Research Paper: The Application of Nutritional Patterns for Developing a Model for Mental Health Through Resorting To Spiritual Well-Being: A Structural Equation Modeling

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ABSTRACT

Background: The aim of this study was The application of nutritional patterns for developing a model for mental health through resorting to spiritual well-being.

Methods: This was a correlational study and the statistical population of this study included all students of South Khorasan (studying at all branches of Islamic Azad University Birjand, Nehbandan, Ferdows, and Qa'en) during the second semester of 2012-2013 and the appropriate sample size was considered 800 by Using stratified sampling method. Spiritual well-being questionnaire Paloutzian And Ellison, Mental Health Questionnaire, and food frequency questionnaire were completed by the students and structural equation modeling was used to analyze the data.

Results: The fitted model showed that high-risk food patterns indirectly and with the mediation of spiritual well-being, increase mental health (anxiety, depression, social function, and psychosomatic symptoms), and low-risk food patterns by increasing spiritual well-being, decreased indicators mental health such as anxiety, depression, social function, and psychosomatic symptoms.

Conclusion: Therefore, according to the results, the correction of high-risk food patterns is associated with an increase in spiritual well-being and, as a result, affects mental health.

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Introduction

During school, students' habits and behaviors, including nutritional patterns (consumption of high-fat foods and ready-to-eat foods and reduction of high-fiber foods, etc.) undergo changes [1]. Previous studies in this regard showed that adolescents and young people developed poor eating habits, such as having ready-to-eat foods, removing main meals, consuming less fruits and vegetables, consuming unhealthy foods (e.g. sausages and fried foods), drinking strong tea, and experiencing overeating [2]. Unhealthy diet and pattern of nutrients intake in the student group can be the initiator of various diseases [3]. Although many studies have been conducted on the identification of the status of inappropriate eating habits in different student populations and the physical consequences of nutritional patterns, the psychological consequences of nutritional patterns have been less considered. In other words, recognizing the implications of high-risk and low-risk food nutritional patterns is of utmost importance from the perspective of psychology for meals planning and reducing psychosocial damages. However, foodstuff has direct and potential effects on the physiology of the nerves [4]. According to previous studies, there is a significant relationship between inappropriate diets and reduction seafood consumption [5] and high incidence of depression [5], negative attitudes toward life [6], and cognitive dysfunction [7].

Nevertheless, the important point is that previous studies used correlation methods, which cannot mean a causal relationship and this relationship can be explained by other sources of information. Given that students' mental stress increases by intake of ready-to-eat foods [8, 9, 4], psychosocial factors that are themselves affected by diet can threaten the health of an individual by itself [10], indicating the importance of mental health. So far, a large number of studies have addressed the relationship between food consumption, mental conditions, and mental pathology such as depression [11] and anxiety [8, 9]. Nevertheless, there are few studies on the relationship between food consumption pattern and mental health indicators. On the other hand, students have a tendency to adhere to bad eating patterns due to special and stressful conditions [12]. In addition, consumption of high-fat foods is associated with high levels of stress and anxiety [13], creating a defective cycle [14]. Given that there is no causal relationship with a certain direction between different nutritional patterns and mental health indicators, that the involvement of mediating variables in this relationship is possible.

Genetic, hormonal, biochemical, and neurological factors have a significant effect on mental illnesses. On the one hand, diet can also affect each of these factors [4]. However, it should be noted that mental illnesses are affected by spirituality and individual's relationship with God [14]. On the other hand, according to narratives and hadith , nutritional patterns can influence spiritual and moral well-being [15]. Spiritual well-being is a term introduced in the new science of medicine in 1979 by the World Health Organization as a fourth pillar of health and agreed upon by the European governments in the Treaty of Copenhagen for social development. Spiritual well-being means having a sense of acceptance, positive feelings, ethics, as well as having the sense of positive interaction with a sacred and superior dominant and themselves, which is obtained in a dynamic, synchronized, emotional, and personal consequential process [16].

According to cognitive behavioral therapies (CBT) (including Beck, Ellis, etc.), mental health (anxiety, depression, somatoform symptoms , etc.) consists of cognitive and emotional dimensions and infrastructures [17], and it is the consequence of structures mentioned on mental health. Therefore, improving mental health implies the processing and reviewing of cognitive and emotional structures. In other words, mental health is defined as the external aspect of the cognition and negative emotions improvement. On the other hand, spiritual well-being includes cognitive dimensions of existential well-being (EWB) (understanding the meaning and concept in the life as an inner dimension of a relationship with oneself) and affective religious well-being (i.e. having a good feeling because of communicating with God, and having a good feeling about social dimension, and having a satisfaction with environment and justice) [18]. Therefore, it seems that the cognitive and affective dimensions of spirituality that represent the spiritual well-being structure (existential and religious well-being) are the infrastructure of the mental health, that is, the mental health is external representation of cognitive and emotional structures in different fields such as spirituality [19]. Several studies have also shown the efficacy of spirituality on mental health and have confirmed the effectiveness of spirituality on mental Hhealth [14]. Therefore, it is possible that these factors affect also the mental health infrastructures, including its cognitive and emotional structures. Although nutritional patterns affect mental health according to numerous studies [20], it seems that improving mental health affected by nutritional patterns, resulted from cognitive (e.g. existential well-being, cognitive changes in understanding and concept of life) and affective changes (calmness and

satisfaction with communication), while anxiety as its opposite [8, 9] is resulted from nutritional patterns regarding spirituality. According to one study, there is a significant relationship between change in protein and religious tendencies in black people [21].

Well-being is a model with various dimensions, namely spiritual, physical, etc. and the perception and cognition of consumable food have been classified as sub-components of well-being in recent research [19]. Studies have also confirmed the relationship between nutrition and well-being [22, 23]. In the present study, the conceptual model of mental health regarding the role of nutritional patterns was investigated using mediation of spiritual well-being (the cognitive component of existential well-being and the affective component of religious well-being). This model supports theoretical foundations of cognitive therapies that consider cognitive and affective factors as the infrastructure of mental health and psychopathology. Therefore, mental health changes reflect changes in cognition and emotions. AS mentioned earlier, cognitive changes (existential well-being) and affective well-being (religious well-being) were discussed in this study due to the role of nutritional patterns in mental health improvement.

On the other hand, by thinking about the teachings, it can be seen that there is a significant relationship between nutrition health and spiritual affairs in various verses (Surah Baqarah, verses 168 and 169, and Surah Mu'minun, verse 51). Avoiding Satan and monotheistic life, and the respect for monotheism have been mentioned after eating tayyab (it means "pure", "wholesome" and "free of adulteration") and halal foods, revealing that tayyab foods have the power affecting human activities and his/her physical and mental health [15]. The Qur'an brings some examples for tayyab food, including vegetables, fruits, legumes, and meat of birds and fish (Maryam, 25. Rahman, 68. Mowmanon, 19, etc.), which is known as low risk nutritional pattern [24]. Therefore, due to the important role of nutrition on the spirituality development and with regard to the effectiveness of spirituality on mental health which are considered as Quranic and research perspectives, this question arises that whether nutrition can affect anxiety, depression, somatoform symptoms, and social functioning disturbance. Due to the importance of nutrition during each student's life and the important role of the student population as future managers and planners, it is necessary to examine the role of nutrition pattern in health. Nowadays, adolescents are more at risk due to various factors, such as the availability of ready-to-use foods, misleading advertising, lifestyle, and low awareness [25]. Therefore, investigating the pathology of nutrition from the perspective of spirituality and psyche is of utmost importance.

Methods

This was a correlational study , in which a set of multivariate regression equations were simultaneously evaluated using the structural equation modeling. Exploratory and confirmatory factor analysis and structural equation modeling were applied by using LISREL software to investigate the mediation role of spiritual well-being concerning nutritional patterns and each of mental health index. The statistical population of this study included all students of South Khorasan (studying at all branches of Islamic Azad University Birjand, Nehbandan, Ferdows, and Qa'en) during the second semester of 2012-2013. According to James Stevens, considering 15-25 items is suitable for each predictor variable in multiple regression analysis [31] . Therefore, according to the number of items entered in the model in each factor, the appropriate sample size was considered 800. Using stratified sampling method, 100 individuals were selected in a multi-stage method from 1800 students in Nehbandan branch, 140 from 3000 students in Ferdows, 220 from 4000 students in Qa'en, 340 students from 7,000 students in Birjand. The questionnaires then were distributed among the participants. The following questionnaires were used to collect data:

Paloutzian and Ellison's Spiritual Well-Being Questionnaire (SWBQ)

This questionnaire was developed by Paloutzian and Ellison in 1982 which includes 20 questions and two subscales. Ten questions are related to religious health and 10 questions are related to existential health. The odd questions are related to the religious well-being subscale and the level of individual experience of a satisfactory relationship with God. The even questions are related to the existential well-being sub-scale that measures the sense of meaning and purposefulness and satisfaction with life. The items were scored using a 6-ponit Likert scale ranging from "totally agree" to "totally disagree". In negative questions, the scoring is done using reverse method. Paloutzian and Ellison have reported that the Cronbach's alpha coefficient for religious, existential, religious well-being, and total score are equal to 0.91, 0.91, and 0.93, respectively [26].

In this study, reliability was obtained >0.7using Cronbach's alpha for spiritual well-being and components of existential and religious well-being. Factor analysis

was used in order to calculate the validity of this study. Given that the sampling adequacy index was 0.88 and Bartlett's test was also significant, the main component analysis method (PC) with Abelimin's rotation was used for factor analysis, and the simple 2-factor structure was obtained. The existential well-being factor explained 3.61% and the religious well-being factor explained 12.37% (48.98%) of the total variance of spiritual well-being.

General Health Questionnaire (GHQ-28)

The General Health Questionnaire was developed by Goldberg in 1972, which is a self-administered and self-reporting questionnaire. It is used in clinical collections aiming at tracing those with a mental disorder. This questionnaire focuses on two major areas, namely the inability to carry out normal functions and the appearance of new and distressing phenomena. The questionnaire consists of 28 test questions that measure mental health. The questionnaire has four subscales as follows: the subscale of physical symptoms, anxiety and insomnia, disruption in social function and depression [27]. It has been reported that the sensitivity of this test is 0.86 in Iran, and that of its feature is 0.82. The overall validity coefficient of this test is 0.88 and the validity coefficient of the subtest is between 0.50 and 0.81. The validity coefficient of the Persian version of the 28-item General Health Questionnaire, with a retest method, with a time interval of 7 to 10 days on the 80-person group is equal to 0.91 which is significant at error level of 0.001[28]. Considering the validity of General Health Questionnaire, the results show that the average sensitivity of GHQ-28 questionnaire is 84% (between 77% and 89%) and its average feature is 82% (between 78% and 85%). Goldberg has reported that this questionnaire has a high and acceptable validity by reviewing previous which used a retest and a Cronbach alpha coefficient calculation. In the present study, its reliability for mental health indicators was more than 0.81. In addition, in this study, factor analysis was used to calculate its validity. The sampling adequacy index was 0.81 and Bartlett test was also significant. The main component analysis method (PC) with Abelimin's rotation was used for factor analysis. It should be noted that in the final model, items with a lower factor load were removed from the model.

Nutrition Pattern Questionnaire

The semi-quantitative food frequency questionnaire ,involving 40 food groups, was completed by obese adults in Tabriz [29]. The results of aforementioned study showed that three nutritional patterns of healthy, western, and traditional were common. In order to investigate the validity, the views of expert were obtained. To examine the reliability of the questionnaire, 30 individuals aged 20-20 years old were selected and the food frequency questionnaire was completed in the first stage by interviewing. In the second stage, after two months, the questionnaire was re-completed by the same people through the interview. In order to assess the reliability of the questionnaire, for investigating the repeatability, the cronbach's alpha coefficient was calculated for 40 food groups and 3 main nutritional patterns. the main component analysis method with Abelimin's rotation was performed on 40 food groups. Finally, three dominant nutritional patterns were considered,including 1. Healthy nutritional pattern, 2. Western nutritional pattern, and 3. Traditional nutritional pattern. According to previous studies, the nature of data, and correlations, values with factor load greater than or equal to 0.2 were considered for determining nutritional pattern items. The factors were named based on the interpretation of food items in each factor, and three factors were named healthy, western and traditional nutritional pattern. Then, each participant scored each item in terms of the amount each nutritional pattern consumption. This score was determined by the weighted average of the relevant groups by considering factor loadings as weight. According to the factor analysis, three dominant nutritional patterns were identified: a) Healthy nutritional pattern, including high consumption nuts, fruits, vegetables, etc. B: Western nutritional pattern, including high consumption soda, sweets and desserts, high-fat dairy, etc. and C: Traditional nutritional patterns, including high consumption of solid oils, eggs, Abgoosht, legumes, potatoes, processed meats, etc. [29]. Scoring was done based on a 7-point Likert scale (I almost do not consume, every 1-2 years, several times in one year, 3-4 times a week, almost once a week, 2-3 times a week, once a day, and at most of the meal). It should be noted that in this study, according to the analysis of the main components with Abelimin's rotation in order to enter the final model, a simple two-factor structure was obtained; in other words, solid oils were considered in the western pattern; and Abgoosht, legumes, and eggs were loaded in separate factors. Then, the single-item factors or the factors less than 0.3 were removed. Therefore, two-factor structure of high-risk nutritional patterns (ready-to-use foods, fried and high-fat foods and deserts, sweets, marinades, and strong tea) and low-risk nutritional patterns (low-fat seafood and vegetarian foods or boiled foods, light tea, and natural beverages) was obtained. Therefore, traditional nutritional pattern was not studied in the present study. It should be noted that Cronbach's alpha was obtained more than 0.7 for

high risk and low risk patterns. The structural equation modeling was used in order to analyze the results.

Results

The average age of the participants was 25.41 years old (standard deviation= 1.61). In terms of gender and educational level, 58.4% were male and 70% had bachelor degree. About 55% of the participants were single and 72.6% were native, of whom 48% lived with their parents.

The assumptions of structural equations in the model were investigated to explain the mental health indicators based on the structural equation model.

A: Measuring variables at a distance level, because the number of ratings classes is 5 or more, we can probably deal with them (albeit with some errors) such as distance data.

B: The same distribution of the endogenous variables: in general, the unevenness dispersion of multivariate regressions does not make the improper Lisrel models but weakens them, because multivariate regression methods, including maximum probability, are resistant to the violation of the normal distribution of error terms. In addition, the large sample size allows the critical parts of t to approach a normal multivariate distribution, and since the sample size of this study was somewhat large, it can be assumed that this assumption is true. The data sieve method also showed that the distribution of variables was close to normal.

C: Lack of multi collinearity of exogenous variables: correlations higher than 0.8 between exogenous variables indicate multicollinearity. According to the results of correlation coefficients between variables listed in Table 1, the assumption that there is no multicollinearity is supported, since a low or moderate significant relationship was observed among correlation coefficients.

Table 1. Matrix of correlation between nutrition patterns, spiritual well-being, and mental health

	Mental health					Spiritual well-being	Nutrition patterns	
	Somatic symptoms	Anxiety	social dysfunction	depression	Religion well-being	Existential well-being	Risky pattern	Low risk pattern
Somatic symptoms	1							
Anxiety	0.699**	1						
Social dysfunction	0.289**	0.273**	1					
Depression	0.551**	0.658**	0.280**	1				
Religious well-being	-0.181**	-0.216**	-0.280**	-0.337**	1			
Existential well-being	-0.452**	-0.512**	-0.455**	-0.626**	0.539**	1		
Risky pattern	0.050	0.029	0.007	0.072	-0.035	-0.102*	1	
Low risk pattern	-0.086	-0.095*	-0.201**	-0.092*	0.194**	0.233**	0.220**	1
Mean	1.97	1.96	1.62	2.52	4.29	4.36	4.31	4.47
Standard deviation	0.66	0.68	0.71	0.51	0.64	1.02	0.91	0.9

* Significant at the level of 0.05
** Significant at the level of 0.01

It should be noted that after comparing the factorized items based on the factor analysis and theoretical foundations, six items that had the highest load were selected for the nutritional patterns, and 3 or 4 items that had the most load factor were considered as a marker for each mental health index. Although Baron and Kenny theory is mainly used for regression analysis, regression analysis is associated with two major constraints: first, the weakness in the statistical relationship estimates because the measurement errors are not considered and second, the assumption that the regression analysis is based on the fact that the endogenous variable cannot be the cause of a mediator (non-recursive model) that is not always true. Therefore, using structural equations modeling is preferred to regression analysis and SPSS. In addition, when theoretical models are complex and multi-item scales are examined, mediation tests are performed in LISREL more efficiently and more quickly.

The result of LISREL file can be similar to the output of Baron and Kenny theory; however, according to Baron and Kenny view, the role of exogenous variable in predicting each mediator and criterion variable is investigated in three separate regression analysis in order to examine the role of mediator variable. In addition, in the other model, the effects of both predictor and mediator on the criterion are evaluated. However,

in structural equations modeling, the predictive-mediating path of the variable and the predictive-mediating path of the criterion are investigated simultaneously. Therefore, if the predictive-mediating path and the mediator-criterion path (with predictive control) be significant, there will be a mediator variable [38]. Therefore, to investigate the role of mediator variable in structural equation modeling, the test of zubel test, which tests the relative size of indirect effect in comparison with direct effect, was used. In other words, this test evaluates the difference between the direct effect of the predictor-criterion and the direct effect of the predictor-the criterion test after controlling the mediation / indirect effect, which is equivalent to the test of mediation effect power. It is assumed that mediation is complete if z test is significant and direct effect of the predictor-criterion is not significant and mediation is partial if z test is significant and the direct path of predictor-criterion is non-significant, or vice versa. In the instructions for reporting the appropriate fitness indexes of the model, chi square along with degree of freedom, the Root mean square error of approximation (RMSEA), and the adaptive fitness index were considered.

Furthermore, because the normal fitness index does not penalize the sample size in contrast to the comparative fitting index, the normal fitness index was considered in the present study. To compare the model with another rival' models, the expected cross-validation index (ECVI) was also considered by determining the relative order for different models, the lowest of which represents the greater fitness of the model. The square root of the variance of the approximation error and the cross-validation index are appropriate, because they do not require comparison with the Zero Model and there is no need for explaining a model with complete independence of the variables [31]. In the following fitted model, as shown, the ratio of chi-square (566.4) to a degree of freedom (296) was less than 2, indicating good fit for the model. In addition, since the adaptive fit indices and normal fitness index were 0.94 and 0.93 respectively, it can be inferred that the model had a good fit with the data. The cross- validation index was also 1.04 and less than the saturated model (1), and it was located in confidence interval (0.95 and 1.14), representing a reasonable approximation in the population. In addition, the square root of the variance of the approximation error was 0.036 (less than 0.06) which was in the confidence interval (0.04 and 0.022), so the degree of model approximation degree was not in the large population, indicating a good fit of the model.

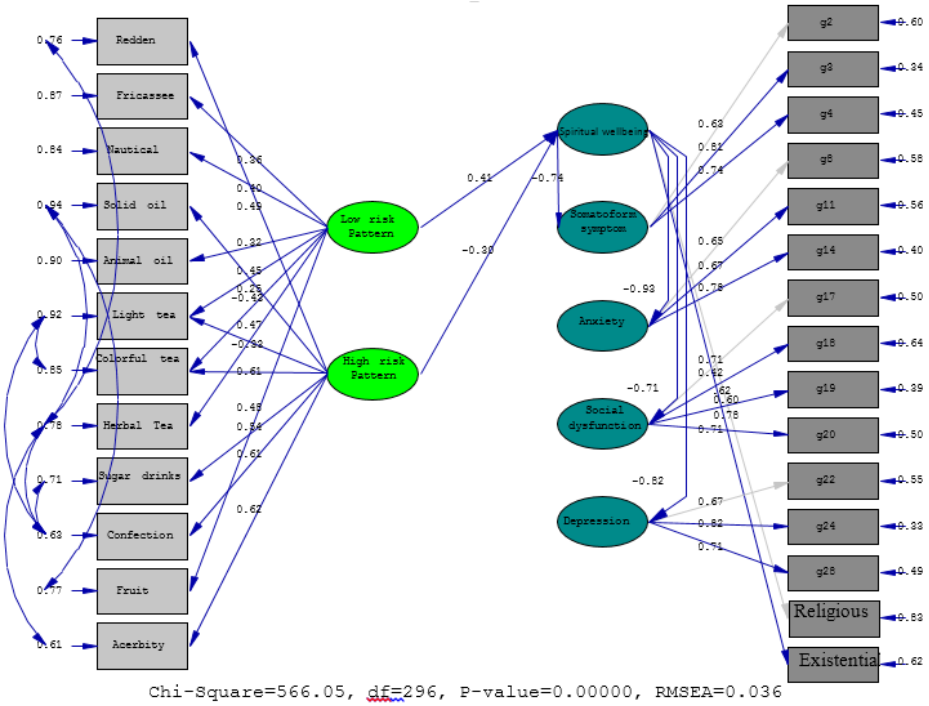

Figure 1. Standardized coefficients of the patterns of nutrition patterns and spiritual well-being on mental health indicators

As shown in Fig. 1, the low-risk nutritional pattern (β= -0.41, P<0.01) and the high-risk nutritional pattern (β= 0.3, P<0.01) showed a significant path with spiritual well-being. Moreover, spiritual well-being showed a significant relationship with somatoform symptoms (β= -0.74, P<0.01), anxiety (β= -0.93, P<0.01), social disruption (β= -0.71 P<0.01), and depression (β= -0.82, P<0.01). It should be noted that no significant relationship was observed between nutritional patterns and any of the mental health indicators. This model showed that low-risk nutritional patterns could predict reduction of somatoform symptoms, anxiety, social disruption, and depression indirectly (the value of indirect effect was 0.3, 0.38, 0.29, and 0.34 respectively). In addition, the high-risk food pattern could predict increased somatoform symptoms, anxiety, social disruption (the value of the indirect effect was 0.22, 0.28, 0.21, and 0.25, respectively) through the spiritual well-being indirectly, indicating the importance of the mediation role of spiritual well-being and high indirect effect of the low-risk pattern. Having compared the relative size of the indirect path against the direct path of each of the mental indices, it was found that the Sobel's z test was also significant (z > 3.92, P<0.05). Hence, according to the two conditions above, the spiritual well-being is considered as complete mediator of the relationship.

Discussion

With respect to mediation role of spiritual well-being, the fitted model showed that high-risk nutritional pattern, including animals, fried foods and strong tea, etc., indirectly increased anxiety, depression, social disturbance, and somatoform symptoms through decreasing existential and religious well-being. However, low-risk nutritional patterns, including high consumption of fruits and vegetables as well as seafood and seafood, indirectly increased mental health through improvement of spiritual well-being.

In line with our findings, previous studies declared a significant relationship between type of food, depression [32], and stress level [33]. Iron, selenium, and zinc deficiency in depressed people are more common than non-depressed people, especially in women [34]. In another study, it was found that patients with mood disorders ate legumes, fruits, and vegetables less than usual [35]. Therefore, according to findings of above studies, it can be concluded that there is a significant relationship between nutritional factors and mental health. However, it should be noted that in aforementioned studies, the zero order correlation method was used, which might not show the causal direction or it might be unable to reveal the effects of other factors. As shown by this study, nutritional patterns affected anxiety, depression, social disturbance, and somatoform symptoms through components of spiritual well-being; that is through increasing or reducing existential well-being (discovering meaning and concept in life) and religious well-being (satisfaction of communicating with God) and with respect to type of nutritional patterns. Therefore, according to the cognitive therapy approach, the cause of the continuity of psychopathology (anxiety, depression, somatoform symptoms, etc.) is cognitive distortions and emotional maladaptation. In addition, given that existential well-being (the cognitive component of understanding meaning of life) and religious well-being (satisfaction of communicating with God) are cognitive and affective structures of spiritual well-being, it is expected that the nutritional patterns affect cognitive and emotional structures in the spiritual dimension; however, future research is needed to make clear the role of nutritional patterns on other dimensions of mental health, including the cognitive and affective structures of the social dimension.

Concerning the fitted model used in this study in relation with the role of nutritional patterns on spiritual well-being, previous studies also yielded the role of nutritional patterns on welfare [22,23]. In addition, religious narratives confirm this point that all beverages and foods even during pregnancy have special effects and play an important role in the spiritual and moral status of the fetus, and after birth, it is effective on the tendency of a person toward good or bad behaviors [36]. Consumption of ready-to-use foods and harmful food additives such as soda and sauce doubles the physical complications of such foods [37]. Therefore, it is expected that physical complications due to inappropriate nutrition interferes with the quality of performing religious practices, including religious well-being (pleasure and satisfaction of communicating with God). In addition, consumption of a high-fat and high-calorie nutritional pattern is associated with cognitive impairment, reduced concentration and learning [38], reduced cognitive activities [7-9], unwillingness to do religious affairs, and lack of attention to existential well-being. Suitable foods and chemicals can improve mental abilities, such as concentration, adjustment of motor skills, motivation, memory, and reaction time [39], which is necessary for discovering meaning and objective in life, communicating with God, and focusing on religious activities. Accordingly, it is also associated with reduced anxiety, stress, and depression, and even can prevent brain aging [39].

Therefore, paying more attention to the principles of healthy nutrition indices in all physical, psychological, spiritual, and social aspects is necessary to realize health. However, holding nutrition training sessions and

interventions is associated with reduced consumption of high-risk nutritional patterns (oil, sugar beverages, and ready-to-use foods [40], confirming the effectiveness of nutritional patterns training on students due to its spiritual and psychological consequences. In addition, identifying the consequences of improper nutritional patterns is considered as a long step towards reducing spiritual and mental health problems of students. Given that this study was a cross-sectional research, performing longitudinal and more extensive research is recommended to confirm these findings.

Conclusion

In general, the obvious result is that there is the possibility of mental health improvement through following a diet that can lead to cognitive exploration and peace achievement while commutating with God. However, there are few studies investigating the effect of a nutrition type on the treatment of mental disorders.

Ethical Considerations

Compliance with ethical guidelines

This research was reviewed and approved by the Ethics Committee in faculty of education sciences and psychology at Islamic Azad University, Birjand branch (Ethic code: 4844/131 and dated 23/03/95).

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Authors' contributions

Study design: Fatemeh Shahabizadeh; Data collection and analysis: Fatemeh Shahabizadeh, Mohammad Jafar Behnamfar; Manuscript preparation: Fatemeh Shahabizadeh.

Conflict of interest

The authors declared no conflict of interest.

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