Efficacy of Intervention Program to Reduce Junk Food Consumption: A Quasi Experimental Study

Ayesha Abdul Khaliq[1], Iram Fatima[2], Christopher Alan Lewis[3]

Abstract

The objective of the study was to assess the efficacy of educational intervention program based on principles of Protection Motivation Theory (PMT) to reduce junk food consumption in high school students in Pakistan. With quasi experimental design, educational intervention was planned and conducted. Fifty students of ages between 13 and 19 years were selected. The Risk Behavior Diagnostic Scale was adapted to measure perceived susceptibility and severity of various disease; response and self-efficacy along with intentions to leave junk food consumption. Junk Food Frequency Checklist was constructed to gauge junk food consumption behavior. Assessments were made before, after and at follow up level. Results from repeated measures ANOVA and post hoc test revealed significant increase in perceived susceptibility and severity of threat to health from pre intervention to post intervention and after one month follow up in adolescents. Significant increase was also noted in response and self-efficacy as well as in intentions to reduce junk food consumption from pre to post and follow up level. Further, significant decline in junk food eating behavior was also reported from pre intervention to follow up and from post to follow up level. Findings provide some evidence that PMT based intervention is effective for reducing junk food consumption in adolescents. Such interventions may also be considered to modify other health-hazardous behaviors.

Keywords: Adolescents, Junk food, Obesity, Pakistan, Protection Motivation, Sedentary

[1]MS Scholar, Institute of Applied Psychology, University of the Punjab, Lahore, Pakistan.
[2]Associate Professor, Institute of Applied Psychology, University of the Punjab, Lahore, Pakistan.
[3]Department of Social and Behavioral Sciences, School of Social and Health Sciences, Leeds Trinity University, Leeds, UK.

Corresponding Author Email:
ayeshaabdulkhaliq@gmail.com

Introduction

"Junk food" is the term given to food that is high in calories but low in nutritional content. In adolescents, both boys and girls undergo several physical and psychological changes which make them partly responsible for their own health and welfare (WHO, 2014a). However, the media plays an important role in their decision making. Many advertisements promote foods that are high in fats, sugar, and salt (WHO, 2014b). In Pakistan, there are about 169 million consumers of junk food. The latest data have shown that the junk food industry is the second largest industry in Pakistan (Baig & Saeed, 2012).

The extra fats contained within junk food can lead to weight gain and obesity and that can put extra pressure on the heart and lungs and can lead to difficulty in breathing (Meszaros, 2020). Obesity is becoming the most growing eating disease as per WHO in 2016, 340 million children, and adolescents, aged 5-19 were reported to be obese (WHO, 2018). Junk food is becoming a global contributor to

chronic illness and ill-health (Azadbakht & Esmaeilzadeh, 2008) and its excessive consumption is known as the root cause of obesity (Flodmark et al., 2004). Another health problem that results from eating fast food is cancer (Dehdari et al., 2016). Globally, stomach cancer is the second most common tumor and the second leading cause of death from cancer. Stomach cancer is also recognized as gastric cancer. Worldwide, Pakistan is ranked 139th for the ranking in terms of gastric cancer (WHO, 2012).

Pakistan currently ranks 8th worldwide in terms of diabetes and is projected to climb to 4th place by the year 2025 (after India, China, and the USA) (The Nation, 2018). Eating too much junk food leads to obesity and that further turns to the threat of diabetes mellitus (WHO, 2010). Fast-food consumption has strong positive associations with weight gain and insulin resistance (Pereira et al., 2008). Fried junk food contains high salt and saturated oil that causes high blood pressure and that hypertension is a risk factor of another disease i.e., coronary heart diseases. Major causes of coronary heart disease are the unhealthy eating patterns, high fat and caloric food, high sodium intake, obesity, diabetes, blood pressure, family history, physical inactivity, and stress (Bhaskar & Monika, 2012).

Above mentioned literature explains well the relationship between junk food consumption and health hazards. These diseases are mainly caused by junk food overconsumption and are interlinked as the onset of one disease leads to the onset of another disease. The intake of junk food imbalances the number of macronutrients, such as too much sugar in food that can cause obesity. Obesity is among the risk factors of heart disease that as one's weight and waist circumference increase, the risk of heart disease increases. Too much salt in the food causes blood pressure and that is another risk factor for heart disease. The extra consumption of saturated fat regularly increases the cholesterol in the blood, a major risk factor for cardiac disease and stroke (Soliman, 2018).

Protection Motivation Theory (PMT) has been tested for its effectiveness in dealing with various health threats. Bai et al. (2018) observed that among PMT constructs, risk perception predicted cancer preventive behaviors. Xu and Chen (2016) found threat appraisal as significant predictor of smoking reduction in school students in China. Wong et al. (2016) used PMT to understand the sedentary behaviors and found it effective in predicting protection motivation drive. More recently, Ranaei et al. (2021) concluded from systematic review that PMT based interventions successfully helped in changing eating behaviors of both children and adults. School based interventions have been reported to be effective in changing eating patterns of children (Chaudhary et al., 2020).

Protection Motivation Theory (PMT; Rogers 1983) explains the responses to the fear of arousing health communications. It enlightens how responses are made to the "fear appeals." It is operationally defined as the intent to take on the recommended action. In this model, the determinants of intention are specified. Among the determinants, four have received the most empirical attention; perceived susceptibility, perceived severity, response efficacy, and perceived self-efficacy. Susceptibility and severity are the same as perceived vulnerability and severity in the Health Belief Model. These are defined as the individual's perception of the risk or the chances of contracting a health disease or condition (Witte, 1992). Perceived severity is the extent to which people believe a particular disease is severe or serious. Response efficacy is a belief that the recommended action is effective in decreasing the danger. Perceived self-efficacy is defined operationally as the belief that one can efficaciously accomplish the recommended action (Bandura,

1997). Behavioral intention is the agreement of the individual with the statements that expressed clear intent to involve in some behavior (Sapp, 1991).

Easy availability is one of the main reasons of junk food consumption in school going children (Bohara et al., 2021) and is currently, the most "hot topic" within Pakistani media. In Pakistan, there are no reported studies to assess the effectiveness of PMT based intervention to improve eating habits and to evaluate the pre and post knowledge of the nutritious value of the junk food, namely perceived susceptibility (threat of getting any disease like obesity, or cardiovascular disease due to the intake of junk food) and perceived self and response efficacy (person's ability to take action for its health) of junk food consumers after receiving the intervention based on PMT. This study can help to promote healthy behaviors and a healthy lifestyle for the enhancement of health and prevention of disease in adolescents.

Method
Research Design
A pre-post quasi-experimental study design was used to test protection motivation theory by an educational intervention on perceived susceptibility, perceived self and response efficacy of adolescents regarding junk food consumption.

Sample
The estimated sample calculated through G*power was 50 for paired sample ANOVA with medium effect size. To avoid bias, all 66 students of class 9th aged 13-19 from one school in Lahore, Pakistan were included. 58 out of 66 attended all sessions of a six-day intervention program but only 50 students responded to scales during pre, post and follow up sessions.

Instruments
Personal Information Sheet
Data was collected regarding gender, age, mother's and father's status of employment, family status, daily pocket money, and eating trends in family.

The Risk Behavior Diagnostic Scale
It consists of five subscales with three items in each. The scales were adapted to be used in the current study. Susceptibility to Threat scale assessed perception of risk to have serious illness due to unhealthy eating. Severity of threat to health due to unhealthy eating was assessed with Severity of Threat scale. Individual's trust that his or her efforts to leave junk food eating will protect from serious illness was measured with Response Efficacy scale. One's confidence in one's ability to stop eating unhealthy food was gauged with Self-efficacy scale. Intentions to leave junk food was measured with Intention scale. Individuals had to respond on five point likert scale from 1 (strongly disagree) to 5 (strongly agree). Mean scale value was calculated as a score for all subscales. Chronbach alpha ranged from .80 to .87 at the pre intervention stage (Witte, 1992).

The Junk Food Frequency Checklist
It was developed to gauge junk food consumption behavior, containing local and international food items consumed by the local population. Items were verified by a nutritionist for their junk food status. It consisted of 20 items. Responses had to be given on 7 point scale ranging from 0 (never) to 6 (daily). Mean scale value was calculated as a score. Cronbach alpha at the pre intervention stage was .77.

PMT Based Educational Intervention Program
A six-day, one hour per day intervention plan was designed by the researchers with the help of review of literature on intervention studies based on protection motivation theory (Maddux & Rogers, 1983; Ranaei et al., 2021). Presentations containing lectures and

videos were delivered on five health issues arising due to junk food consumption. The videos included interviews of indigenous adolescents who suffered from health issues (obesity, hypertension and stomach ulcer) and overcame them as well as international animated videos describing the health hazards of junk food overconsumption. The videos and lectures were prepared in way to increase susceptibility and severity to threat as well as to enhance self and response efficacy. Other than power point presentations and videos, chart and leaflet making activities containing pros and cons of junk food consumption, group discussions and homework assignments regarding hazards of junk food consumption and ways to reduce it were also part of the intervention plan. Although, the school was English medium but the medium of communication chosen during the six-day intervention was mixed. The manual for intervention was approved by two researchers who have used protection motivation theory for their intervention studies.

Procedure

Before conducting the research, permission was taken from head of school. Informed consent was taken from all the participants and their parents. Students were required to complete the set of questionnaires including demographic information sheet, the Junk Food Frequency Checklist and Risk Behavior Diagnostic Scale prior to any intervention. After that, the six-day intervention was implemented to enhance their knowledge of health hazards of junk food, their perceived susceptibility towards different diseases caused by junk food consumption and their self-efficacy to avoid junk food. The training of 1- hour intervention was delivered for six days. After 1-week intervention, students were required to complete the entire questionnaires again. After 1 month, students were reassessed through the questionnaires without giving any intervention. No teacher, parent, or guardian was allowed to be with the participant during the intervention and assessment process to avoid any kind of pressure or response biases. Appreciation certificates were given after follow up to only those participants who successfully attended whole 6-day intervention and were present at all three stages of assessment.

Results

The results of the study highlight that majority of the respondents belonged to joint family system (60%, *n*=30). Majority of the respondents consumed homemade food (52%, *n*=26) whereas 46% (*n*=23) consumed both homemade and junk foods. Majority of the respondents (58%, *n*=29) used to consume lunch from their school canteen. A detailed description is given (Table 1).

Table 1

Demographic Characteristics of Respondents (N=50)

Indicators	n (%)
Age	Mean 14.72 (±1.09)
Gender	
Male	20 (40)
Female	30 (60)
Family System	
Nuclear	20 (40)
Joint	30 (60)
Parent Status	
Single	2 (4)
Dual	48 (96)

Mother's employment status	
Employed	11 (22)
Housewife	39 (78)
Father's employment status	
Employed	46 (92)
Unemployed	4 (8)
Daily Pocket Money (Rs)	39.30 (±27.71)
Eating trend in family	
Homemade food	26 (52)
Readymade food	1 (2)
Both	23 (46)
You get lunch from	
Home	14 (28)
Canteen	29 (58)
Both	7 (14)

Table 2

Repeated Measure ANOVA Comparing Three Testing Conditions (N=50)

Variables	Pre-Test		Post-Test		Follow-up		$F_{(2,98)}$	p	η^2
	M	SD	M	SD	M	SD			
Response Efficacy	3.77	0.69	4.55	0.46	4.91	0.58	56.04	<.001	.61
Self-Efficacy	3.25	1.00	3.91	0.79	4.26	0.72	44.93	<.001	.10
Susceptibility to Threat	3.88	0.58	4.59	0.47	3.89	0.58	79.21	<.001	.52
Severity of Threat	3.95	0.61	4.62	0.54	3.95	0.61	75.85	<.001	.43
Intention	2.78	1.10	3.74	0.89	4.26	0.76	44.52	<.001	.15
Junk Food Consumption Behavior	1.95	0.73	1.87	1.04	1.35	1.05	7.31	.001	

Repeated measures ANOVA was conducted to assess if the scores on study variables differed across three stages. Results in Table 2 highlight that all the measured variables are significantly different at least at one stage of assessments.

Table 3
Post Hoc Analysis (N=50)

Variables	Testing Conditions		*Mean Difference*
Junk Food Consumption Behavior	Pre	→Follow up	12.06*
	Post	→Follow up	10.32*
	Pre	→ Post	000
Risk Behavior Diagnostic Scale			
Response Efficacy	Pre	→Post	-2.32*
	Pre	→Follow up	6.42*
	Post	→Follow up	8.75*
Self-Efficacy	Pre	→Post	-1.98*
	Pre	→Follow up	-3.94*
	Post	→Follow up	-1.06*
Susceptibility to Threat	Pre	→Post	-2.092*
	Post	→Follow up	2.092*
Severity of Threat	Pre	→Post	-1.996*
	Post	→Follow up	1.996*
Intention	Pre	→Post	-2.880*
	Pre	→Follow up	-4.420*
	Post	→Follow up	-1.540*

*$p<.05$

Post-hoc analysis with Bonferroni method was carried out for pairwise comparisons of pre, post, and follow-up. Results reveal that students reported significantly less junk food consumption at the follow up level as compared to pre intervention and post intervention. Whereas no significant difference was found in the behavior of junk food eating between pre and post intervention. Response and self-efficacy; perceived susceptibility, and severity to threat and intentions increased from pre to post, and pre to follow up as well as from post to follow up level. A detailed description is given in table 3.

Discussion

The consumption of junk food among adolescents is a serious public health concern and risk factor for many health issues in a young age. The implementation of interventions aimed to change behavior of adolescents can help to develop healthy eating behaviors. The current study aimed to test the effectiveness of PMT theory within the context of trying to reduce junk food consumption among a sample of Pakistani adolescents.

Demographics revealed that most of the students used to take their lunch from canteen, which highlights the important factor of "easy availability" of junk food as the cause of its high consumption as evident from literature that school going adolescents

consume junk foods due to its easy availability and ready-to-use packaging (Bohara et al., 2021).

The study was an initial attempt to develop an intervention Program to reduce junk food consumption based on PMT for use in Pakistani schools. The significant differences in PMT based constructs including susceptibility, severity, response and self-efficacy at three stages of intervention provide some evidence for validity of the scales in the local population. The difference at all the three stages also suggest the utility of the program in bringing consistent changes in the thinking styles of the students at least for one month. The finding is in line with the conclusion drawn be Chaudhary et al. (2020) from a review of school based intervention studies to promote healthy eating. Direct instruction combined with modeling and opportunities for open discussions help in bringing relatively permanent changes in attitudes.

Further, current study provided some evidence that the designed intervention based on PMT was effective in reducing junk food consumption. These findings are supported by previous research (Ranaei et al., 2021). Current study used direct instruction method to inform the harmful effects of junk food eating. Knowing only the hazards of unhealthy behavior is not enough to change the long held habits of eating mouthwatering food. Knowing that you are equally vulnerable as other people makes you pay more attention to the threats. The current intervention program used video recorded interviews of students going through the health issues of the same social group as of the sample of the study. This might have caused the sample to relate more with those who are suffering. Similarly, documentaries regarding students of their own social group showing how they came out of their problems leaving the junk food would have helped

them increase their own response and self-efficacy.

Results also revealed significant increase in intention to stop junk food consumption from pre to post and post to follow up level after one month of intervention. However, reported junk food consumption did not significantly reduce immediately after intervention. But, it significantly decreased after one month. Changes come first at the cognitive level and then they convert into behavior. It seems that it takes some time to convert intentions into behavior especially when it is a matter of changing habitual eating patterns (Milne et al., 2000). It is also probable that students communicated and discussed about the intervention program at school with their family and teachers who further encouraged and helped them to adopt healthy eating.

Results of this study highlight the need of further nutritional educational programs as the course part of the student's syllabus, which can highlight the importance of nutritious food intake. Moreover, it showcases the easy availability of junk food at school canteens and provides the basis to ponder for availability of healthy instead of junk food at educational institutes.

Limitations of Study

Time constraint was the major limitation in the current study. A 6-month intervention should be designed to further assess the change in behavior regarding junk food consumption among adolescents.

Conclusion

The study concluded a significant effect on reducing junk food consumption behavior among adolescents. Significant differences were found in all components of protection motivation theory at pre, post, and follow up. Hence, it demonstrates that Protection Motivation Theory is very useful in the modification of any behavior as in the present study, it was helpful in the reduction of junk food consumption behavior. The findings of

the present research should be helpful in making people aware of the health hazards of junk food and to take initiative measures to prevent diseases caused by junk food by reducing its consumption. Parents and caregivers can be trained to pay more attention to their children's diet and health.

Contribution of Authors

Ayesha Abdul Khaliq: Conceptualization, Investigation, Data Curation, Formal Analysis, Writing - Original draft

Iram Fatima: Conceptualization, Methodology, Formal Analysis, Writing- Reviewing & Editing

Christopher Alan Lewis: Conceptualization, Methodology, Investigation, Writing - Reviewing & Editing

Conflict of Interest

There is no conflict of interest declared by authors.

Source of Funding

The authors declared no source of funding.

References

Azadbakht, L., & Esmaeilzadeh, A. (2008). Fast foods and risk of chronic diseases (Editorial). *Journal of Research in Medical Sciences (IRMS), 13*(1), 1-2. https://www.sid.ir/en/journal/ViewPaper.aspx?id=102786

Bai, Y., Liu, Q., Chen, X., Gao, Y., Gong, H., Tan, X., Zhang, M., Tuo, J., Zhang, Y., Xiang, Q., Deng, F., & Liu, G. (2018). Protection motivation theory in predicting intention to receive cervical cancer screening in rural Chinese women. *Psychooncology, 27*(2), 442-449. https://doi.org/10.1002/pon.4510

Baig, A. K., & Saeed, M. (2012). Review of trends in fast food consumption. *European Journal of Economics, Finance and Administrative Sciences*, *48*, 77-85.

Bandura, A. (1997). *Self-efficacy: The Exercise of Control.* Freeman.

Bhaskar, R., & Monika, O. (2012). Junk food: Impact on health. *Journal of Drug Delivery and Therapeutics*, *2*(3).67-73.

Bohara, S. S., Thapa, K., Bhatt, L. D., Dhami, S. S., & Wagle, S. (2021). Determinants of junk food consumption among adolescents in Pokhara Valley, Nepal. *Frontiers in Nutrition*, *8*. https://doi.org/10.3389/fnut.2021.644650

Chaudhary, A., Sudzina, F., & Mikkelsen, B. E. (2020). Promoting healthy eating among young people—A review of the evidence of the impact of school-based interventions. *Nutrients, 12*(9), https://doi.org/10.3390/nu1209 2894

Dehdari, T., Dehdari, L., & Jazayeri, S. (2016). Diet-related stomach cancer behavior among Iranian college students: A text messaging intervention. *Asian Pacific Journal of Cancer Prevention: APJCP*, *17*(12), 5165.

Flodmark, C. E., Lissau, I., Moreno, L. A., Pietrobelli, A., & Widhalm, K. (2004). New insights into the field of children and adolescents' obesity: The European perspective. *International Journal of Obesity*, *28*(10), 1189-1196.

Maddux, J. E., & Rogers, R. W. (1983). Protection motivation and self-efficacy: A revised theory of fear appeals and attitude change. *Journal of Experimental Social Psychology, 19*(5), 469–479. https://doi.org/10.1016/0022-1031(83)90023-9

Meszaros, L., (2020, March 25). Processed and junk foods: Bad news for pretty

much every system in the body. MD Linx. https://www. mdlinx.com/ internal-medicine/article/2868

Milne, S., Sheeran, P., & Orbell, S. (2000). Prediction and intervention in health-related behavior: A meta-analytic review of protection motivation theory. *Journal of Applied Social Psychology,* *30*, 106-143. http://dx.doi.org/10.1111/j.1559-1816.2000.tb02308.x

Pereira, M. A., Kartashov, A. I., & Ebbeling, C. B. (2008). Fast-food habits, weight gain, and insulin resistance (the CARDIA study): 15-year prospective analysis (vol 365, pg 36, 2005). *Lancet*, *365*(9464), 1030-1030. doi: 10.1016/S0140-6736(04)17663-0

Ranaei, V., Yarmohammadi, S., Alizadeh, L., Dadipoor, S., Pilevar, Z., & Aghamolaei, T. (2021). The effectiveness of interventions based on the protection motivation theory on healthy eating behaviors: A systematic review study. *Food and Health, 4*(2), 21-27.

Rogers, R. W. (1983). Cognitive and psychological processes in fear appeals and attitude change: A revised theory of protection motivation. In: *Social Psychophysiology: A Sourcebook*, Edited by: Cacioppo, B. L. and Petty, L. (Eds.) 153–176. New York: Guilford.

Sapp, S. G. (1991). Impact of nutritional knowledge within an expanded rational expectations model of beef consumption. *Journal of Nutrition Education*, *23*(5), 214-222.

Soliman, G. A. (2018). Dietary cholesterol and the lack of evidence in cardiovascular disease. *Nutrients, 10*(6), 780.

The Nation (2018). Pakistan ranked 9th in obesity, 8th in diabetes (2018, May 6). The Nation, p. 4. https://nation.com.pk/06-May-2018/pakistan-ranked-9th-in-obesity-8th-in-diabetes

Witte, K. (1992). Putting the fear back into fear appeals: The extended parallel process model. *Communications Monographs, 59(4), 329-349. doi: https://doi.org/10.1080/ 09709274.2012.11906514*

Wong, T. S., Gaston, A., DeJesus, S., & Prapavessis, H. (2016). The utility of a protection motivation theory framework for understanding sedentary behavior. *Health Psychology and Behavioral Medicine*, *4*(1), 29-48. doi: https://doi.org /10.1080/21642850.2015 .1128333

World Health Organization (2010). Nutrition: Malnutrition. http://www.emro.who.int/health-topics/obesity/

World Health Organization (2012). Obesity and Overweight. https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight

World Health Organization (2014a). Adolescence: psychological and social changes. https://apps.who.int/adolescent/second-decade/section2 /page5/ adolescence-psychological-and-social-changes.html

World Health Organization (2014b). Protecting children from the harmful effects of food and drink marketing. https://www.who.int/features/2014/uk-food-drink-marketing/en/

World Health Organization. (2018). Obesity and overweight. https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight

Xu, Y., & Chen, X. (2016). Protection motivation theory and cigarette smoking among vocational high school students in China: A cusp catastrophe modeling analysis. *Global Health Research and Policy*, *1*(1), 1-9. doi: 10.1186/s41256-016-0004-9