İSTANBUL UNIVERSITY PRESS

Psikoloji Çalışmaları - Studies in Psychology
SP 2024, 44 (3): 393–414
DOI: 10.26650/SP2022-1170143

RESEARCH ARTICLE / ARAŞTIRMA MAKALESİ

Turkish Adaptation of the Multidimensional Psychological Flexibility Inventory

Çok Boyutlu Psikolojik Esneklik Envanterinin Türkçe Uyarlama Çalışması

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ABSTRACT

Psychological flexibility and inflexibility are the foundational processes of Acceptance and Commitment Therapy (ACT). According to the Hexaflex model, these processes are composed of twelve dimensions; six sub-processes contribute to psychological flexibility and six sub-processes contribute to psychological inflexibility. The Multidimensional Psychological Flexibility Inventory (MPFI; Rolffs et al., 2016) includes items that assess all these sub-processes. The aim of the current study was to adapt the MPFI into Turkish and explore the psychometric properties of the Turkish MPFI. The sample (N = 603, M_{age}= 39, SD = 12.3) of the study was recruited online through convenience sampling. The psychometric properties of the Turkish MPFI were examined by assessing internal consistency for reliability, performing confirmatory factor analysis regarding validity, testing measurement invariance, examining its relationship with another tool measuring the same construct, and analyzing its effects on other theoretically related constructs such as depression, anxiety, and stress. The results of the confirmatory factor analysis supported the original higher order factor structure in the Turkish version with 12 first-order factors, half and half distributed into second-order global flexibility and inflexibility factors. The internal consistencies for the global flexibility scale (α = .96) and the global inflexibility scale (α = .93) were very high. The scale demonstrated strong correlations with psychological inflexibility, supporting its convergent validity. Global flexibility predicted lower levels of depression, anxiety, and stress, whereas global inflexibility predicted higher levels, supporting the construct validity. Additionally, the scale showed measurement invariance across gender and mental health status. Overall, these findings provide evidence for the reliability and validity of the scores obtained from the Turkish MPFI.

Keywords: Psychological flexibility, psychological inflexibility, Acceptance and Commitment Therapy, Multidimensional Psychological Flexibility Inventory

ÖZ

Psikolojik esneklik ve psikolojik katılık süreçleri, Kabul ve Kararlılık Terapisinin (ACT) temelini oluşturmaktadır. Hexaflex modeline göre, bu süreçler 12 boyuttan oluşmaktadır. Altı alt-süreç psikolojik esnekliğine katkı yaparken, altı farklı alt-süreç ise psikolojik katılığa katkı yapmaktadır. Çok Boyutlu Psikolojik Esneklik Envanteri (MPFI; Rolffs ve ark., 2016), tüm bu alt-süreçleri değerlendirecek maddeler içermektedir. Bu çalışmanın amacı, MPFI'yi Türkçeye uyarlamak ve Türkçe formun psikometrik özelliklerini araştırmaktır. Araştırmanın örneklemi (N = 603, $M_{yaş}$= 39, SD = 12.3) kolay ulaşılabilir örnekleme yoluyla oluşturulmuş ve veriler çevrimiçi olarak toplanmıştır. Türkçe MPFI'nin psikometrik özelliklerini incelemek adına, güvenirliği için içtutarlılık analizi, geçerliği kapsamında doğrulayıcı faktör analizi, ölçüm değişmezliğinin test edilmesi, aynı yapıyı ölçen başka

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Submitted: 02.09.2022 • **Revision Requested:** 17.11.2022 • **Last Revision Received:** 15.10.2024 • **Accepted:** 22.10.2024

bir ölçüm aracıyla ilişkisinin incelenmesi ve depresyon, anksiyete ve stres gibi teorik olarak ilişkili diğer yapılar üzerindeki etkileri analiz edilmiştir. Doğrulayıcı faktör analizi sonuçlarına göre, orijinal ölçekteki gibi üst boyutlu bir yapı Türkçe MPFI'de de desteklenmektedir. Bu üst boyutlu yapı, küresel esneklik ve katılığı temsil eden ikinci dereceden faktörler ve her birini oluşturan altışar tane birinci derece faktörden oluşan iki dereceli bir faktör yapısıdır. Küresel esneklik ölçeği (α = .96) ve küresel katılık ölçeği (α = .93) iç tutarlılık göstergeleri çok yüksek seviyede çıkmıştır. Ölçek, yakınsak geçerliği destekleyen psikolojik katılık ile güçlü korelasyonlar göstermiştir. Küresel esneklik, daha düşük depresyon, anksiyete ve stres seviyelerini yordarken, küresel katılık daha yüksek seviyeleri yordamıştır ve yapı geçerliğini desteklemiştir. Ayrıca ölçek, cinsiyet ve ruh sağlığı durumu açısından ölçüm değişmezliği göstermiştir. Sonuç olarak bu bulgular, MPFI'nin Türkçe formundan elde edilen puanların güvenirlik ve geçerliğine ilişkin kanıtlar sunmaktadır.

Anahtar Kelimeler: Psikolojik esneklik, psikolojik katılık, Kabul ve Kararlılık Terapisi, Çok Boyutlu Psikolojik Esneklik Envanteri

Acceptance and Commitment Therapy (ACT) is an empirically based psychological intervention that uses acceptance and mindfulness strategies mixed in different ways with commitment and behavior-change strategies to increase psychological flexibility (Hayes et al., 2012). ACT is rooted in the Relational Frame Theory, a comprehensive theory of language and cognition. Relational Frame Theory underpins ACT by explaining how humans learn language and cognition through relating events and symbols, which in turn influence behavior and psychological experiences (Barnes-Holmes et al., 2002). Central to ACT is the Hexaflex model, which outlines six interrelated processes of psychological flexibility and inflexibility. Regarding flexibility: (a) Acceptance is defined as a personal skill in remaining connected with one's inner distressing experiences such as emotions, sensations, or thoughts; (b) present moment awareness is defined as the ability to devote attention to the here and now and not being preoccupied with the past or future; (c) self-as-context is defined as the skills of being aware of the self as a perspective-taking agent and being able to see the big picture when in distress; (d) defusion is the skill of being able to discriminate between what the reality is and the reality of the thoughts; (e) values is defined as being in contact with personal values that can guide one's life; (f) committed action is defined as engaging in behaviors based on personal values. The Hexaflex model identifies six inflexibility processes that correspond to these flexibility processes. They include (a) experiential avoidance, which is the tendency to avoid distressing private experiences; (b) lack of contact with the present moment, which is defined as being preoccupied with the past or future; (c) self-as-content is defined as categorizing one's self as fixed and unchangeable; (d) fusion is defined as a cognitive fusion where one is aroused by thoughts as if they were physical situations; (e) lack of contact with personal values is defined as being unaware or lacking important personal goals that can guide one's life; and (f) inaction, which is defined as the rigid pattern of behaviors such as avoidance, behavioral excesses or short-term solutions without value-based intentions, or impulsivity. The Hexaflex model comprises these 12 processes, capturing the intricate interactions between them to model both human flourishing and suffering, along with effective intervention strategies.

Understanding psychological flexibility and inflexibility in relation to mental health outcomes is crucial for developing effective therapeutic interventions. Empirical studies support the role of psychological flexibility as a mediator in the mechanism of change in mental health outcomes (Hayes et al., 2006). For example, in their systematic review, Stockton et al. (2018) identified 12 empirical studies supporting the psychological flexibility mechanisms of ACT as meditators of change in outcomes such as anxiety, quality of life, depression, well-being, rehospitalization, pain reactivity, and psychological distress. Similarly, Thompson et al. (2020) conducted a transdiagnostic meta-analytical review of internet-based ACT studies that targeted psychological flexibility. They found these studies were effective in improving and maintaining outcomes such as anxiety, depression, and quality of life. Furthermore, findings related to psychological inflexibility are also noteworthy. Eisenbeck et al. (2019) demonstrated the role of psychological inflexibility in mediating the relationship between psychological distress and procrastination. Likewise, Tavakoli et al. (2018) demonstrated that psychological inflexibility was related to stress, worry, generalized anxiety, and somatization. Furthermore, Levin et al. (2014) found evidence supporting psychological inflexibility as a transdiagnostic pathological process

across current and lifetime histories of depressive, anxiety, substance use and eating disorders. These findings highlight the importance of addressing both psychological flexibility and inflexibility in therapeutic approaches to improve mental health outcomes.

Various instruments can measure psychological inflexibility or flexibility separately (e.g., Acceptance and Action Questionnaire-II, Bond et al., 2011; Comprehensive Assessment of Acceptance and Commitment Therapy, Francis et al., 2016). These scales assess flexibility or inflexibility as unidimensional and do not distinguish between processes. On the other hand, there are scales that measure specific processes or their combinations (e.g., the Multidimensional Experiential Avoidance Questionnaire, Gámez et al., 2011; Five Facet Mindfulness Questionnaire, Baer et al., 2006). The scarcity of research on the impact of various processes within the Hexaflex model on mental health outcomes is attributed to the widespread utilization of the Acceptance and Action Questionnaire-II (Hsu et al., 2023). This questionnaire measures psychological inflexibility as unidimensional, failing to capture the multi-process nature of the Hexaflex model. The Hexaflex model is conceptualized as a network of 12 interrelated processes. These processes are conceptualized as forming a complex and dynamic system. Hayes et al. (2012) stated that touching on one component "almost invariably 'activates' one or more of the other processes" (p. 66). This highlights the meaningful relationships between components that are worth exploring and that the relationships between the processes of the Hexaflex model and their relationship with mental health would better be explored within the context of each other and not in isolation. The exploration of the Hexaflex model's structure and its connection to mental health is also constrained by the scarcity of measures that can simultaneously assess all the processes of the model. (Christodoulou et al., 2018). It is crucial to concurrently distinguish and evaluate these processes to significantly contribute to our understanding of the distinct effects they exert and their interconnectedness with various mental health constructs. For example, Sundström et al. (2023) asserted that research on psychological flexibility in chronic pain is constrained by the absence of a unified metric that encompasses all aspects. The psychological flexibility framework presents an ACT-informed intervention approach to foster resilience and promote mental health. Arch et al. (2023) highlighted that ACT could be advanced by addressing the challenges regarding the measurement and evaluation of the processes. The Multidimensional Psychological Flexibility Inventory (MPFI; Rolffs et al., 2016) was developed to overcome these limitations. The MPFI simultaneously assesses all 12 components of the Hexaflex model. Therefore, there is a need for a reliable and valid measure that evaluates all 12 processes within the Hexaflex model for research and clinical practice in Turkey. Thus, the aim of the current research is to adapt the MPFI into Turkish.

Multidimensional Psychological Flexibility Inventory (MPFI)

The MPFI was developed across three studies (N = 3,040). An initial item pool of 554 items (410 from existing measures of psychological flexibility and inflexibility and 84 written by the authors) was refined through exploratory factor analyses (EFA), confirmatory factor analyses (CFA), and item response theory (IRT). The final questionnaire form had 60 items. Further EFA and CFA analyses of the final form confirmed 12 factors representing 12 processes of the Hexaflex model. The 60-item MPFI showed excellent internal consistency

across different demographic groups (Rolffs et al., 2016). Regarding the convergent validity of the scale, the MPFI's global inflexibility scale showed strong associations with existing measures of inflexibility such as the Acceptance and Action Questionnaire-II. There are no established specific measures for the inflexibility processes that can be used to investigate the subscales' convergent validity. However, there are comparable scales and parts of larger scales that can be used. The inflexibility subscales of the MPFI showed strong correlations with the comparison inflexibility measures such as the distraction subscale of the Multidimensional Experiential Avoidance Questionnaire (comparable to experiential avoidance) or Mindful Attention and Awareness Scale reversed (comparable to lack of contact with the present moment). The convergent validity of the MPFI flexibility subscales was supported with strong correlations with measures such as the decentering subscale of the Toronto Mindfulness Scale (Lau et al., 2006) comparable to acceptance; the mindfulness subscale of the Self Compassion Scale (Neff, 2003) comparable to self as context; or the non-reactivity subscale of the Five Facet Mindfulness Questionnaire comparable to defusion. The discriminant validity of the MPFI was examined through correlations with conceptually distinct scales measuring concepts such as neuroticism, emotional intelligence, and kindness to self and individual functioning indices such as psychological distress, autonomy, and relatedness. All the MPFI subscales showed low to moderate correlations with these scales, supporting their discriminant validity.

MPFI has been adapted to several languages (French, Grégoire et al., 2020; Italian, Landi et al., 2021b; Chinese and Japanese, Lin et al., 2020). The adaptation studies supported its original factorial structure with two second-order factors representing global flexibility and inflexibility and their corresponding sub-processes as first-order factors. In addition, the convergent and discriminant validity of the 60-item and 24-item versions of the scale received empirical support (Landi et al., 2021; Lin et al., 2020; Rolffs et al., 2016; Seidler et al., 2020). Ulubay (2020) undertook the adaptation of the scale to Turkish in their unpublished master's thesis. Nevertheless, this study exhibited several limitations. Ulubay (2020) employed EFA in their analysis. However, in scale adaptation studies, it is recommended to conduct CFA, especially when there is a strong theoretical model assumption (Orcan, 2018), as is the case with the Hexaflex model. The MPFI was designed and aimed to assess all the 12 processes of the Hexaflex model, and empirical studies on its factorial structure support its construct validity across different cultures (Lin et al., 2020; Seidler et al., 2020). After conducting the EFA, some items were excluded due to cross-loadings. As a consequence, the experiential avoidance subscale, for instance, ended up consisting of only one question. Measuring experiential avoidance is essential for studies in this field because it represents a significant transdiagnostic variable (Hayes et al., 1996). Therefore, the EFA method impedes the theoretical assumptions of the scale, preventing it from effectively evaluating and distinguishing all 12 processes simultaneously. Furthermore, Ulubay (2020) employed CFA to validate the EFA data within the same sample set, leading to statistical redundancy.

Aims of this Study

There is a need for a reliable and valid measure that simultaneously assesses all 12 processes in the Hexaflex model for use in research and clinical practice in Turkey. The

objective of this study was to adapt the MPFI into Turkish and investigate its relationship with the psychopathological symptoms of depression, anxiety, and stress.

The factorial structure of the MPFI-TR was examined through CFA in the current study in parallel with existing adaptations of the scale (Lin et al., 2020; Grégoire et al., 2020; Landi et al. 2021b). The hierarchical structure of the scale is expected to align with the original inventory. Second, to support convergent validity, the MPFI-TR is expected to show a positive relationship with a measure assessing psychological inflexibility. Accordingly, the following hypotheses have been developed.

H1. MPFI-TR is composed of two second-order latent variables representing global flexibility (with first-order latent variables of acceptance, present moment awareness, self-as-context, defusion, values and committed action) and inflexibility (with first-order latent variables of experiential avoidance, lack of contact with present moment, self-as-content, fusion, lack of contact with values and inaction).

H2. The scores obtained from the global inflexibility scale of the MPFI-TR and the Acceptance and Action Questionnaire-II, which measures inflexibility, have a positive relationship.

There is a limited number of research investigating simultaneously all the processes of the Hexaflex model regarding their relationships with each other or mental health outcomes due to the lack of comprehensive scales that can distinguish between the processes. After the development of the MPFI, recent research was able to provide novel insights on the unique associations between the processes itself (Baker & Berghoff, 2022) and with mental health outcomes (Landi et al., 2021a). To the authors' knowledge, this is the first study in Turkey that investigates the predictive value of all the 12 processes of the Hexaflex model with psychopathological symptoms. Based on this, the third hypothesis of the study was developed.

H3. The sub-processes of psychological flexibility and inflexibility are expected to be distinctly associated with psychological symptoms, such that flexibility will be negatively related to symptoms of a) depression, b) anxiety, and c) stress, while inflexibility will be positively related to symptoms of d) depression, e) anxiety, and f) stress.

Studies demonstrate that measures of psychological symptoms can show measurement non-invariance across genders (Putnick & Bornstein, 2016). Since psychological flexibility and inflexibility are closely related to psychopathology, it is essential to establish whether a measure regarding this construct has measurement invariance across genders or not. Psychological flexibility and inflexibility are transdiagnostic multidimensional constructs that underlie human functioning. Therefore, it is favorable that a measure assessing them shows measurement invariance across reported mental health status (people currently in need of professional mental help and/or in psychological or psychopharmacological treatments and/or having a substance abuse problem versus not in treatment/do not have mental health problems). If measurement invariance were established, then it would indicate that psychological flexibility and inflexibility have the same structure across genders and people with reported psychological problems vs. people who did not report a problem. This will allow comparing group means and support psychological flexibility and inflexibility

as a dimensional construct underlying human functioning showing similar meanings across important demographic factors that otherwise create measurement non-invariance in measures of psychopathological symptoms or result in different mean scores across the groups. It is expected that the MPFI-TR will show measurement invariance across males and females and mental health status. Thus, the fourth hypothesis of the study was developed based on this,

H4. MPFI-TR shows configural, metric and scalar invariances across genders (male versus female) and mental health status (currently in need of professional mental help and/or in psychological or psychopharmacological treatments and/or having a substance abuse problem versus not in treatment/do not have mental health problems).

Method

Participants

The sample consisted of 603 individuals aged between 18 - 75 (M = 39.0, SD= 12.3), recruited through convenience and snowball sampling. Female participants constituted 77.8% of the sample. High school diploma was the highest educational level achieved by 8.8% of the participants, 59.0% had an undergraduate degree and 32.2% had a graduate degree. More than half (56.7%) of the participants were either married or living with a partner, 30.2% were single and 13.1% were widowed, divorced, or indicated having other status. Approximately two-thirds (68.0%) of the participants were employed, 12.3% were unemployed, 11.6% were students and 8.1% were retired. Lastly, 13.3% indicated they were currently receiving mental health treatment. Participants' characteristics can be seen in Table 1.

Table 1. *Participants' Demographic Characteristics (N=603)*

Demographic Dimension		***N***	**%**
Gender			
	Female	469	77.8
	Male	130	21.6
	Other	4	0.7
Level of Education			
	Primary School	3	0.5
	Secondary School	3	0.5
	High School	47	7.8
	University	356	59
	Masters	148	24.5
	PhD	46	7.6
Marital Status			
	Married	314	52.1
	Living together with a partner	28	4.6
	Never married	182	30.2
	Divorced	60	10
	Widow	11	1.8
	Other	8	1.3
Employment			
	Employed	410	68
	Unemployed	74	12.3
	Student	70	11.6
	Retired	49	8.1
Mental Health			
	Reports needing professional help	180	29.9
	Currently getting professional help	80	13.3
	Currently using psychiatric medicine	48	8.0
	Reports alcohol/drug addiction	37	6.1
	Has someone in the family who has a mental health problem	129	21.4

Measures

Socio-Demographic Information Form

The socio-demographic form provided information regarding age, gender, marital status, level of education, employment state, and mental health status (if they were currently in need of professional mental help, in psychological or psychopharmacological treatments, have a substance abuse problem) of the participants.

Multidimensional Psychological Flexibility Inventory (MPFI)

The MPFI is a 60-item self-report questionnaire developed by Rolffs et al. (2016) that measures psychological flexibility and inflexibility. It has 12 subscales (each composed of 5 items) in accordance with the 12 sub-processes of the Hexaflex model (Hayes et al., 2012). These subscales are divided into two global scales of flexibility and inflexibility, each containing six subscales. The respondent was asked to rate the statements regarding their experiences in the last two weeks on a Likert scale (6-point; 1= *never true to* 6= *always true*). The average of the mean of the respective questions gives a score for the subscales, and a composite score of flexibility or inflexibility is calculated by averaging the scores of the respective subscales. Cronbach's αs for the global flexibility and inflexibility scales were found to be .97 and .96, respectively (Rolffs et al., 2016).

In this study, the order of the items of the MPFI were randomly presented to the participants. Descriptive statistics regarding the mean, standard deviation, and Cronbach's alphas (αs) for the current study are presented in Tables 2 and 3.

Acceptance and Action Questionnaire II

The Acceptance and Action Questionnaire-II (Bond et al., 2011) is a 7 item self-report questionnaire designed to measure psychological inflexibility. The participant rates how much, on a 7-point Likert scale, an item is true for themselves (1 = *not at all true* to 7 = *completely true*). The result is calculated by summing up the scores, and higher scores indicate higher levels of inflexibility. The internal consistency level Cronbach's α was .84 (Bond et al., 2011). The Turkish version of the scale (Yavuz et al., 2016) has demonstrated reliable measurement of psychological inflexibility in the Turkish language, with a Cronbach's α of .84 and a 60-day test–retest reliability indicated by Pearson's correlation coefficient, r = 0.85. The scale exhibited single factor and demonstrated correlations with rumination, anxiety, depression, and obsessive-compulsive symptoms. In this study, the Cronbach's α was .93 (Table 2).

Depression, Anxiety and Stress Scale-21

The Depression, Anxiety and Stress Scale-21 is a short form of the original 42-item version developed by Lovibond and Lovibond (1995). It consists of three dimensions; (a) depression, (b) anxiety, and (c) stress. There are seven questions for each dimension. The items are rated on a Likert scale (4-point; 0= *did not apply to me at all* to 3 = *applied to me very much, or most of the time*). The score of each dimension is calculated as the sum of item scores, and higher scores indicate higher levels on the dimension in question. The Cronbach's α levels were .91 for depression, .84 for anxiety, and .90 for stress scales (Lovibond & Lovibond, 1995). The reliability of the Turkish version of the scale was demonstrated, with Cronbach's α levels of .87 for depression, .85 for anxiety, and .81 for stress subscales. The test-retest reliability coefficient was r = 0.68 for depression, r = 0.66 for anxiety, and r = 0.61 for stress subscales. It demonstrated good discrimination between healthy and clinical subjects based on mean scores (Sarıçam, 2018). The Cronbach's α levels in the current study were .89 for depression, .87 for anxiety and .87 for the stress dimension (Table 2).

Procedure

The ethical committee of Arel University approved the study on 23.10.2019 (No. 69396709-050.01.01). The translation process of the Turkish MPFI included a multistep approach (Sousa & Rojjanasrirat, 2010; Wild et al., 2005). First, two independent bilingual psychologists provided forward translations. Second, the authors combined these translations by resolving the discrepancies. Third, a professional translator back-translated the combined forward translation into English. Fourth, the authors and the translator assessed the back-translation by comparing it to the original version, and the necessary changes were made to reach the final form. Lastly, the final form was pre-tested in a small sample of five psychologists and five monolingual individuals to ensure the applicability and clarity of the items. It was determined that the items were comprehensible and easy to rate. Potential respondents were reached through social media platforms (e.g., WhatsApp, Facebook), and subsequently, these individuals forwarded the online form to other potential participants. The inclusion criteria were providing informed consent for voluntary participation and being at or above 18 years of age. The instructions on how to answer the questions were included at the beginning of each questionnaire. The data were collected in November 2019.

Data Analysis

The analyses were conducted with SPSS (v. 23) except for the Confirmatory Factor Analyses (CFA) and measurement invariance analyses, which were conducted with the R package lavaan (Rosseel, 2012). The Cronbach's alpha was evaluated for the internal consistency of the subscales. The intercorrelations among the MPFI subscales, global flexibility, and global inflexibility scales were calculated to evaluate the construct validity. Convergent validity was examined through its association with the Acceptance and Action Questionnaire-II.

Factorial structure was examined through second-order CFA following the original study and other adaptation studies of the scale (Grégoire et al., 2020; Landi et al., 2021b; Lin et al., 2020; Rolffs et al., 2016). The model used for the CFA comprised two second-order factors representing global flexibility andinflexibility. The first-order factors of flexibility were acceptance, present moment awareness, self-as-context, defusion, values, and committed action. The first-order factors of inflexibility were experiential avoidance, lack of contact with the present moment, self-as-content, fusion, lack of contact with values and inaction. The model fit to the data was screened through Chi-Square ($\chi 2$), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), the Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR).

Configural, metric and scalar invariances across genders (male versus female) and mental health status (currently in need of professional mental help and/or in psychological or psychopharmacological treatments and/or having a substance abuse problem versus not in treatment/do not have mental health problems) were examined to investigate the psychometric equivalence of the Turkish MPFI across these groups. The construct validity was assessed through standard multiple regression analyses where global flexibility and global inflexibility were examined as predictors of psychological health indicators of

depression, anxiety, and stress. Additionally, the same analyses were conducted by taking the sub-processes of flexibility and inflexibility separately as independent variables.

Results

Initially, descriptive statistics were examined for the MPFI. Afterwards, confirmatory factor analysis, intercorrelations, and reliability analysis outcomes were examined. Lastly, other analyses of validity were conducted. Skewness and kurtosis measures were employed to assess the normality assumptions, with values within the range of ≤|3| being deemed indicative of sufficiently normal distributions (D'Agostino et al.,1990). Descriptive statistics indicated that skewness values ranged between -.939 and 1.065, and kurtosis values ranged between -1.062 and .742 suggesting that all variables had relatively normal distributions (see Table 2). Additionally, the multivariate normality assumption was assessed through Mardia's (1970) multivariate skewness and kurtosis statistics, along with their associated *p*-values. To assert multivariate normality, both *p*-values for skewness and kurtosis statistics must surpass 0.05. Because we found violations of the multivariate normality assumption in the data, the R package lavaan WLSMV (Weighted Least Squares Mean and Variance adjusted) estimator for the fitting function was used. The WLSMV is a robust estimator that does not assume normally distributed variables, making it the preferred choice for modeling categorical or ordered data (Brown, 2006) and it is used for CFA models with ordered-categorical indicators (Rosseel, 2012).

Table 2. *Descriptive Statistics of Turkish MPFI*

Flexibility	Item	*M*	*SD*	Skw.	Krt.	R	Inflexibility	Item	*M*	*SD*	Skw.	Krt.	r
Acceptance	1	3.86	1.26	-.13	-.69	.53	Experiential	1	4.00	1.32	-.29	-.58	.31
	2	3.98	1.27	-.37	-.53	.68	Avoidance	2	3.91	1.25	-.26	-.45	.23
	3	3.64	1.34	-.10	-.76	.45		3	3.97	1.40	-.25	-.79	.23
	4	3.74	1.31	-.13	-.67	.51		4	3.46	1.33	.20	-.73	.50
	5	4.58	1.16	-.58	-.23	.54		5	3.71	1.41	-.03	-.84	.36
Awareness	1	4.57	1.14	-.72	.32	.58	Lack of Contact	1	2.75	1.40	.59	-.43	.67
	2	3.88	1.21	-.14	-.57	.65	with Present	2	2.41	1.25	.88	.28	.68
	3	4.39	1.22	-.62	-.12	.60		3	2.77	1.32	.54	-.47	.60
	4	4.99	1.00	-.94	.66	.32		4	3.04	1.57	.39	-.90	.60
	5	4.74	1.02	-.59	-.06	.67		5	2.99	1.38	.42	-.63	.65
Self as Context	1	4.27	1.16	-.50	-.17	.71	Self as Content	1	3.45	1.45	.13	-.93	.51
	2	4.44	1.19	-.61	-.15	.65		2	3.57	1.50	.05	-.06	.53
	3	4.31	1.19	-.51	-.18	.71		3	3.16	1.60	.31	-.04	.53
	4	4.24	1.25	-.48	-.34	.73		4	3.84	1.39	-.21	-.75	.35
	5	4.29	1.17	-.35	-.50	.68		5	3.50	1.45	-.01	-.93	.55
Defusion	1	3.74	1.28	-.09	-.65	.71	Fusion	1	3.16	1.46	.42	-.81	.69
	2	3.55	1.31	-.02	-.70	.69		2	3.10	1.50	.45	-.79	.65
	3	3.90	1.25	-.16	-.67	.66		3	2.77	1.39	.77	-.15	.63
	4	3.76	1.16	-.13	-.39	.64		4	3.57	1.45	.08	-.89	.58
	5	4.19	1.17	-.41	-.35	.75		5	3.85	1.33	-.10	-.82	.51
Values	1	4.92	1.03	-.83	.48	.49	Lack of Contact	1	2.68	1.33	.73	-.14	.60
	2	4.49	1.16	-.58	-.16	.66	with Values	2	3.02	1.35	.41	-.59	.54
	3	4.32	1.16	-.43	-.25	.70		3	2.60	1.42	.74	-.28	.50
	4	4.49	1.07	-.61	.04	.68		4	2.87	1.41	.58	-.44	.63
	5	4.51	1.15	-.64	-.05	.69		5	2.98	1.41	.50	-.51	.45
Committed Action	1	4.50	1.20	-.70	-.00	.63	Inaction	1	2.86	1.40	.52	-.65	.68
	2	4.39	1.17	-.62	.03	.70		2	2.89	1.34	.54	-.44	.62
	3	4.39	1.18	-.54	-.11	.71		3	3.09	1.54	.39	-.87	.69
	4	3.90	1.37	-.29	-.75	.58		4	2.39	1.28	.07	.74	.59
	5	4.13	1.35	-.48	-.50	.60		5	2.48	1.33	.85	.12	.69

Note. Item total correlations were calculated by using the respective global scale's total scores; *r*: Total correlations; skw: Skewness; krt.: Kurtosis.

Confirmatory Factor Analysis

The CFA with two second-order latent variables representing global flexibility (with first-order latent variables of acceptance, present moment awareness, self-as-context, defusion, values and committed action) and inflexibility (with first-order latent variables of experiential avoidance, lack of contact with present moment, self-as-content, fusion, lack of contact with values and inaction) scales using the WLSMV estimator (with marker method which fixes the first loading of each factor to 1 to identify the model) demonstrated a good fit on all the indices examined: $\chi 2$ (1697, N = 603) = 6521.54, p < .001, CFI = .942, TLI = .939, RMSEA = .069, SRMR = .086. The standardized path coefficients revealed that all the items in the flexibility dimension had strong standardized path coefficients (range

= .51 and .89 to their corresponding first-order factor, except for item 4 ("I was in touch with the ebb and flow of my thoughts and feelings") of the present moment awareness factor, which had a moderate coefficient (.23). All the items of the inflexibility dimension had strong standardized path coefficients to their corresponding first-order factor (range = .35 and .88 (see table 3). Furthermore, the first–order factors of the sub-processes of flexibility had strong standardized path coefficients to their second-order factor (range = .74 and .97. All inflexibility sub-processes had strong standardized path coefficients to their second-order factor (range = .48 and 1.02, except for experiential avoidance, which had a weak coefficient (.13). The standardized correlation between the two second-order factors was .55, which indicates a shared variance of 29%. Overall, the hierarchical structure of the original inventory was supported in the Turkish MPFI, and these results contribute to the construct validity of the Turkish MPFI.

Table 3. *Standardized coefficients, standard errors, z-value and R^2 for Confirmatory Model of the MPFI*

Flexibility	Item	Std Coef.	*SE*	*Z*	R^2	Inflexibility	Item	Std Coef.	*SE*	*z*	R^2
Acceptance	1	0.63			0.40	Experiential	1	0.72			0.52
	2	0.89	0.12	12.23*	0.80	Avoidance	2	0.58	0.07	11.26*	0.34
	3	0.57	0.10	9.59*	0.32		3	0.51	0.08	8.89*	0.26
	4	0.62	0.10	10.29*	0.39		4	0.88	0.10	11.83*	0.77
	5	0.64	0.10	9.51*	0.41		5	0.79	0.09	12.64*	0.62
Awareness	1	0.62			0.38	Lack of Contact	1	0.82			0.68
	2	0.74	0.11	11.30*	0.55	with Present	2	0.84	0.04	22.50*	0.70
	3	0.68	0.11	10.98*	0.46		3	0.68	0.05	16.24*	0.46
	4	0.25	0.07	5.16*	0.06		4	0.71	0.06	17.46*	0.50
	5	0.73	0.09	12.19*	0.54		5	0.73	0.05	17.49*	0.53
Self as Context	1	0.73			0.54	Self as Content	1	0.71			0.51
	2	0.70	0.06	16.60*	0.48		2	0.77	0.11	9.79*	0.59
	3	0.75	0.06	18.96*	0.56		3	0.74	0.08	13.71*	0.54
	4	0.79	0.06	19.50*	0.62		4	0.35	0.09	5.02 *	0.12
	5	0.73	0.06	18.35*	0.53		5	0.74	0.12	8.96 *	0.54
Defusion	1	0.78			0.61	Fusion	1	0.82			0.66
	2	0.78	0.05	20.97*	0.61		2	0.85	0.05	20.19*	0.72
	3	0.70	0.05	16.91*	0.50		3	0.87	0.05	19.76*	0.75
	4	0.68	0.05	15.28*	0.46		4	0.69	0.05	16.73*	0.47
	5	0.82	0.05	19.89*	0.68		5	0.52	0.05	11.63*	0.27
Values	1	0.51			0.26	Lack of Contact	1	0.74			0.55
	2	0.70	0.14	10.72*	0.49	with Values	2	0.63	0.06	13.48*	0.39
	3	0.76	0.16	10.15*	0.58		3	0.55	0.07	11.34 *	0.31
	4	0.73	0.14	10.44*	0.54		4	0.72	0.07	14.61*	0.52
	5	0.76	0.16	10.42*	0.58		5	0.47	0.08	8.67*	0.22
Committed Action	1	0.70			0.49	Inaction	1	0.79			0.63
	2	0.78	0.07	15.48*	0.61		2	0.72	0.05	17.14*	0.51
	3	0.81	0.06	17.66*	0.66		3	0.74	0.05	20.53*	0.54
	4	0.70	0.08	14.92 *	0.48		4	0.72	0.05	17.94*	0.52
	5	0.70	0.07	15.50 *	0.49		5	0.70	0.05	17.62*	0.49

Note. Marker method (fixes the first loading of each factor to 1) was used to identify the CFA model. Std coef: Standardized coefficient.

Intercorrelations Among MPFI Subscales

The correlation coefficients among the MPFI subscales are shown in Table 4. The correlations between the global flexibility scale and all the six psychological flexibility subscales were large and positive (range = .76 and .90). Likewise, apart from experiential avoidance (r = .48), all the inflexibility subscales correlated with a large magnitude with the global inflexibility scale (range = .71 and .86). The intercorrelations among the flexibility subscales were positive with medium to large magnitudes (range = .49 and .83) and the intercorrelations among the inflexibility subscales were positive with small to large magnitudes (range = .14 and .86). Experiential avoidance had weak intercorrelations with the inflexibility subscales (range = .14 and .20) except for with self as content (r = .48). The correlation between the global flexibility and inflexibility scale was .39. The intercorrelations between the flexibility and inflexibility subscales, except for the experiential avoidance and self-as-content subscales, were all negative with small to large magnitudes (range = -.22 and -.57). Experiential avoidance showed a small and negative correlation only with acceptance (r = -.09) but had small and positive correlations with the rest of the flexibility subscales (range = .14 and .23). It was also positively associated with the global flexibility scale with a small magnitude (r = .16). However, it still had a stronger positive correlation with the global inflexibility scale (r = .48). Furthermore, self-as-content had a significant negative association only with acceptance (r = -.12) and committed action (r = -.09) and had non-significant correlations with the rest of the flexibility subscales. It was also the only inflexibility subscale that did not have a significant negative correlation with the global flexibility scale (apart from experiential avoidance which had a positive correlation). Overall, most of the correlation coefficients were in the small to large magnitudes and had a positive direction within their respective dimension (except for experiential avoidance), lending support to the construct validity of the Turkish version of the MPFI.

Table 4. *Descriptive statistics and Pearson's r Correlations of MPFI subscales and AAQ-II*

Scale	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	AAQ-II
Flexibility																	
1. Acceptance	3.96	.97	(.82)	.59*	.59*	.66*	.52*	.49*	.76*	-.09**	-.31*	-.12*	-.24*	-.22*	-.29*	-.29*	-.33*
2. Awareness	4.51	.80		(.76)	.68*	.66*	.73*	.65*	.84*	.14*	-.39*	-.02	-.28*	-.32*	-.35*	-.27*	-.39*
3. Self as Context	4.31	.95			(.86)	.83*	.78*	.72*	.90*	.21*	-.39*	-.06	-.46*	-.35*	-.49*	-.35*	-.51*
4. Defusion	3.82	1.00				(.87)	.69*	.64*	.88*	.19*	-.36*	-.03	-.49*	-.32*	-.44*	-.33*	-.49*
5. Values	4.55	.85					(.83)	.78*	.88*	.23*	-.43*	-.05	-.39*	-.38*	-.47*	-.34*	-.46*
6. Committed Action	4.27	1.00						(.86)	.84*	.15*	-.45*	-.09**	-.45*	-.42*	-.57*	-41*	-.53*
7. Global Flexibility	4.24	0.79							(.96)	.16*	-.46*	-.08	-.46*	-.39*	-.52*	-.39*	-.54*
Inflexibility																	
8. Avoidance	3.81	1.04								(.84)	.20*	.48*	.14*	.19*	.19*	.48*	.12*
9. Lack of Contact with the Present Moment	2.79	1.12									(.87)	.40*	.64*	.76*	.73*	.83*	.63*
10. Self as Content	3.51	1.12										(.81)	.44*	.40*	.48*	.71*	.45*
11. Fusion	3.29	1.15											(.87)	.61*	.76*	.80*	.72*
12. Lack of Contact with Value	2.83	.99												(.76)	.72*	.81*	.62*
13. Inaction	2.74	1.09													(.85)	.86*	.74*
I4. Global Inflexibility	3.16	0.82														(.93)	.73*

Note. ** $p < .05$, * $p < .01$. Values in parenthesis denote Cronbach's alpha levels. AAQ-II: Acceptance and Action Questionnaire

Internal Consistency

The observed internal consistency level of the MPFI's global flexibility (α = .96) and inflexibility (α = .93) were excellent. The Cronbach's alpha levels of the 12 subscales showed adequate to very good internal consistencies (range =.76 - .87) (see Table 4). The mean inter-item correlation in the global flexibility scale was .42 Furthermore, it was .32

in the global inflexibility scale, supporting internal consistency. The corrected item total correlations ranged between .32 and .75 for the flexibility items and ranged between .31 and .69 for all inflexibility items supporting reliability except items 2 (.23) and 3 (.23) in the experiential avoidance scale (see Table 2).

Convergent Validity

Table 4 shows the correlations of the Acceptance and Action Questionnaire-II and MPFI. The correlation between the MPFI global flexibility and the Acceptance and Action Questionnaire-II was large and significant (r = -.54, p < .001). The correlation between MPFI global inflexibility and the Acceptance and Action Questionnaire-II was also large and significant (r = .73, p < .001). Additionally, correlations with flexibility sub-processes were negative at medium to large levels (range = -.33 and -.53, p < .01) and correlations with inflexibility sub-processes were positive at small to large levels (range = .12 and .74, p < .01). Overall, these findings support convergent validity with the Acceptance and Action Questionnaire-II.

Construct Validity

The results of the regression analyses are shown in Table 5. The analyses involving global flexibility and inflexibility explained 46% of the variance in depression, 34% in anxiety, and 41% in stress. Higher scores on the global flexibility scale predicted lower levels of depression, anxiety, and stress. Higher scores on the global inflexibility scale predicted higher levels of depression, anxiety, and stress. The variance explained in the mental health indicators was 16- 51% when the sub-processes of flexibility and inflexibility were the predictors. Among the sub-processes of the flexibility dimension; defusion was a predictor of lower anxiety and stress, and committed action significantly predicted lower depression and anxiety. Among the sub-processes of the inflexibility dimension; self-as-content and fusion predicted higher depression, anxiety, and stress. Additionally, lack of contact with the present moment and inaction predicted higher levels of depression. Experiential avoidance predicted lower levels of these three mental health indicators.

Table 5. *Regression Results of Global Flexibility, Global Inflexibility and Subscales Predicting Depression, Anxiety and Stress*

	Depression	Anxiety	Stress
	B	*β*	*β*
Global Psychological Flexibility and Inflexibility as Predictors			
Global Flexibility	-.23*	-.16*	-.25*
Global Inflexibility	.56*	.50*	.50*
Adjusted R^2	.46*	.34*	.41*
Flexibility Sub-processes as Predictors			
Acceptance	.12	.11	.06
Present moment awareness	.00	.04	.06
Self-as-context	-.06	-.07	-.20
Defusion	-.18	-.27**	-.36**
Values	-.05	.03	.06
Committed action	-.33**	-.23**	-.10
Adjusted R^2	.24**	.16**	.24**
Inflexibility Sub-processes as Predictors			
Experiential avoidance	-.14**	-.11**	-.10**
Lack of contact with present moment	.24**	.08	.09
Self-as-content	.11**	.17**	.12**
Fusion	.20**	.27**	.36**
Lack of contact with values	.07	.09	.11
Inaction	.25**	.16	.12
Adjusted R^2	.51**	.37**	.43**

Note. p-values * $p < .05$, ** $p < .01$.

Measurement Invariance

Regarding gender, fit indices from the configural model show good fit, demonstrating configural invariance. For the metric and scalar invariance values for $\triangle\chi 2$ significant at $p < .05$, $\triangle$CFI $\geq$ - .010, and $\triangle$RMSEA $\geq$ .015 were used as non-invariance criteria (Chen, 2007; Putnick & Bornstein, 2016) and invariance was established if two out of three criteria were met as suggested in the literature (Landi et al., 2021b). Accordingly, the metric level of invariance across genders was established since three of the criteria were met and the scalar level of invariance was also established since two ($\triangle$CFI, $\triangle$RMSEA) of the criteria were met. Regarding mental health status, fit indices from the configural model show good fit, demonstrating configural invariance. Metric and scalar levels of invariance was established since two of the criteria ($\triangle$CFI, $\triangle$RMSEA) were met at both levels. Overall, the invariance of the configural, metric and scalar levels with respect to gender and mental health status were all established. The fit indices and model comparisons are presented in Table 6. These findings underscore that the factor structure of the Turkish MPFI is similarly valid in females and males, and across people who report having psychological problems and people who do not report psychological difficulties.

Table 6. *Results of Evaluation of Measurement Invariance across Genders, and Mental Health Status*

	Model fit				Model Comparison					
	χ^2	*Df*	CFI	RMSEA	Models	$\Delta\chi^2$	Δdf	*p*	ΔCFI	ΔRMSEA
Gender invariance										
M1- Configural	7,711.413	3,394	.949	.065						
M2 – Metric	8,509.533	3,452	.940	.070	M2-M1	71.764	58	.105	-.009	.005
M3- Scalar	8,563.459	3,498	.940	.070	M3-M2	68.629	46	.016	0	0
Mental health status invariance										
M1- Configural	7,820.450	3,394	.941	.066						
M2 – Metric	8,562.811	3,452	.931	.070	M2-M1	77.525	58	.044	-.009	0.004
M3- Scalar	8,652.399	3,498	.931	.070	M3-M2	126.21	46	.000	-.001	0

Note. Gender invariance: Male (n = 130) vs. female (n = 469). Mental health status: Reported needing professional mental help and/or in psychological or psychopharmacological treatments and/or have substance abuse problem (n = 212), vs. not in treatment/do not have mental health problems (n = 391).

Discussion

This study investigated the psychometric properties of the Turkish MPFI. The reliability, convergent and construct validity and the measurement invariance of the scale were examined. The internal consistency of the global flexibility and inflexibility scales was very high, and the subscales had adequate to very high levels of reliability. Regarding construct validity, CFA showed that the original second-order factor structure was valid in the Turkish MPFI. This structure was composed of two second-order factors representing global flexibility and global inflexibility and corresponding sub-processes as their first-order factors. Moreover, the intercorrelations between the flexibility subscales ranged between .49 and .83 (.46 and .76 in the original scale) sharing 24% to 69% of their variance. The intercorrelations between the inflexibility subscales ranged between .14 and .76 (.31 and .78 in the original scale) sharing 2% to 57% of their variance. These findings suggest that these processes contain unique information and can change independently for an individual. Additionally, almost all the subscales significantly correlated with each other, meaning that these constructs are also linked in an individual's life (Hayes et al., 2012). Thus, the correlational properties of the Turkish MPFI supported that the Hexaflex processes are related yet distinct constructs and could be assessed, evaluated, and worked on either together or separately from each other (Rolffs et al., 2016). Overall, these findings supported the construct validity of the scale.

The Turkish MPFI also performed similarly across females and males, and the mental health status showed measurement invariance. Furthermore, the global flexibility and global inflexibility scales and sub-processes demonstrated significant correlations in the expected direction with the Acceptance and Action Questionnaire-II, which contributed to the convergent validity of the scale. Regarding construct validity, global flexibility predicted lower depression, anxiety, and stress levels, whereas global inflexibility predicted higher levels. Among the flexibility sub-processes, defusion predicted lower anxiety and stress, whereas committed action predicted lower levels of depression and anxiety. Among the inflexibility sub-processes, lack of contact with the present moment, self-as-content, fusion and inaction predicted higher levels of depression, whereas higher levels of anxiety or stress were predicted by self–as-content and fusion. These results support other findings in the literature (Grégoire et al., 2020; Landi et al., 2021b) that individual sub-processes of flexibility and inflexibility might have differential connections to facets of mental health outcomes.

Experiential avoidance showed unexpected associations with flexibility scales and mental health problems. This process is theoretically the cornerstone of the model and was found to be negatively related to mental health (Angelakis & Pseftogianni, 2021; Tyndall et al., 2020). However, in this study it was positively correlated with flexibility subscales (except for acceptance) and predicted lower depression, anxiety, and stress. Another Turkish adaptation study of the MPFI (Ulubay, 2020) also found that four out of five items of the experiential avoidance subscale loaded on both flexibility and inflexibility global factors on an EFA. These findings raise questions regarding the ability of the items in this subscale to assess Experiential Avoidance in Turkish culture or there might be cultural issues rendering experiential avoidance an adaptive and flexible response in a Turkish sample. Experiential avoidance was also found to be related to higher functioning in Taiwanese and Chinese participants, while it was related to poorer functioning in Asian American and Caucasian participants (Lin et al., 2019). These findings imply that this sub-process might manifest differently in non-western cultures. Therefore, the experiential avoidance of unpleasant emotions may be perceived as an adaptive response among participants. Similarly, participants in an assumed healthy sample may have considered their ability to achieve a specific experiential avoidance process (e.g., ability to distract oneself from bad memories, thoughts) as an end in itself and adaptive. This may have resulted in their ratings showing associations with flexibility sub-processes. Lastly, the original items are not comprehensive enough and fail to capture experiential avoidance reliably across populations and cultures.

It can be argued that experiential avoidance is intertwined with one's culture and that the manifestation of this process could be moderated by cultural practices (Borgogna, 2020). In fact, studies of the MPFI in Western cultures also found unexpected results regarding experiential avoidance or other sub-processes. The Italian and French adaptation studies of the MPFI found that experiential avoidance did not have a significant relationship with the Acceptance and Action Questionnaire-II. Landi et al. (2021b) suggest that their findings could be confounded with the effects of the COVID-19 pandemic but remind that the adaptiveness of processes are context dependent, and they should not be dichotomized into functional and dysfunctional skills (Hayes et al., 2012). Grégoire et al. (2020) suspect that individuals not trained in ACT might have biases against the meaning of questions regarding flexibility and inflexibility and specifically the items of the experiential avoidance subscale might be hard to grasp in Francophone respondents. The current study was conducted before the COVID-19 pandemic, and unexpected associations still emerged. Several pre- or post-pandemic studies also highlight unexpected results regarding the factor loadings and associations within the sub-process and between psychological health outcomes. For instance, Seidler et al. (2020) demonstrated that fit indices of CFA significantly improved when defusion was loaded on both second-order factors, which represented global flexibility and global inflexibility. Rogge et al. (2019) found that present moment awareness was a predictor of high levels of depression, or Baker and Berghoff (2022) found that acceptance and experiential avoidance had associations in the unexpected direction with quality of life dimensions. These findings warrant fine-tuned techniques in future studies that explore the sub-processes and their relationship with mental health outcomes. For instance, network analysis, which is a novel perspective in exploring the associations between components of

a complex psychological system, is useful in elucidating the unique associations of these sub-processes and their relationship to other psychological constructs and mental health outcomes (Baker & Berghoff, 2022; Christodoulou et al., 2018).

This study had some limitations. First, data were collected through convenience sampling, and data from a randomly selected sample would have yielded more reliable results regarding the psychometric properties of the scale. Four hundred sixty-nine of the participants were women, 91% of whom had at least undergraduate education, which is an important limitation in terms of generalizability. Second, the data were obtained from the general population, and it should be noted that having a mental health problem based on self-report/being treated or not cannot be considered as a clinical group. Although investigating the properties of the scale in the general population is essential, it must be accompanied by clinical data to establish clinical thresholds and properties. Third, the evaluation of convergent validity exclusively relied on the Acceptance and Action Questionnaire-II, which gages psychological inflexibility. Including additional measures that assess flexibility and inflexibility, such as the Multidimensional Experiential Avoidance Questionnaire or Self Compassion Scale, would have contributed to the convergent validity of the Turkish MPFI. Lastly, comparing the mean scores of different groups that the scale showed measurement invariance would have contributed to the discriminant validity of the scale.

In conclusion, the findings of this study showed that the Turkish MPFI was a sufficiently reliable and valid instrument to assess psychological flexibility and inflexibility according to the Hexaflex model. This instrument will provide a useful tool for clinical practice and future studies in Turkey. Moreover, the Turkish MPFI creates opportunities to conduct cross-cultural studies on ACT processes. However, attempts should be made to better conceptualize and assess experiential avoidance and its role in psychological processes in this culture.

Ethics Committee Approval: The ethical committee of Arel University approved the study on 23.10.2019 (No. 69396709-050.01.01).

Informed Consent: Consent was obtained from the participants.

Peer-review: Externally peer-reviewed

Author Contributions: Conception/Design of Study- Z.C.A.K., E.Ş.; Data Acquisition- Z.C.A.K.; Data Analysis/Interpretation- Z.C.A.K., E.Ş.; Drafting Manuscript- Z.C.A.K., E.Ş.; Critical Revision of Manuscript- Z.C.A.K.; Final Approval and Accountability- Z.C.A.K., E.Ş.

Conflict of Interest: The authors have no conflict of interest to declare.

Grant Support: The authors declare that this study has received no financial support.

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How cite this article / Atıf Biçimi

Armağan Küçükseymen, Z. C., & Şalcıoğlu, E. (2024). Turkish adaptation of Multidimensional Psychological Flexibility Inventory. *Psikoloji Çalışmaları - Studies in Psychology, 44*(3), 393–414. https://doi.org/10.26650/SP2022-1170143