated with fast food consumption of individuals. This view is supported by previous studies (Gheysvandi, Eftekhar Ardebili, & Azam, 2015; Mohammadi Zeidi & Pakpour, 2013; Kellar & Abraham, 2005; Kothe et al., 2012) that demonstrate after a training intervention students with stronger intention to consume fruits and vegetables were more likely to actually consume them. However, the link between intention and behavior is not always visible. This matches our final finding that revealed there is no statistically significant difference between both groups at the behavioral level after the intervention. In agreement with this finding, there are studies that could not find such an impact (Gao, Huang, Zhang, Liu, Feng, Liu, Sun, 2014; Anderson et al., 2005). Perhaps an explanation for the recent finding is that we should consider contextual factors (e.g. availability and accessibility to healthier food options in settings such as schools', shopping centers, restaurants, etc.) that could influence the intention-behavior link before we expect to observe such a link.

Suggestions And Limitations

According to our findings, several suggestions can be addressed. First, considering the crucial role of parents and teachers in shaping healthy food habits, future studies should always consider them as a key component of the training intervention. Second, parents and teachers should be trained on how to best transfer and express their knowledge to children and adolescents in regards to their disapproval of fast food consumption. As our findings show, students can perceive this disapproval and change their own attitudes accordingly. Third, future studies are recommended to use multilevel interventions to prevent students from consuming fast food. For both students and parents, we suggest adding more professionally designed visual and graphical messages (eg. Infographics) or short video clips that could demonstrate the differences between fast food and healthy foods and their subsequent impact on the body.

This study is not free of limitations. The use of self-report questionnaires to record the student's responses may increase the possibility of the social desirability effect. In other words, students may have responded to the questions in a way to satisfy members of the research team. The second limitation is related to sample size and type. Due to limitations we only sampled male students, which leaves out the female high school student population. Future studies are highly encouraged to include females as well. The third limitation is related to the socioeconomic profile of the participants. We did not investigate the extent to which the social and economic status of the students may influence the findings. For example, wealthier students may consume more fast food because they have the financial backing to do so. The fourth limitation may be related to the extent to which students show consistent avoidance behaviors to fast food consumption when outside of the school environment. Lastly, we believe that our study primarily focused on changes in attitudes and beliefs and future studies may consider the degree to which actual behaviors changed and which physical indicators, such as weight, may also be influenced by this intervention.

Conclusion

The proposed parent-teacher interaction-based intervention was found to be an applicable, timely and overall useful way to reduce fast food consumption among adolescent students. When students receive consistent and simultaneous messages from both parents at home and teachers at school regarding the negative impacts of fast food consumption on their health, they become more pliable to possess negative attitudes towards fast food and greater positive attitudes towards healthy foods. These findings explicitly indicate that although high school students are mature enough to understand the difference between harmful and healthy foods, their actual attitudes and behaviors can still be influenced and altered by parents and teachers.

Declarations

Ethics approval and consent to participate

This study received an ethics approval from the ethics board of the Medical Science University of Shahid Beheshti located in Tehran, Iran (Ethic Code: 6727). Moreover, a written consent was obtained from the parents of each participant before the participant could take part in this study.

Consent for publication

All authors agree to publish this study in the journal of International Journal of Behavioral Nutrition and Physical Activity.

Availability of data and material

The data of this study will be available upon request.

Competing interests

The authors declare that there is no conflict of interest among them.

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No official fund was received for conducting this study.

Authors' contributions

SR and MG designed the study and applied for ethics approval. YS and PH collected data and entered data into the statistical programs. MC analyzed data and drew tables and figures. SR and YS wrote the first draft.

LS and FD structured the manuscript, improved the English text and removed typos. MC and MG revised the first draft. LS and FD improved the second version. MC, PH, and SR revised the second and third versions. All authors checked and confirmed the final version.

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Figures

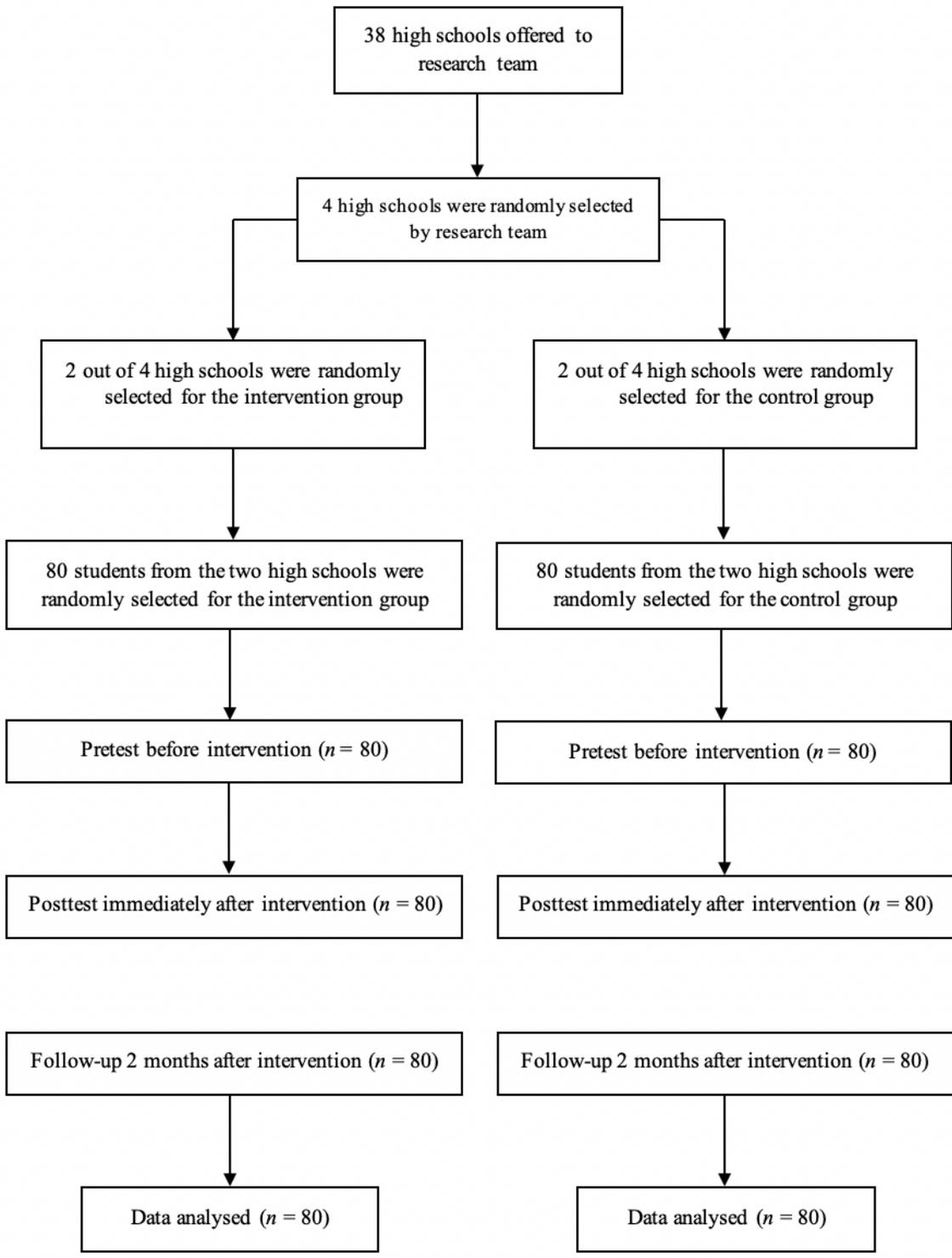


Figure 1

Flow chart of sampling method in the present study

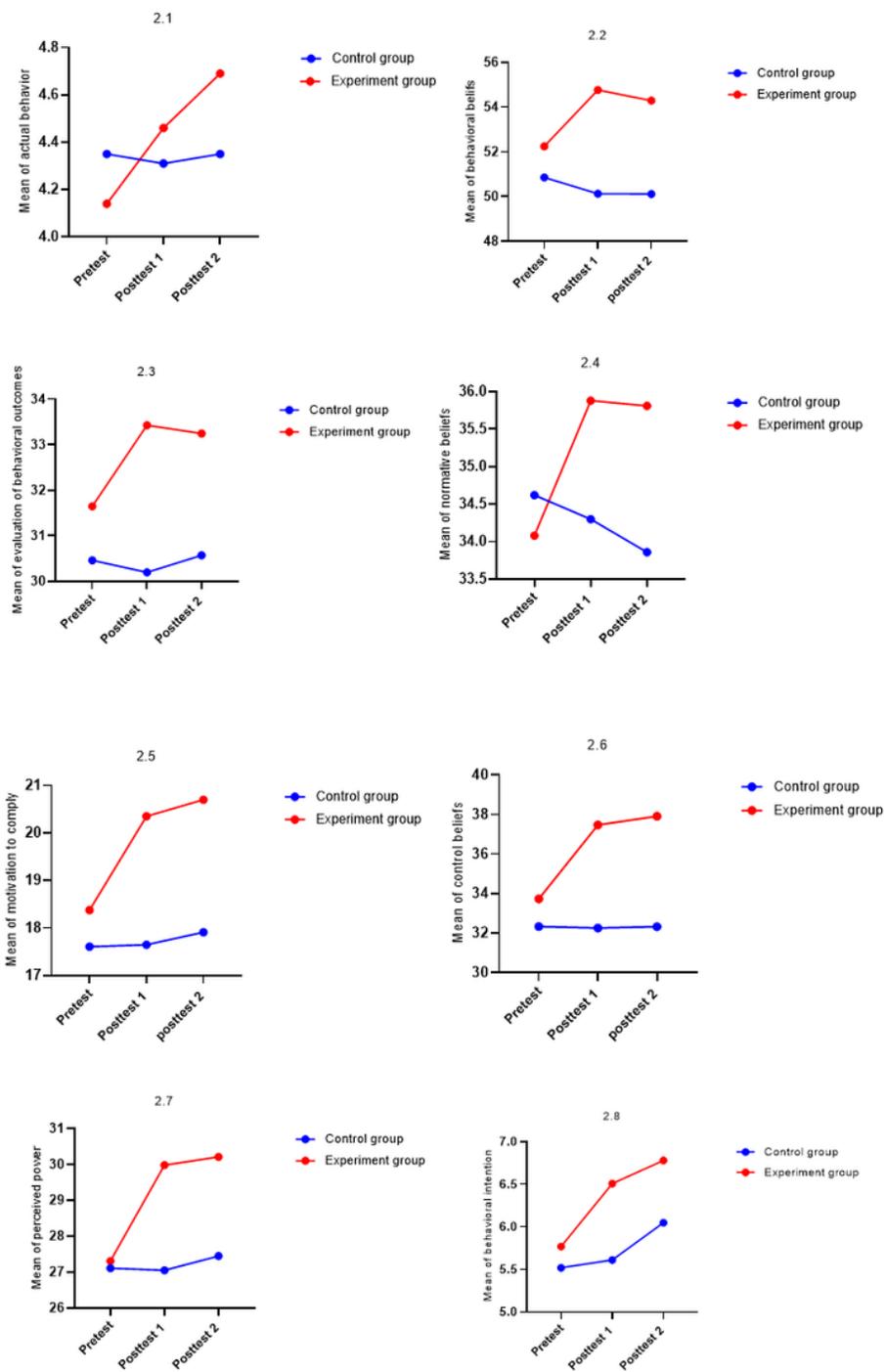


Figure 2

Pretest, immediate posttest and long term posttest of the components of fast food consumption

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