Role of Traumatic Events and Motivational Structure in Ambiguity Tolerance of Irritable Bowel Syndrome

Habibeh Mohammadi[1*], Hamid Afshar-Zanjani[2], Farzad Goli[3], Ammar Hasanzadeh Kashtli[4], Khadijeh Abolmaali[5]

[1]Psychosomatic Research Center, Isfahan University of Medical Sciences, Isfahan, Iran AND Tunekabon Branch, Islamic Azad University, Iran
[2]Department of Psychiatry, School of Medicine AND Psychosomatic Research Center, Isfahan University of Medical Sciences, Isfahan, Iran
[3]Faculty Instructor, Energy Medicine University, California, USA AND Danesh Tandorosti Institute, Isfahan, Iran
[4]Postdoctoral Researcher, University of Life Sciences, University of Alberta, Edmonton, Canada
[5]Department of Psychology, Tehran North Branch, Islamic Azad University, Tehran, Iran

*Corresponding Author:
Habibeh Mohammadi, PhD
Tunekabon Branch. Islamic Azad University. Iran ANA Research and Behavioral Science Center, Khorshid Hospital, Beheshti St., Isfahan, Iran
Telefax :+98 31 2222135
Email : habibehmohammadi61@gmail.com

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Abstract

Background:
The main purpose of this study was to delineate the role of motivational structure and traumatic events in the prediction of ambiguity tolerance in patients with irritable bowel syndrome (IBS).

Methods:
A total of 200 patients with the diagnosis of IBS, referred to the Shariati hospital in 2018, were enrolled using a correlational design and convenience sampling. All participants were asked to complete the ambiguity tolerance questionnaire, the life event checklist, and the personal concerns inventory. Data analysis was performed by Pearson correlation method and regression analysis test in SPSS software.

Results:
Findings showed that there was a significant relationship between traumatic events (r=- 0.66, P=0.01) and adaptive (r=0.24, P=0.01) and non-adaptive motivational structure (non-AMS) (r=- 0.10, P=0.01) with tolerance of ambiguity (P<0.05). With increasing non-AMS and with decreasing non-AMS and traumatic events, the tolerance of ambiguity is increased. Moreover, the motivational structure (adaptive and non-adaptive) and traumatic events could define and predict 43% of the variance in ambiguity tolerance.

Conclusion:
Thus, regarding the important role of motivational structure and traumatic events in predicting ambiguity tolerance in IBS patients, it is prudent to put emphasis on these measures to improve patients' overall health and probably alleviate symptoms and provide psychologic rehabilitation.

Keywords: Ambiguity tolerance, Irritable bowel syndrome, Motivational structure, Traumatic events

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Introduction

Irritable bowel syndrome (IBS) is classified as a psychosomatic disease with both clinical and experimental evidence describing it as the combination of irritable bowel and irritable brain. It has a prevalence of 10% to 20% globally[1] and affects 6% of the Iranian population.[2]

High and usually unrealistic personal expectations (perfectionism),[3] stress confrontation, sleep problems,[4] initial incompatible schema,[5,6] body awareness disorder,[7] failure tolerance,[5] and low quality of life[8,9]

are all examples of patients' complaints. Concerning the ongoing global industrialization process, from which we are not exempt, psychosomatic disorders are increasing dramatically. This indicates the growing need for more investigations in this area.

One of the most renowned measures in psychosomatic disorders, especially IBS, is ambiguity tolerance. People with low ambiguity tolerance cannot probably find appropriate solutions due to their defective cognitive cycle and therefore are more likely to opt for maladaptive strategies. In other words, individuals who anticipate negative events with higher certainty are less capable in ambiguous situations and suffer more anxiety.[10] Ambiguity tolerance, an important cognitive mechanism, is clinically shown to be defective in patients with IBS; hence, the provisional disability to withstand the hateful consequence of the apprehended lack of vital and fundamental information is termed "uncertainty intolerance", which is believed to be augmented by ambiguity awareness.[11] It is also depicted as an approach taken by individuals to unfamiliar, complex, and vague manners.[12] Several lines of evidence have shown that uncertainty intolerance is a common and trans-diagnostic component involved in many emotional disorders.[13]

People react to ambiguous circumstances in three ways: cognitive (perceive a situation as black or white), emotional (tribulation, hatred, anger, anxiety), or behavioral (avoidance). Low ambiguity tolerance in traumatic or stressful situations usually leads to substance abuse or criminal activities[14] and often is associated with psychological problems such as obsessive-compulsive disorder or generalized anxiety disorder. In addition, it may also replace the fundamental elements of thought and behavior while struggling to overcome the stressful condition.[15-17] Clinical findings in Iranian patients with IBS show that they endure low ambiguity tolerance, which is significantly affecting their quality of life.[18] Clinical trials have also revealed some degree of cognitive dysfunction in patients with IBS.[19] For instance, Farup and Hestad showed that depression was remarkably prevalent among these patients, and its presence was associated with more severe cognitive defects.[20]

Another important measure expected to have a role in ambiguity tolerance is the occurrence of traumatic events. Traumatic events have been the area of active research concerning acute stress disorder, panic attack, and post-traumatic stress disorder (PTSD), and it is asserted that they have serious outcomes and complications.[21,22] In addition to childhood and adolescence misconduct, which is more common in patients with IBS, traumatic events are also more likely to be reported in them than in the general population; and psychological distress and physical symptoms are their major complaints.[23]

Intolerance of uncertainty interferes with the correct prediction and decision-making skills through different pathways like confusion, perceived ambiguity in life, perfectionism, and/or incapacity to survive with the inadequate knowledge of the environment and the ensuing fear and anxiety. Thus, patients will turn toward motivational resources to confront such fears and uncertainties, resulting in unhealthier means of emotional expression.[24]

Forbearing ambiguity and its complications will drastically affect the motivational structure so that it would not lead to positive goals. The motivational structure defines how we choose and pursue our goals, is completely individualized, and can predict people's tendency toward unhealthy behaviors.[24] Moreover, it delineates the individual's tolerance rate, confrontational strategies, and efficient behaviors.[25,26] It is shown that people with the maladaptive motivational structure (MMS) are more likely to suffer from lower mental health and have positive attitudes toward inefficient behaviors such as substance abuse.[27] The way a person follows his/her goals depends on many factors, including the type of goal (avoidant or inspirational), action timeframe, details prediction, obstacles, commitment, and the degree of conflict between goals, which collectively form the person's motivational structure.[28] Cox and Klinger have described adaptive and maladaptive forms of the motivational structure. Individuals with the former are more inclined to express their emotions aberrantly, often pursue avoidant objectives and show more commitment. Achieving goals will bring little joy to them, and failure will minimally upset them. Moreover, they often unrealistically follow their goals regardless of success or failure. The opposite is true for people with MMS, which is more essentially

involved in causing complications.[24] The findings of Sugawara and colleagues on patients with IBS in Japan showed that avoidant inclinations, repression, and passive confrontational behaviors are more prevalent than average and meaningfully correlate with their depression symptoms. [29] Meanwhile, Hauser and colleagues believe that patients with IBS are more inclined to interpret events negatively, which could culminate in more severe mental distress and a tendency to particular avoidant behaviors in response to usual life events or mishaps.[30] It is also emphasized by Bonnert et al that avoidant orientation is an essential characteristic in patients with IBS and should be addressed specifically during treatment.[31]

People with higher ambiguity tolerance are less likely to face negative thoughts and tension in resolving conflicting issues since they can think of multiple solutions simultaneously and are able to choose the optimum solution.[32] In contrast, anxious people find uncertain situations distressful and disturbing, so they experience chronic anxiety.[15] Higher ambiguity intolerance is linked to the amygdala and posterior midfrontal cortex function in a positive and negative way, respectively. Mohammadi and colleagues reported a high level of ambiguity intolerance among patients with IBS.[33] However, this is also associated with some maladaptive personality traits like neuroticism.[34,35] Regarding the observed association between ambiguity intolerance and amygdala functions or neuroticism, which are both correlated with IBS symptoms, it is expected that the former will be a major problem in patients with IBS.

Considering the great number of studies on IBS in Iran, most of the studies are mainly focused on the quality of life and psychological features of patients, thus elucidating the paucity of accurate research to evaluate the more underlying psychological properties of IBS, in particular the ambiguity tolerance, based on various intrinsic and extrinsic variables. Furthermore, we ought to acknowledge the role of extrinsic factors like traumatic events and intrinsic factors like motivational structure in IBS, the co-occurrence of physical and mental illnesses, and its high prevalence in Iranian people. So identifying these features would provide the chance to recognize psychotherapy strategies, educate patients, reduce therapeutic costs and assist mental health authorities in devising proper support services and psychological interventions to improve mental health. This study evaluates the role of traumatic events and motivational structure in predicting ambiguity tolerance in patients with IBS.

Materials and Methods

This was a descriptive correlational study. Participants were patients with IBS diagnosed based on ROME III criteria for IBS, at the gastrointestinal (GI) research institute, Shariati hospital, Tehran in 2018. Since correlational methods require at least 30 participants per variable,[35] the sample size was calculated as 200 patients to increase the extrinsic validity of the research, which was accrued through convenience sampling. Due to the distorted or incomplete completion of the questionnaire, the final sample was reduced to 177 people. Inclusion criteria were as follows: lower than the average score in the ambiguity tolerance questionnaire, age between 20-50 years, and minimum literacy of high school degree. Patients with blood per rectum, GI bleeding, actual or planned pregnancy, weight loss in the past 3 months, prior abdominal surgery, palpable abdominal mass, or history of mental disorder (bipolar disorder, major depression, psychosis, generalized anxiety disorder, panic disorder (in the past 2 years were excluded.

Ambiguity tolerance scale (MSTAT-II) was devised by McLain, comprising 13 items.[36] Participants answer each item on a 5-point Likert scale from “totally agree” to “totally disagree”. Individuals with scores higher than 45 have an acceptable level of ambiguity tolerance. He also assessed the inventory’s correlation with other convergent questionnaires; 0.6 with Budner’s 16-item scale, 0.71 with Story and Aldang’s 8-item scale, and 0.58 with McDonald’s 20-item scale. A Cronbach’s alpha of 0.82 was reported for the MSTAT-II.[37] However, in another study, the validity and reliability coefficients of 0.48 and 0.85 were calculated, respectively.[37] Feizi et al in their study, reported the validity of the questionnaire through the construct validity of 0.48.[37] Aalipour et al also measured the Cronbach’s alpha of 0.8 for the reliability of this questionnaire.[38]

Life events checklist (LEC) was originally created in 2013 alongside the Clinician-Administered PTSD

Scale (CAPS) to be administered before the CAPS.[39] It has 17 domains, each indicating a series of potentially traumatic events, natural disasters, or other stressful incidents. Participants answer each item on a 5-point nominal scale: 1: It has not happened to me; 2: I witnessed it; 3: I learned about it; 4: I am not sure; 5: It does not apply to me. To confirm the definition of true exposure criteria based on DSM-V, participants were asked, "Was the event accompanied by death, death treat, or severe injury to you or other persons".

In a study to evaluate the psychometric properties of a Korean version of LEC, a mean kappa value of 0.619 and a 17-item internal consistency of 0.667 (Cronbach's alpha) were reported. Principle component analysis with Varimax rotation also revealed six factors describing 57% of the total variance, namely physical assault/others, accident/injury, natural disaster/ witnessing death, sexual abuse, criminal assault, and man-made disaster.[40] A convergent validity assessment of this checklist showed that traumatic events were significantly correlated with post-traumatic symptoms in a positive way, and the cut-off value of 23 was calculated using ROC analysis.[41] In Iran, exploratory factor analysis was used to determine the validity of the questionnaire, and the results of factor analysis confirmed the existence of four factors: accidents, injuries, rape/aggression and unusual experiences, which these factors explain 62.49% of the variance of variables. The Cronbach's alpha for LEC in this study was measured as 0.76, which shows more than average reliability.[42]

Personal concerns inventory (PCI) – This inventory [Cox] is a revised form of the motivational structure questionnaire (MSQ),[43] in which participants are not asked to describe their concerns but to rate their most important goals in each aspect of life.[44] These aspects include home, family, and friend issues; love, intimacy, and sexual issues; personal changes; career and income; leisure time; health and hygiene; education; spiritual issues; smoking, etc. The domains were achievement, avoidance, control, information, success probability, luck, satisfaction, disappointment, discomfort, commitment, and time.[44] Two general factors are derived from these domain analyses: The adaptive motivational structure (AMS), which shows the presence of essential elements required to reach a satisfactory solution for personal concerns, and the MMS demonstrating indifference towards reaching personal goals.[44]

The body of evidence confirms the acceptable reliability and validity of MSQ. A study showed increased skin conductance in participants' response to observing goals selected in MSQ, revealing MSQ's validity.[45] In another study, it was shown that there was a relationship between participants' dreams and their current concerns read to them before sleep.[44] The Cronbach's alpha for 10-item PCI was calculated in students and alcoholics as 0.77 and 0.75, respectively.[45] In an Iranian study to assess reliability, PCI was completed by 40 students (45% female, mean age: 17.25±0.85 years), and 80 adults (50% female, mean age: 42.26±5.18 years). The results revealed that the Persian version had good internal consistency for each component and the test as a whole.[46]

Results

Of 177 patients with IBS, 131 (74.8%) were female and 46 were male (26.2%). 58.3% of the participants were married, and 41.7% were not. In terms of literacy, 35 (19.8%) had high-school degree, 13 (7.3%) had diploma, 88 (49.7%) had bachelor degree, 37 (20.8%) had masters degree, and 4 (2.3%) had PhD. The mean age was 31 years, with 64, 89, and 27 persons in the following age groups, respectively: 20-30 years, 31-40 years, and 41-50 years.

Table 1 demonstrates the data regarding the correlation between study variables. According to the analysis, all predictor variables had a meaningful correlation with the independent variable, with the highest correlation coefficient observed for the traumatic events (r=0.66) and the lowest for the MMS (r=-0.101).

To provide control for age and sex variables in the hierarchical regression analysis, first control variables were introduced, followed by predictor components. As Table 2 shows, control variables (age and sex) were able to only predict 3% of the total variance in ambiguity intolerance, while in the second part of the analysis, the definitive weight of all variables together was 0.46. The absolute difference of 0.43 indicates that predictive variables can define and predict 43% of ambiguity intolerance variance controlling for both age

and sex ($P \leq 0.001$).

Under normal distribution of the data, both predictive and independent variables were measured as continuous factors. Residuals analysis for dispersion, normality, and lack of inter-correlation was done, and correlation with predictive factors was confirmed. Univariate and multivariate outlier detection was done as well using the Mahalanobis distance method and distance, lever, and penetration detection statistics. Durbin-Watson statistic was performed to evaluate collinearity using tolerance coefficient, variance inflation factor, and error freedom. Table 3 shows the results of the regression analysis.

The standard weight for age and sex (control variables) measured with regression were 0.09 and 0.11, respectively. This illustrates the presence of a simple correlation between these measures and ambiguity intolerance (independent variable), though it was not significant. After the introduction of all variables into the analysis, sex meaningfully predicted ambiguity intolerance ($\beta = 0.108$), in other words, sex could affect ambiguity tolerance after controlling for predictive variables. It looks that sex would more significantly predict ambiguity tolerance at a particular level of interaction with predictive variables, although the Durbin-Watson test was calculated as

Table 1. Correlation coefficients between motivational structure and traumatic events with ambiguity intolerance

		Mean	SD						
1.	Ambiguity tolerance	44.78	6.95	1					
2.	Traumatic events	48.44	8.46	-0.66**	1				
3.	Adaptive motivational structure	16.56	5.54	0.24**	-0.23**	1			
4.	Maladaptive motivational structure	10.00	4.76	-0.10*	0.13*	-0.47**	1		
5.	Age	3.47	39.69	-0.14*	0.11	0.32**	-.49**	1	
6.	Sex	NA	NA	0.15**	0.08	0.35**	0.50**	0.41**	1

* $P<0.01$; ** $P<0.05$.

Table 2. Hierarchical regression analysis of independent variables based on predictive variables

Model	R	R square	Corrected R	F	P
Sex Age	0.17	0.03	0.02	4.89	0.008
Traumatic events Adaptive motivational structure Maladaptive motivational structure	0.68	0.46	0.45	83.90	0.0001
Delta	$\Delta R = 0.50$	$\Delta R^2 = 0.29$	Δ Corrected $R^2 = 0.43$	$\Delta F = 79.01$	

Table 3. Prediction of tolerance ambiguity by predictive variables (hierarchical regression coefficients)

Model		Non-standardized coefficients		Standardized coefficients	t	*P*
		β	Standard error	β		
1	Constant	42.31	0.91		46.37	0.0001
	Age	0.38	0.25	0.09	1.55	0.123
	Sex	0.60	0.33	0.11	1.85	0.066
2	Constant	17.30	1.76		9.81	0.0001
	Age	0.24	0.20	0.06	1.21	0.228
	Sex	0.57	0.27	0.11	2.20	0.028
	Traumatic events	-0.53	0.03	-0.64	-15.09	0.0001
	Adaptive motivational structure	0.12	0.06	0.09	1.98	0.048
	Maladaptive motivational structure	-0.19	0.08	-0.13	-2.39	0.02

1.831, revealing the independence of observations. As Table 3 determines, after controlling for sex and age, predictive factors including traumatic events, AMS, and MMS were all significantly competent in predicting ambiguity tolerance.

Discussion

The study was designed to determine the role of traumatic events and motivational structure in predicting ambiguity intolerance in patients with IBS. Our results revealed that 43% of ambiguity intolerance variance could be meaningfully defined and predicted by the predictive variables regulating for sex and age. Traumatic events were negatively associated with ambiguity tolerance prediction, which was in line with several previous studies.[47-52]

According to research findings, individuals who have experienced traumatic events are more likely to have maladaptive emotional regulation and difficulty adapting emotions compared to persons with no previous traumatic event.[42] In other words, frequent anxiety exposure and its consequences would lead to meta-worry or metacognitive negative beliefs regarding anxiety, including thought and risk uncontrollability. From a metacognition standpoint, to confront meta-worry, people would opt for negative emotional regulation strategies (e.g. ruminations, threat monitoring, thought control, thought suppression, avoidance). These strategies would result in threat-based personal processing so that persistent anxiety and threat perception would prevent the normalization of cognition.[53] Likewise, ambiguity intolerance can also be described as the sequel of traumatized cognitive processing. The experience of traumatic events might have a role in dysfunctional attitude formation, particularly in self-insufficiency beliefs, insecurity, and uncontrollability. It seems that the worrying outcome of these events would cause remarkable defects in cognitive functions and result in ambiguity intolerance and uncertainty, and possibly dysfunctional behaviors.[54,55]

Our data confirmed that AMS could meaningfully predict ambiguity tolerance regardless of age and sex. Since tolerance to uncertainty describes an individual's inclination to tolerate future mishaps, this is in accordance with studies approving the role of AMS and MMS in shaping dysfunctional behaviors. Thus, ambiguity intolerance might be considered the missing link in these interactions and relations.[26,56]

Another considerable finding in this research is the defined adverse role of MMS in predicting ambiguity tolerance. Regarding the similarities between features of MMS and internal motivation, our data support the findings of another study revealing the positive and negative effects of internal and external motivation on ambiguity tolerance.[57]

Some psychologists have evaluated the impact of motivational factors on behaviors and attitudes. Motivational structure outlines the individual's cognitive and behavioral pattern in following his/her ultimate goals. To better elucidate the point, the way an individual seeks his/her desires has a major and effective role in creating ambiguity tolerance. Evidence shows that reductions in adaptive aspects of the motivational structure are associated with psychological turmoil. Assessing AMS and ambiguity tolerance interaction requires a good understanding of its components. Major aspects of AMS, like a passionate orientation to desires and commitment, are considered cognitive components.[58] From the value aspect, however, the motivational structure is linked to attitudes that are defined by the level of satisfaction achieved by reaching goals and dissatisfaction from failure.

As the motivational structure theoreticians, Cox and Klinger describe adaptive and maladaptive types. People with maladaptive motivational styles have difficulty expressing emotions and often seek avoidant objectives, are not fulfilled with their achievements, and failure would hardly dissuade them. They are less satisfied with their lives and less motivated to change their manner. Conversely, an adaptive motivational style makes its beholder choose more realistic goals and dedicate resources to follow these healthy objectives.[24,44] Cognitive, emotional, and behavioral harms are in close relationship with complications of pursuing desires. With people unrealistically following their goals and being indifferent to their desires, cognitive, emotional, and behavioral harms are more likely to happen. Based on neurodevelopmental models, the MMS will disrupt the behavioral and cognitive system through a provisional imbalance between the threat/reward

effect and control mechanisms.[58,59] As we can consider an individual's reluctance to tolerate possible future mishaps as a presentation of uncertainty intoleranc,[60] it is assumed that MMS would diminish tolerance to misfortunes and dogmatism by decreasing cognitive flexibility, impulsiveness, and self-regulation.

The main characteristic of MMS is to avoid positive challenges of life and plays an important part in ambiguity intolerance. Intolerance to uncertainty is defined as emotional, cognitive, and behavioral reactions to vague situations and striving to control the future thus avoiding any encounters in life and a high level of general anxiety are its main features.[61] As a result, MMS (reluctance to follow internal or external objectives, excessive control of external events, defective knowledge of events, fortuity, indifference to achievements, improper timing) can be a key factor in generating intolerance to uncertainty, which in turn increases anxiety and results in distress and discomfort in response to any doubt or uncertainty about the future. This suspicion interferes with proper functionality and would lead to cognitive bias and cause problems in the perception, interpretation, and reaction to the uncertain situation on the emotional, cognitive, and behavioral levels.

The study population and the cross-sectional design of the research bring about some limitations in the generalizability of findings and cognitive interpretation. Lack of in-person interviews with patients is another weakness, and like the socio-economic status, generalization of results should be made with caution. The severity and extent of IBS are strong stressors, and the lack of control over this variable and the lack of a control group are among the limitations of this study. The most important limitation of this study was the lack of access to statistical samples of the research community due to the prevalence of coronavirus and also the return of a small number of questionnaires. Also, because of the large number of questions in these questionnaires, just a few people completed the questionnaire. Therefore, it is beneficial to hold special therapeutic workshops for clinical and health psychologists in psychological centers and interventional programs involved in ambiguity tolerance improvement in patients with IBS. Moreover, as traumatic events and motivational structure can probably reduce ambiguity tolerance leading to diminished mental health in patients with IBS, we suggest better educating these patients about the effective role of psychological interventions. Additionally, we can use ambiguity tolerance therapeutic protocols such as increasing awareness about worries of the future, problem-solving strategies, and vague situation realization in salutary procedures for these patients.[62]

In conclusion, this research revealed that an unhealthy motivational structure and traumatic events have a meaningful role in ambiguity intolerance in patients with IBS. This finding has both theoretical and practical advantages. In theory, it can improve our knowledge in this area and also provoke further investigations. In practice, we can reduce both the physical and mental burden of the disease in IBS through appropriate education in order to improve public health and ambiguity tolerance. Since we used self-reporting to measure ambiguity tolerance, generalizing the results should be done with caution. Better and more reliable tools are required for further studies.

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Conflict of Interest

The authors declare no conflict of interest related to this work.

Ethical Approval

It should be noted that this study has been reviewed and approved by tha Islamic Azad University, Tunkabon branch, with the ethics code IR.IAV.TON.REC.1399.011.

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