Factors related to reduction in the consumption of fast food: application of the theory-based approaches

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Abstract

Background. The Trans-Theoretical model (TTM) and Theory of Planned Behaviour (TPB) may be promising models for understanding and predicting reduction in the consumption of fast food. The aim of this study was to examine the applicability of the Trans-Theoretical model (TTM) and the additional predictive role of the subjective norms and perceived behavioural control in predicting reduction consumption of fast food in obese Iranian adolescent girls.

Materials and methods. A cross sectional study design was conducted among twelve randomly selected schools in Sabzevar, Iran from 2015 to 2017. Four hundred eighty five randomly selected students consented to participate in the study. Hierarchical regression models used to predict the role of important variables that can influence the reduction in the consumption of fast food among students. using SPSS version 22.

Results. Variables Perceived behavioural control (r=0.58, P<0.001), Subjective norms (r=0.51, P<0.001), self-efficacy (r=0.49, P<0.001), decisional balance (pros) (r=0.29, P<0.001), decisional balance (cons) (r=0.25, P<0.001), stage of change (r=0.38, P<0.001), were significantly and positively correlated while experiential processes of change (r=0.08, P=0.135) and behavioural processes of change (r=0.09, P=0.145), were not significant.

Conclusions. The study demonstrated that the TTM (except the experiential and behavioural processes of change) focusing on the perceived behavioural control and subjective norms are useful models for reduction in the consumption of fast food.
may be important predictors for reduction in the consumption of fast food.16-18 Subjective norms and perceived behavioural controls may be important predictors of the reduction in the consumption of fast food.16,18,19 Subjective norms include what other people think and how other people behave13 Perceived behavioural control include factors that may facilitate completion of the behaviour (such as resources and opportunities).20 Because of the complementary nature of these two models, research has begun to use TTM and TPB (perceived behavioural control, subjective norms) to get a richer understanding of behaviour for reduction in the consumption of fast food in obese Iranian adolescent girls in Sabzevar, Iran from 2015 to 2017.

Materials and Methods

Study design and setting

A cross-sectional design was employed between March 2015 and 2017 among students from Sabzevar, Iran. At the time of the study, there were 57 schools in the Sabzevar, twelve schools were randomly selected. Using lottery methods for the study with a total of 57 students registered. Culturally similar students were the setting for the study. Obese Iranian adolescent girls ranged in age from 15 to 18 years. Students (n=485) were enrolled. Ethical approval for this study was gained from the research ethics committee at Tehran University of Medical Sciences with the number of (IR.TUMS.REC.1394.760) in 2015. An informed consent was obtained from all of the participants and parents.

Inclusion criteria

1. Adolescent girls between 15-18 years 2. BMI values ≥85th (CDC) 3. No diets 4. All of the samples participated willingly and voluntarily in this study. (Voluntary consent) 5. Being Iranian 6. Fast food (Sausage, sandwich, pizza, hamburgers, hot dogs, French fries) consumption once a week.

Exclusion criteria

1. Sick students. 2. Incomplete questionnaires. 3. Physical activity because of confounding effect. Students completed the measures in a classroom setting.

Sample size

The sample size was calculated using the formula for cross-sectional study with 0.05 margin of error, 95% confidence level, 1.5 design effect and additional 15% non response rate.21,22 It was calculated that a sample of 485 students.

Demographic variables

Demographic variables included, age, grade, level of education of the mother and father (illiterate, primary, guidance, school, high school, associate, B.S, M.S, PhD), job of mother and father (house wife, government employed, private sector employed, unemployed), number of members child, family residence status (Rent - Personal), height, weight and BMI(Weight(kg)/ height(m)²) measured. Trained persons performed measurement of height and weight based on the protocol of WHO at the residence of the participants. Measurement of weight was performed in terms of kg, using a digital balance, with an error of less than 100 grams, and of height was done using a ribbon meter and in terms of meter.

Self administered structured questionnaire, adapted from similar previous studies, questionnaires provided at Tehran University of Medical Sciences based on TTM and TPB.23 The questionnaires pilot was tested on 20 students. All questionnaires CVI (Content Validity Index) and CVR (Content Validity Ratio) values were higher than 0.75 and 0.62. Face validity were considered to be suitable with respect to 18 of expert panel members (Table 1).24

Stages of behaviour change

The TTM consists of five stages of change (pre-contemplation, contemplation, preparation, action, maintenance) represent the temporal, motivational, and consistency of behaviour change.25 To five stages of change the regard to the following questions.
1- I have not reduce fast food consumption and I have not thought about it (yes – no).
2- I have not reduce fast food consumption, but I have thought about it (yes – no).
3- I have not reduce fast food consumption, but I am planning to do so within one month (yes – no).
4- Now it is less than 6 month since I have reduced my consumption of fast food (yes – no).
5- Now it is more than 6 months since I have reduced my consumption of fast food (yes – no).

The answer yes reveals that the participant is in that stage and the answer no reveals that she is in other stages.

Questions ranging from pre-contemplation (=1), contemplation (=2), preparation (=3), action (=4) and maintenance (=5).

| Measures                                   | Content validity index | Content validity ratio | Cronbach’s Alpha |
|--------------------------------------------|------------------------|------------------------|------------------|
| Stage of change Ques                       | 0.92                   | 0.90                   | 0.90             |
| Self-efficacy Ques                         | 0.98                   | 0.97                   | 0.82             |
| Pros Ques                                 | 0.83                   | 0.86                   | 0.79             |
| Decisional balance (pros) Ques            | 0.83                   | 0.85                   | 0.71             |
| Decisional balance (cons) Ques            | 0.81                   | 0.84                   | 0.75             |
| Experiential processes of change Ques      | 0.88                   | 0.90                   | 0.80             |
| Behavioral processes of change Ques        | 0.82                   | 0.88                   | 0.82             |
| Subjective norm Ques                      | 0.90                   | 0.94                   | 0.88             |
| Perceived behavioral control Ques          | 0.94                   | 0.96                   | 0.95             |
| Reduction in the consumption of fast food Ques | 0.89                   | 0.84                   | 0.78             |
Self-efficacy

Self-efficacy as the confidence of persons on their ability for reduction in the consumption of fast food. Self-efficacy includes confidence and temptation. Confidence is described as the belief that one is able to engage in a healthy behaviour across multiple contexts while temptation is described as one’s temptation or urge to engage in an unhealthy behaviour across multiple contexts. In this research, eight questions were designed. The stem of all questions began with the phrase “How much you are confidence that you can”. The answers to the questions were designed in the form of 5 optional Likert scale (completely confident = 5, not confidence at all = 1).

Decisional balance

The TTM consists of decisional balance construct assesses the perceived barriers (cons) and benefits (pros) associated with the adoption of healthy behaviour. Decisional balance for reducing fast food consumption was assessed using a questionnaire with 8 questions. The questions on assessing pros including: delight arisen from fast food consumption in dietary (one question), positive effects on bodily fitness (one question), positive effects of comfort sleep (one question), positive effects on longevity (one question), positive effects on increasing resistance toward difficulties (one question). The questions on assessing cons including: Feel uncomfortable without fast food (one question), my life would be dull and boring without fast food (one question), lack of entertainment (one question), much time to prepare healthy foods is necessary without fast food (one question).

The answers to the questions were designed in the form of 5 optional Likert scale (very much = 5, very little = 1).

Processes of change

The experiential approaches are most effective when individuals have not yet changed their behaviour (pre-contemplation and contemplation stages), whereas behavioural strategies are more appropriate when individuals have initiated or are attempting to maintain new behaviours (action or maintenance stages). The questionnaires (PCS) for reduction in the consumption of fast food contain 30 items that measure experiential and behavioural processes of change. The items had moderate internal consistency: consciousness raising (0.89), self-liberation (0.78), social liberation (0.79), counter conditioning (0.88), stimulus control (0.78), helping relationship (0.80), and dramatic relief (0.80), self-reevaluation (0.86), environmental reevaluation (0.87), reinforcement management (0.86).

The questionnaires were consisted of questions experiential processes of change (consciousness raising (3 items), helping relationship (3 items), self liberation (3 items), dramatic relief (3 items), environmental reevaluation (3 items). Behavioural processes of change (self-reevaluation (3 items), social liberation (3 items), reinforcement management (3 items), stimulus control (3 items), counter conditioning (3 items), and assessed ranging from disagree strongly to agree strongly +1 to 5.

Reduction in the consumption of fast food

This scale had four items, how often do you eat fast food in 7 days? What time would you normally buy fast food? How often do you eat fast food in 30 days? How often do you consume fast food at school?

Subjective norm

This scale had four items; direct subjective norm assessed ranging from disagree strongly to agree strongly +1 to 5. The items had high internal consistency (Cronbach’s alpha =0.90).

Perceived behavioural control

Perceived behavioural control include external control factors. This scale had two items; PBC assessed ranging from disagree strongly to agree strongly (+1 to +5). The items had high internal consistency (Cronbach’s alpha =0.95).

Anthropometric

Trained persons performed measurement of height and weight based on the protocol of world health organization at the residence of the participants. Measurement of weight was performed in terms of kg, using a digital balance, with an error of less than 100 grams, and of height was done using a ribbon meter and in terms of meter.

Statistical analysis

The analysis was carried out by SPSS software version 22. Descriptive statistics including mean and deviation frequency were used to describe demographic information of research samples. The correlation coefficient of Pearson were used to determine correlation and between TTM variables and subjective norms, perceived behavioural control. Using a hierarchical regression was conducted. The level of significance of P<0.05 was considered for all tests.

Results

The mean±standard deviation for age (16.36±0.70), for weight (66.46±4.34), height (158.69±3.04), BMI (1.24±0.42), number of children in family (2.59±0.75) (Table 2). Pre-contemplation (35.7%), contemplation (37.1%), preparation (8.9%), action (9.3%), maintenance (9.1%) of the population enters into each stage. The means and standard deviations for the processes of change were Behavioural; Self-liberation (M=13.99, SD=3.24), Counter-conditioning (M=10.26, SD=2.59). Stimulus control (M=9.79, SD=6.36). Cognitive; Consciousness raising (M=10.21, SD=3.20). Social liberation (M=9.91, SD=6.43). Dramatic relief (M=11.85, SD=3.45). Environmental re-evaluation (M=7.11, SD=2.06). Reinforcement management (M=9.47, SD=2.07). Self re-evaluation (M=6.28, SD=2.44). Helping relationships (M=12.28, SD=2.06).

Relationships between constructs

The correlation coefficient of Pearson was used to determine correlation between constructs from the TTM and subjective norm and perceived behavioural control. Perceived behavioural control

| Variable                        | Mean±SD          |
|---------------------------------|------------------|
| Age (year)                      | 16.36±0.70       |
| Weight (kg)                     | 66.46±4.34       |
| Height (cm)                     | 158.69±3.04      |
| Body mass index (BMI)           | 1.24±0.42        |
| Number of children in family    | 2.59±0.75        |

Table 2. Mean of age, weight, height, body mass index, the number of children.
The current study was designed to understand and predict reduction the consumption of fast food using the Transtheoretical Model of behaviour change as well as the Theory of Planned Behavior (perceived behavioural control, subjective norms).

Although research has yet to examine how the TTM is related to the TPB, the results of current study lend support to this alternative examination of the models to predict behaviours. Hierarchical regression analyses revealed stages of change, decisional balance (pros and cons), perceived behavioural control, subjective norms, self-efficacy significantly predicted reduction the consumption of fast food.

**Table 3.** Partial correlations (Pearson’s r) among the components of TTM constructs and perceived behavioural control, subjective norm.

| Construct                          | Reduction in the consumption of fast food | Experiential processes of change | Behavioural processes of change | Self-efficacy | Decisional balance (pros) | Decisional balance (cons) | Subjective norm | Perceived behavioural control | Stage of change |
|-----------------------------------|-------------------------------------------|---------------------------------|---------------------------------|---------------|---------------------------|------------------------|----------------|-------------------------------|----------------|
| Reduction in the consumption of fast food | 1                                         |                                 |                                 |               |                           |                        |                 |                               |                |
| Experiential processes of change  | 0.08                                      | 1                               |                                 |               |                           |                        |                 |                               |                |
| Behavioural processes of change   | 0.09                                      | 0.48**                         | 1                               |               |                           |                        |                 |                               |                |
| Self-efficacy                     | 0.49**                                    | 0.19*                          | 0.18*                           | 1             |                           |                        |                 |                               |                |
| Decisional balance (pros)         | 0.29**                                    | 0.04*                          | 0.09*                           | 0.15*         | 1                         |                        |                 |                               |                |
| Decisional balance (cons)         | 0.25**                                    | 0.06                           | 0.10*                           | 0.12*         | 0.14*                     | 1                      |                 |                               |                |
| Subjective norm                   | 0.51**                                    | 0.08                           | 0.18**                          | 0.43**        | 0.28**                    | 0.23*                  | 1                |                               |                |
| Perceived behavioural control     | 0.58**                                    | 0.08                           | 0.28**                          | 0.33**        | 0.28**                    | 0.32**                 | 0.26*            | 1                             |                |
| Stage of change                   | 0.38**                                    | 0.04                           | 0.06                            | 0.31**        | 0.08                      | 0.25**                 | 0.33**           | 0.23**           | 1               |

**Table 4.** Correlations the processes of change.

| Processes of change | CR | SL | CC | SC | HR | DR | SL | SR | ER | RM |
|---------------------|----|----|----|----|----|----|----|----|----|----|
| Consciousness raising | 1  |    |    |    |    |    |    |    |    |    |
| Self-liberation     | 0.04| 1  |    |    |    |    |    |    |    |    |
| Counter-conditioning| 0.32*| 0.36| 1  |    |    |    |    |    |    |    |
| Stimulus control    | 0.06| 0.56| 0.26| 1  |    |    |    |    |    |    |
| Helping relationships| 0.22*| 0.04| 0.16| 0.20| 1  |    |    |    |    |    |
| Dramatic relief     | 0.23| 0.41| 0.09| 0.20| 0.14| 1  |    |    |    |    |
| Social liberation   | 0.19| 0.16| 0.09| 0.19| 0.31| 0.03| 1  |    |    |    |
| Self re-evaluation  | 0.32*| 0.27| 0.22| 0.31*| 0.29| 0.42*| 0.31| 1  |    |    |
| Environmental re-evaluation| 0.10| 0.23| 0.03| 0.24| 0.39| 0.39*| 0.19| 0.14| 1  |    |
| Reinforcement manag | 0.46*| 0.29| 0.33*| 0.20| 0.39*| 0.10| 0.51*| 0.38*| 0.03| 1  |

*P<0.001. Consciousness Raising, CR; Self-Liberation, SL; Counter-Conditioning, CC; Stimulus Control, SC; Helping Relationships, HR; Dramatic Relief, DR; Social Liberation, SL; Self Re-evaluation, SR; Environmental Re-evaluation, ER; Reinforcement Management, RM.
fast food. These results do not suggest that one model better in reduction the consumption of fast food, but that prediction of reduction the consumption of fast food is improved with these models in conjunction. Perceived behavioural control was the most significant predictor of reduction the consumption of fast food. The results of current study are not consistent with the study of Armitage and Conner (2010), it was worth differentiating between the external control factors (PBC) and internal self-efficacy, as the internal factors appeared to play a much stronger part in influencing intentions, other studies have supported the premise that self-efficacy is predictive of behaviour. This difference may be related to the type of behaviours measured. Subjective norms were found to be a significant predictor in reduction the consumption of fast food.

Environmental factors, such as associations with social or support groups who promote reduction the consumption of fast food may also provide positive effects. Similarly, it should be noted that family and friends are also likely to act as powerful groups as this is important information for individuals who wish reduction the consumption of fast food. This suggests that social influence and the need to comply with group norms in particular, influence fast food consumption. It is worth noting that the earlier qualitative study identified perceptions of being overweight as a particular source of fear of negative evaluation. However, neither the opinions held by health experts nor the behaviour modelled by significant others were significantly predictive.

These results are consistent with research where subjective norms predicted intention, and was significant, this would suggest that adolescent girls are more concerned about social normative influences than their own processes of change towards reduction the consumption of fast food. In another study found subjective norms to be more predictive of intention when looking at safety helmet use and suggested that subjective norms are more likely than attitude to predict intention in health behaviours that could affect the health of others or in behaviours that may be performed publicly. This would be particularly applicable in the area of reduction the consumption of fast food, as these behaviours are both likely to affect the health of others and may be performed in front of people.

Self-efficacy was a predictor of consumption reduction of fast food. Studies show that food and nutrition related self-efficacy in adolescents with food choices healthy diet and behaviour. The decisional balance was significant in our study. The results of the study are not consistent with the following studies. The perception and endorsement of the pros of changing may be a powerful change strategy for moving individuals in the stages of change. The pros may be more disposed to change than the cons because the pros more sensible and immediate whereas a reduction in the cons requires longer-term maintenance.

The experimental and behavioural processes of change were not found to be significantly predictive of reduction the consumption of fast food. Processes of change are the strategies that people use to apply transition from one stage to another. Processes of change in previous studies were important predictors of adoption and maintenance behaviour. Processes of change in children and adolescents should include increasing knowledge of hazards and diseases caused by the consumption of fast food in the short and long term of multi-dimensional illness.

In other words, although participants appeared to be aware that the longer-term consequences of frequent fast-food consumption were likely to be negative, this knowledge did not have a significant impact on fast food consumption rates. Similarly, if adolescents perceive that they generally eat unhealthily, this may allow

Table 5. Hierarchical regression of Stage of change, Processes of change, Self-efficacy, Decisional balance, subjective norms, perceived behavioural control into reduction in the consumption of fast food.

| Variables                      | β   | t     | R   | R²  | F    |
|-------------------------------|-----|-------|-----|-----|------|
| **Step 1**                    |     |       |     |     |      |
| Stage of change               | 0.21| 2.25* | 0.63| 0.39| 24.16**|
| Experiential processes of change | 0.01| 0.14  |     |     |      |
| Behavioural processes of change | 0.01| 0.14  |     |     |      |
| Decisional balance (pros)     | 0.19| 3.14**|     |     |      |
| Decisional balance (cons)     | 0.19| 3.14**|     |     |      |
| Self-efficacy                 | 0.41| 2.92**|     |     |      |
| **Step 2**                    |     |       |     |     |      |
| Stage of change               | 0.22| 2.37* | 0.83| 0.69| 58.64**|
| Experiential processes of change | 0.05| 0.98  |     |     |      |
| Behavioural processes of change | 0.05| 0.98  |     |     |      |
| Decisional balance (pros)     | 0.51| 5.43**|     |     |      |
| Decisional balance (cons)     | 0.51| 5.43**|     |     |      |
| Self-efficacy                 | 0.52| 5.91**|     |     |      |
| Subjective norm               | 0.53| 6.01**|     |     |      |
| Perceived behavioural control | 0.58| 6.19**|     |     |      |

**P<0.001; *P<0.05.

Conclusions

Overall, the results from our study are congruent with the previous findings in western countries and therefore, this study supports the external validity of TTM. In summary, the TTM and TPB (subjective norm and perceived behavioural control) is a logical and coherent explanation of behaviour in Iranian students. Future studies should explore the effects of reduction in the consumption of fast food developed in reference to the TTM and TPB among Iranian studies using randomized controlled trials.

The most important limitation of this study is that despite the use of self-report questionnaire due to the nature of the question-
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Key words: behavior change; obesity; overweight; student.

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Contributions: ZJ had participated in data collection and analysis and drafted the paper; GG, MT, MF, KJ designed and supervised the study and edited the draft of the paper.

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