



Measuring psychological flexibility and inflexibility: further psychometric evidence of the Multidimensional Psychological Flexibility Inventory short form (MPFI-24) in Spanish population

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Accepted: 20 January 2025
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Abstract

The Multidimensional Psychological Flexibility Inventory (MPFI) is a recently developed measure of psychological flexibility and inflexibility (PF and PI) based on the Hexaflex/Inflexahex Model. The aim of this article was to assess the factorial structure, reliability, and convergent and criterion validity of the MPFI-24 in a sample from Spain. The MPFI-24 was tested in a sample of 508 university students (Study 1). Items comprising the acceptance and Experiential Avoidance (EA) subscales were rewritten and tested in a sample of 406 university students (Study 2). Participants completed online cross-sectional surveys including the Spanish MPFI-24, and measures of PF, PI, and mental health. Confirmatory factor analysis showed a six-component first-order factor structure for PF and for PI. The MPFI-24 demonstrated acceptable internal consistency, temporal stability, and convergent and criterion validity. The MPFI-24 is a promising tool. Potential areas for improvement of the measure are discussed.

Keywords Multidimensional psychological flexibility inventory (MPFI) · Psychological flexibility · Psychological inflexibility · Psychometric properties · Validity

Introduction

Acceptance and Commitment Therapy (ACT; Hayes et al., 2012) is an evidence-based, transdiagnostic treatment approach used to treat a variety of psychological problems, such as anxiety, depression, substance use, or chronic pain (Chin & Hayes, 2017; Wilson & Luciano, 2014), whose common underlying mechanism is Psychological Flexibility/Inflexibility (PF/PI). The main aim of ACT is to promote PF (Chin & Hayes, 2017), which is defined as being able to consciously contact the present moment and to change or persist in behaviours when doing so is in line with one's chosen values (Hayes et al., 2012). Conversely, PI implies

a rigid pattern of behaviour controlled by one's psychological reactions over chosen values (Bond et al., 2011). ACT is based on a conceptual model called the Hexaflex/Inflexahex Model, which simultaneously provides a framework of psychopathology, psychological health, and intervention (Hayes et al., 2012). According to the Hexaflex/Inflexahex Model (Hayes et al., 2012), PF is composed of 6 interrelated components or processes: acceptance (openness to unwanted inner experiences); contact with the present moment (being in touch and aware of what is occurring); self-as-context (taking the perspective of oneself as distinct of one's experiences); defusion (being able to observe internal experiences without attachment); contact with values (i.e. chosen qualities of action that cannot be achieved as objects and that give meaning to life); and committed action (i.e. effective behaviour which pursues one's chosen values). In contrast, PI is related to the 6 opposite processes: EA (attempts to alter or suppress one's unwanted inner experiences); lack of contact with the present moment (being unaware of one's experiences); self-as-content (lack of perspective of oneself as separate from one's experiences); fusion (being attached to unwanted internal experiences); lack of contact with

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values (disconnection from important areas of life); and inaction (loss of chosen-values-directed behaviours).

According to this model, although PF and PI are distinct constructs, their components are interrelated, with mutual facilitative relationships (Rolffs et al., 2016). Moreover, Hayes et al. (2012) suggest that low levels of one or more components of PF increase the risk of PI, and therefore, suffering and maladaptive behaviours.

The Hexaflex/Inflexahex Model offers a transdiagnostic model that could be applied to a range of disorders which share functional processes despite their topographic differences (Levin et al., 2014; Ruiz, 2010). Its 12 components could help in understanding the differences and the underlying mechanisms of disorders (Rolffs et al., 2016). It provides both researchers and clinicians with 12 key potential mechanisms that drive change throughout the therapeutic process of ACT, while also facilitating the disentangling of the role (mediation or moderation) of its components in individual outcomes such as health behaviour or well-being (Rolffs et al., 2016). Previous studies have indicated that PF is associated with individual health, well-being, and quality of life (Hayes et al., 2006). Gloster et al. (2017) showed that a higher level of PF is a protective factor for physical and mental health and promotes well-being in coping with stress. Conversely, PI is associated with psychological distress (Rolffs et al., 2016), depression, and anxiety symptoms (Ruiz, 2010), as well as physical health problems (Stabbe et al., 2019).

Various measures have been developed in line with this theoretical model, including the Acceptance and Action Questionnaire-II (AAQ-II; Bond et al., 2011), the Cognitive Fusion Questionnaire (CFQ; Gillanders et al., 2014), or the Mindful Attention and Awareness Scale (MAAS; Brown & Ryan, 2003). Although these measures have been validated and are well-established, each one measures different components of the Hexaflex/Inflexahex Model. Moreover, the AAQ-II, which is the most widely used of these measures, has recently been criticised on the grounds that it simplifies the PI construct into a single dimension by assuming that EA is equivalent to PI (Tyndall et al., 2019). Regarding its divergent validity, recent research has suggested that this measure functions as a measure of neuroticism or negative affect (Tyndall et al., 2019). Although the Hexaflex/Inflexahex model is multidimensional, as mentioned, the available measures suffer from several limitations; thus, there is a need for alternative multidimensional measures. Rolffs et al. (2016) developed the Multidimensional Psychological Flexibility Inventory (MPFI) to consolidate all the PI and PF components of the Hexaflex/Inflexahex Model into a single instrument that assess all these components as 12 separate subscales (6 corresponding to PF and 6 corresponding to PI). The MPFI was developed from a pool of

554 items over 3 studies that included a combined sample of 3040 respondents. Exploratory and confirmatory factor analysis, as well as item response theory, were used to create and refine the structure of the measure. The final version of the MPFI comprises 60 items—or 24 items in its short version—that allow a global PF and PI score to be obtained, as well as 12 independent scores corresponding to each subscale. Rolffs et al. (2016) also demonstrated its discriminant and convergent validity, as well as responsiveness to change over time. The MPFI-60 has been tested in several countries such as Argentina (Simkin et al., 2023), China, Japan and Taiwan (Lin et al., 2020), Italy (Landi et al., 2021), Iran (Azadfar et al., 2022), Sweden (Tabrizi et al., 2022), and the United States (Seidler et al., 2020). However, the MPFI-24 has only been tested in Argentina (Simkin et al., 2023), Canada and France (Grégoire et al., 2020), and the United States (Seidler et al., 2020). The MPFI-60 has also been tested in people with chronic pain (Sundström et al., 2023).

Studies analysing the psychometric properties of the MPFI-24 have shown high internal consistency and supported a second-order factor structure in which PF and PI serve as the second-order factors, while their respective processes are the first-order factors, thereby supporting the Hexaflex/Inflexahex Model (Grégoire et al., 2020; Rolffs et al., 2016; Seidler et al., 2020; Simkin et al., 2023). The MPFI-24 has demonstrated adequate convergent and criterion validity as shown by strong associations between its subscales and existing measures of PF and PI, and measures of psychological well-being and distress, respectively (Grégoire et al., 2020). Its temporal stability over a 2-week period is also adequate (Grégoire et al., 2020).

Although the psychometric properties of the MPFI-60 have been more extensively examined across studies (Azadfar et al., 2022; Landi et al., 2021; Lin et al., 2020; Rolffs et al., 2016; Seidler et al., 2020; Simkin et al., 2023; Sundström et al., 2023; Tabrizi et al., 2022), evidence suggests that both the MPFI-60 and MPFI-24 are psychometrically sound tools for measuring PF and PI in both clinical and research contexts (Rolffs et al., 2016).

Despite previous studies have suggested that the MPFI-60 and MPFI-24 are valid and reliable measures of PF and PI and their components, discrepancies remain concerning their factorial structure. The results show that a higher-order factor model (Azadfar et al., 2022; Grégoire et al., 2020; Landi et al., 2021; Lin et al., 2020; Rolffs et al., 2016; Seidler et al., 2020; Simkin et al., 2023; Sundström et al., 2023; Tabrizi et al., 2022), a 12-related-factor model (Tabrizi et al., 2022), and a six-related-factor model (a 6-subscale model for PF and a 6-subscale model for PI) (Thomas et al., 2021) have a good fit to the data. Previous studies analysing the psychometric properties of both the MPFI-60 and the MPFI-24 have suggested that further improvements should

be made to the internal consistency of some of the PF subscales (Grégoire et al., 2020; Tabrizi et al., 2022) or even to the EA subscale in terms of its convergent validity and correlation with other PI subscales (Landi et al., 2021; Tabrizi et al., 2022).

As mentioned above, the MPFI-24 has not been extensively studied (Grégoire et al., 2020; Seidler et al., 2020; Simkin et al., 2023), nor has it been tested in Spain. Although Simkin et al. (2023) translated the MPFI into Spanish and explored its psychometrical properties in a sample from Argentina, cultural and language differences may emerge depending on the content of the items included in the questionnaires. Thus, there is a need for a version of the MPFI specifically for Spain that can be tested in samples from this country.

The latter aspect represents a challenge because very few questionnaires that measure PF or PI have been translated into Spanish. Those that have been translated include the AAQ-II (Ruiz et al., 2013), CFQ (Romero-Moreno et al., 2014), MAAS (Soler et al., 2012), Valued Living Questionnaire (Wilson & Luciano, 2014), Five Facets of Mindfulness Questionnaire (FFMQ; Cebolla et al., 2012), and Philadelphia Mindfulness Scale (PHLMS; Tejedor et al., 2014). These measures have the same limitations as the original English versions, because they only assess specific processes included in the Hexaflex/Inflexahex Model. Therefore, Spanish therapists and researchers do not have the opportunity to assess all the PF and PI processes using a single brief measure, which would be more efficient than using multiple instruments. Taking this aspect into account, the MPFI-24 could be of value to the Spanish research community and to Spanish therapists using ACT in the intervention process. Moreover, it should be tested across different samples, including both community and clinical, from different cultures and speaking different languages.

Given these considerations, the primary aim of this paper was to provide additional evidence for the reliability and validity of the MPFI-24, across two studies that analyse the psychometric properties of the MPFI-24 using a total sample of 914 undergraduate students from Spain. The aim of the first study was to evaluate the factorial and internal structure, reliability, validity, and temporal stability of the MPFI-24 in a sample of 508 university students. Convergent validity was analysed by examining correlational patterns between the MPFI-24 and measures of the components of PF and PI. Criterion validity was assessed by investigating associations between the MPFI-24 subscales and measures of mental health (e.g., anxiety, depression, quality of life [QoL], positive and negative affect, and well-being). The aim of the second study was to refine the translation of some of the MPFI-24 items and re-analyse its factorial and

internal structure, reliability, and convergent validity in a sample of 406 undergraduate students.

Method

Procedure

Recruitment and assessment

The study procedures were approved by the Experimentation Ethics Committee of the University of Málaga. The Study 1 sample was recruited from different faculties of the University of Málaga by contacting teachers and asking them to inform the students about the study. The survey was developed using Google Forms and took approximately 30 min to complete. The Study 2 sample was recruited from students following two different subjects within the Psychology Degree course; the strategy was the same as that used in Study 1. The Google Forms survey took approximately 15 min to complete. All the participants in both studies were informed of the aims of the studies and were asked for informed consent; they were also informed if their teachers decided to offer rewards for their participation. In the event of their refusing to participate, they were offered the possibility of performing an alternative task.

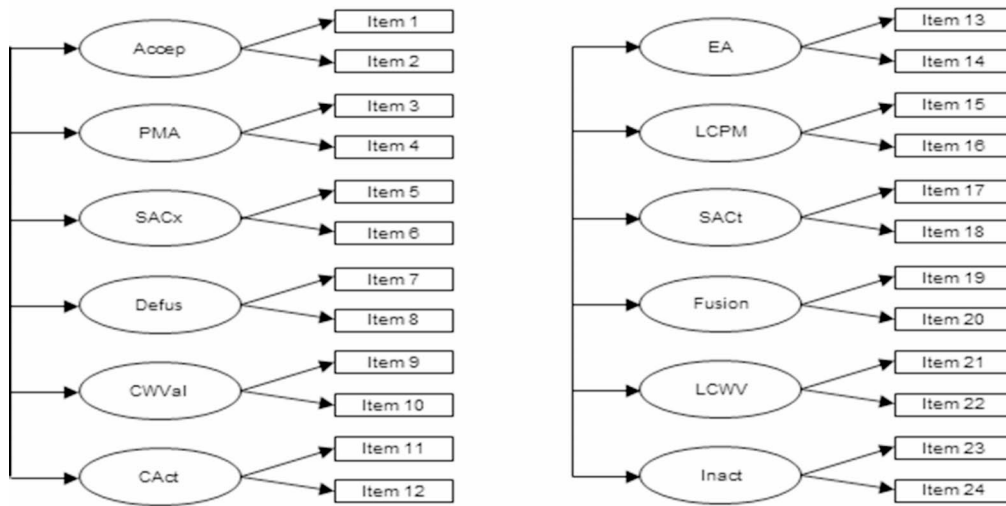
After 2 weeks, 279 Study 1 participants were invited by their teachers to complete the Spanish MPFI-24 using Google Forms to establish the test-retest reliability of the instrument. The questionnaire took approximately 10 min to answer. The data obtained from each participant was matched using a personal password. A total of 124 participants completed this second measure.

Data analyses

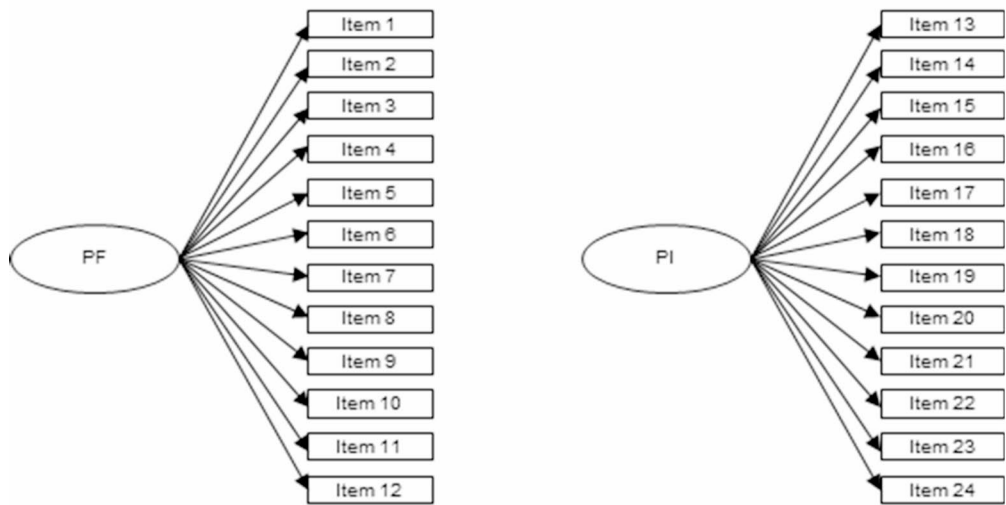
In a first step, we calculated the descriptive statistics of the sample, asymmetry, and kurtosis of the MPFI-24 items.

Given that some of the data deviated from normality, we analysed the factorial validity of the MPFI-24 by performing confirmatory factor analysis via structural equation modelling with the Maximum Likelihood method on the covariance matrix and asymptotic covariance matrix (Batista & Coenders, 2000) using the LISREL 8.30 software package (Jöreskog & Sörbom, 1993). Given previous evidence of low to moderate latent correlation coefficients between PF and PI (Seidler et al., 2020; Thomas et al., 2021)—supporting the distinction between these constructs— and following the work of Thomas et al. (2021), three alternative models (Fig. 1) were tested for each of the higher-order constructs (PF and PI):

Model 1:



Model 2:



Model 3:

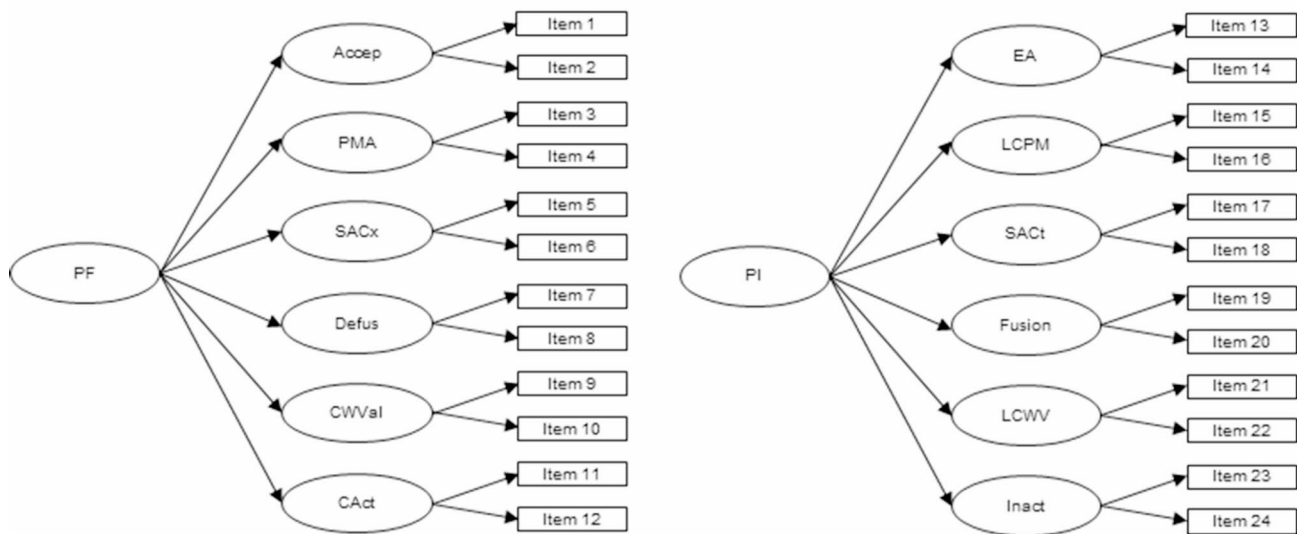


Fig. 1 Graphical depiction of the three models tested with CFAs. Abbreviations: Accep=Acceptance; PMA=Present Moment Awareness; SACx=Self-as-Context; Defus=Defusion; CWVal=Contact with Values; CAct=Committed Action; EA=Experiential Avoidance; LCPW=Lack of Contact with the Present Moment; SACT=Self-as-Content; LCWV=Lack of Contact with Values; Inact=Inaction

- 1) A six-related-factor structure corresponding to the dimensions which comprise PF (acceptance, present moment awareness, self-as-context, defusion, contact with values, committed action) and PI (EA, lack of contact with present moment, self-as-content, fusion, lack of contact with values, inaction).
- 2) A one-factor structure without subscales with 12 items loaded onto one factor (either PF or PI).
- 3) A second-order-factor structure in which 12 items are simultaneously loaded onto a general factor (either PF or PI) and their respective 6 domain-specific factors.

The following goodness-of-fit indexes were used: the Satorra-Bentler chi-square (Bentler, 2006), the Comparative Fit Index (CFI; Bentler, 1990), the Non-Normed Fit Index (NNFI; Bentler & Bonnet, 1980), the Root Mean-Square Error of Approximation (RMSEA), and the Akaike Information Criterion (AIC; Akaike, 1987). The Satorra-Bentler chi-square index is divided by the degrees of freedom in order to reduce the sensitivity of chi-square to sample size and corrects the statistic under distributional violations (Bentler, 2006), where ratios of 3 or less show that the model has an acceptable fit (Kline, 2016). Comparative Fit Index and NNFI values greater than 0.90 indicate good fit (Hu & Bentler, 1999), and RMSEA values less than 0.08 and less than 0.60 indicate an adequate and a good fit, respectively (Hu & Bentler, 1999). The AIC index identifies the parsimony and fit of the model; the models are compared according to their AIC values and the model with the lowest AIC value is chosen. Some of the items of the acceptance, EA, and lack of contact with present moment subscales showed negative error variances; thus, following the recommendations of Fuchs & Dimantopoulos (2009), negative error variances were set to $1 - \alpha$ as needed. We used IBM SPSS Statistics version 25.0 to investigate the internal consistency of the MPFI-24 subscales by calculating Cronbach's alpha and the corrected item-factor correlations. The Intraclass Correlation Coefficient (ICC) was calculated to assess test-retest reliability. Cronbach's alpha values were interpreted as follows: >0.90, excellent; >0.80, good; >0.70, acceptable; >0.60, questionable; >0.50, poor; and <0.50, unacceptable (George & Mallery, 2003). Pearson correlation coefficients were computed to assess convergent validity, criterion validity, and intercorrelations between the MPFI-24 subscales. Correlations were calculated between the MPFI-24 subscales and measures of PF and

PI components (AAQ-II, CFQ, MAAS, and Valued Living Questionnaire) as well as criterion variables (positive and negative affect, QoL, satisfaction with life, and anxiety and depression symptoms). The magnitude of correlations was interpreted using Cohen's (1988) criteria: values between 0.10 and 0.29 were interpreted as low correlations; those between 0.30 and 0.49 as moderate; and those between 0.50 and 1 as large. The ICC values were interpreted according to the guidelines provided by Koo and Li (2016): values of less than 0.50 were interpreted as indicating poor reliability; those between 0.50 and 0.75 as moderate reliability; those between 0.75 and 0.90 as good reliability; and greater than 0.90 as excellent reliability.

The same analytical procedures were used in Study 1 and Study 2 to allow a direct comparison of the results and to validate the findings from Study 1 using an independent sample in Study 2. This approach strengthens the overall conclusions by demonstrating replicability across the two studies.

Study 1

The aim of Study 1 was to analyse the psychometric properties of the MPFI-24 in a sample of 508 university students from Spain. Factorial structure was investigated using CFA; reliability was analysed by evaluating its internal consistency and temporal stability; and convergent and criterion validity were determined using Pearson correlation coefficients with other measures of the dimensions comprising PF and PI, as well as criterion variables. Based on the theoretical formulation of the Hexaflex/Inflexahex Model (Hayes et al., 2012), we expected to replicate the higher-order factor structure observed in previous studies that tested the internal structures of both the MPFI-60 (Azadfar et al., 2022; Landi et al., 2021; Lin et al., 2020; Rolffs et al., 2016; Seidler et al., 2020; Simkin et al., 2023; Sundström et al., 2023; Tabrizi et al., 2022), and the MPFI-24 (Grégoire et al., 2020; Seidler et al., 2020; Simkin et al., 2023). Regarding validity, it was predicted that the PF subscales of MPFI-24 would show significant positive correlations with other measures of PF (i.e., any such correlations would be stronger with measures that assess the same construct as each subscale, and weaker with those that assess other constructs), well-being, and health, and negative correlations with measures of PI, discomfort, and health problems. We also predicted that there would be positive correlations between the PI subscales and PI-related measures—which would be stronger with the measures that assess the same constructs as each of the subscales and weaker with those that assess other constructs—positive correlations between the PI subscales and discomfort and health problems, and negative correlations

between the PI subscales and well-being, health, and PF measures.

Participants

The sample comprised 508 students (426 women and 82 men) from the University of Málaga (Spain). The age range was 18–63 years ($M=22.12$, $SD=6.29$). Regarding marital status, the majority of the sample were single (91.7%), married or partnered (7.5%), or divorced (0.8%). Most of the sample were studying full-time (92.2%), followed by studying and working (7.5%), or retired (0.4%). Regarding educational level, 96.1% were degree students, 2.8% were studying a master's degree, 0.4% were PhD students, and 0.8% did not specify their level. The majority of the sample were students from the faculty of Psychology and Speech Therapy (73.4%), followed by students from the faculty of Health Sciences (17.1%), Life Sciences (6.5%), Economic Sciences (0.8%), Communication Sciences (0.2%), Education (0.2%), and Social and Work Studies (0.2%). However, 1.6% did not specify their discipline.

Translation process

The MPFI-24 and its instructions were independently translated from English to Spanish by the authors, who then met to discuss their translations until they reached consensus. In order to ensure that the items of the Spanish version were clear, the questionnaire was administered to a convenience sample of 10 respondents, who were asked to indicate the level of clarity of each item and make suggestions for reformulating 8 items. After taking into account their suggestions and reaching consensus, the Spanish MPFI-24 was translated back into English by a bilingual professional translator without consulting the original version. The translator offered suggestions to make it equivalent to the English language. The authors met to examine the translator's work and compare this version with the original version. They adjusted 7 of the items. The Spanish MPFI-24 was once again translated back into English and compared with the original by the translator in order to ensure they were equivalent.

Self-reported measures

Demographics

Participants indicated their gender, age, marital status, level of education, the faculty where they studied, course, and employment status.

Multidimensional psychological flexibility inventory-24 (MPFI-24)

The MPFI-24 (Rolffs et al., 2016) is a 24-item measure of overall PF and PI, and their 12 components (6 of PF, and 6 of PI). PF is represented by the subscales of acceptance, present moment awareness, self-as-context, defusion, contact with values, and committed action, whereas PI is represented by the subscales EA, lack of contact with present moment, self-as-content, fusion, lack of contact with values, and inaction. Each subscale is composed of 2 items. The MPFI-24 scale was created from the 60-item MPFI. Items are rated on a 6-point Likert scale (1=*never true* to 6=*always true*) and can be averaged to represent each of the 12 components or an overall flexibility or inflexibility composite. Higher scores indicate greater PF or PI.

Convergent validity measures

Acceptance and action questionnaire-II (AAQ-II) The Spanish version of the AAQ-II (Ruiz et al., 2013) was used in this study. The AAQ-II is a self-report questionnaire composed of 7 items that assess EA. Items are rated on a 7-point Likert scale (1=*not at all true* to 7=*completely true*). Item scores are summed, with higher scores indicating higher EA. In this study, Cronbach's alpha for the AAQ-II was 0.91.

Cognitive fusion questionnaire (CFQ) The Spanish version of the CFQ (Romero-Moreno et al., 2014) was used. The CFQ is composed of 7 items assessing cognitive fusion. Items are rated on a 7-point Likert scale (1=*never* to 7=*always*). Item scores are summed, with higher scores indicating greater cognitive fusion. The observed Cronbach's alpha was 0.93.

Mindful attention awareness scale (MAAS) The Spanish version of the MAAS (Soler et al., 2012) was used to measure mindfulness in daily life. This scale comprises 15 items rated on a 6-point Likert scale (1=*almost always* to 6=*almost never*). The item scores are averaged, and higher scores indicate greater mindfulness. Cronbach's alpha obtained was 0.90.

Valued living questionnaire The Spanish version of Valued Living Questionnaire (Wilson & Luciano, 2014) was used to assess values in terms of their importance, and consistency/discrepancy with them. This questionnaire focuses on 10 life areas that are rated on a 10-point scale relative to their importance (1=*not important at all* to 10=*extremely important*). Consistency with values is also rated on a scale from 1 to 10 (1=*completely inconsistent with my values* to 10=*completely consistent with my values*). Discrepancy

with values was calculated from the difference between importance and consistence. Scores are summed, with higher scores indicating greater importance, consistence, or discrepancy. This measure is still in the process of validation; the importance, consistency, and discrepancy subscales had Cronbach’s alphas of 0.72, 0.73, and 0.72, respectively. This study used the consistency and discrepancy subscales.

Criterion validity measures

Positive and negative affect schedule (PANAS) The PANAS in its long form (Watson et al., 1988) is a self-report questionnaire comprising two 10-item subscales assessing positive and negative affect over the past week. Items are rated on a 5-point Likert scale (1=*very slightly or not at all* to 5=*extremely*). Responses for each subscale are summed, with higher scores indicating greater positive or negative affect, respectively. In the current study the Spanish long-form version was used (Sandín et al., 1999). Cronbach’s alphas were 0.91 for positive affect and 0.87 for negative affect.

Hospital anxiety and depression scale (HADS) The Spanish version of the HADS (Tejero et al., 1986) was used to assess anxiety and depression symptoms. It is composed of 14 items rated on a 4-point Likert scale (0=*never* to 3=*very often*). Item scores are summed to obtain an overall depression and anxiety score, with higher scores indicating greater symptomatology. The depression and anxiety symptoms subscales had a Cronbach’s alpha of 0.76 and 0.86, respectively.

The world health organization quality of life-BREF (WHOQOL-BREF) The Spanish version of the WHOQOL-BREF (Lucas, 1998) was used to assess quality of life. The

WHOQOL-BREF is a self-report questionnaire composed of 26 items comprising different dimensions (physical health, psychological health, social relationships, and environmental health). Items are scored on a 5-point Likert scale (1=*not at all* to 5=*an extreme amount*). Scores on the different subscales are summed, with higher scores indicating greater quality of life. Cronbach’s alpha for the different dimensions were as follows: physical health, 0.71; psychological health, 0.78; social relationships, 0.64; and environmental health, 0.78.

Satisfaction with life scale (SWLS) The SWLS (Atienza et al., 2000) is a 5-item self-reported scale which assesses the subjective judgement of well-being. Items are scored on a 5-point Likert scale (1=*strongly disagree* to 5=*strongly agree*). Item scores are summed, with higher scores indicating greater subjective well-being. In this study, the SWLS had a Cronbach’s alpha of 0.85.

Results

Factorial structure, internal consistency, and corrected item-factor correlations

Table 1 shows all the goodness-of-fit indexes of the tested models. Regarding the PF construct, after correcting the error variance of item 2 (acceptance subscale), the six-related-factor model had the best fit and was the most parsimonious. However, although it approached having an acceptable fit, it was not adequate. For the PI construct, after adjusting the error variance of item 14 (EA subscale), the six-related-factor model had the best fit and was adequate, followed by the second-order factor model, which was also adequate.

Table 1 Results of confirmatory factor analysis on model fit across studies

	χ^2/df	NNFI	CFI	RMSEA	AIC		χ^2/df	NNFI	CFI	RMSEA	AIC
Study 1. Factor structure						Study 1. Factor structure					
PF						PI					
Six-related-factor model	3.71	0.96	0.98	0.07	224.25	Six-related-factor model	1.66	0.99	1	0.04	142.48
One-factor model	11.11	0.85	0.88	0.14	647.69	One factor model	16.21	0.86	0.88	0.17	923.29
Second-order factor model	4.90	0.94	0.96	0.09	298.29	Second-order factor model	2.30	0.99	0.99	0.05	170.87
Study 2. Factor structure						Study 2. Factor structure					
PF						PI					
Initial six-related-factor model	3.39	0.96	0.98	0.08	211.40	Initial six-related-factor model	1.91	0.98	0.99	0.05	152.19
Final six-related-factor model	2.97	0.97	0.98	0.07	189.82	Final six-related-factor model	1.42	0.99	1	0.03	133.49
One-factor model	9.86	0.85	0.88	0.15	580.19	One-factor model	11.53	0.82	0.86	0.16	670.36
Second-order factor model	4.20	0.95	0.96	0.09	263.73	Second-order factor model	2.43	0.98	0.98	0.06	177.62

Note: χ^2 =Satorra-Bentler scaled Chi-square; df=degrees of freedom; NNFI=Non-Normed Fit Index; CFI=Comparative Fit Index; RMSEA=Root Mean Square Error of Approximation; AIC=Akaike Information Criterion; PF=Psychological flexibility; PI=Psychological inflexibility. Models with the best fit to the data are highlighted in bold

Table 2 shows the corrected item-factor correlations and internal consistency for the 6 PF and PI subscales. As can be seen, the acceptance subscale had the lowest internal consistency ($\alpha=0.28$), and item 1 had the lowest factor loading. This subscale was followed by the self-as-context and awareness subscales, which had questionable internal consistency ($\alpha=0.60$ and $\alpha=0.68$, respectively), but adequate factor loadings (>0.30). The remaining subscales had moderate to good internal consistency and factor loadings. It should also be noted that factor loadings in the EA subscale were high (>0.80) after adjusting error variance of item 14 (see supplementary material S1 for additional information).

Test-retest reliability

Test-retest correlations were analysed over a 2-week interval for each of the 12 subscales of the MPFI-24 (Table 2). Test-retest correlations ranged from $r(124)=0.57$ to $r(124)=0.75$, suggesting moderate temporal stability over a period of 2 weeks (see supplementary material S1 for additional information).

Intercorrelations between the MPFI-24 subscales

Moderate to high positive correlations were found between most of the PF domain-specific subscales (ranging from $r=.30$ to $r=.57$, $p<.001$). However, the acceptance subscale showed low positive associations with the other PF components. A similar pattern of correlations was observed between most of the PI domain-specific components, with correlations ranging from $r=.39$ to $r=.70$ ($p<.001$). Low positive correlations were found between the EA subscale and the other PI components. Low negative correlations were found between most of the PF domain-specific subscales and the PI subscales (ranging from $r=-.1$, $p<.05$

to $r=-.36$, $p<.001$), along with a low positive correlation between acceptance and EA (see Supplementary Material S2 for more detailed information). Overall, except for the correlations observed in the acceptance and EA subscales, these patterns of correlations support the theoretical formulation of the Hexaflex/Inflexahex Model (Hayes et al., 2012), and highlight the distinction between the PF and PI domains and their components (Rolffs et al., 2016).

Convergent validity

Pearson correlation coefficients were computed to assess convergent validity and intercorrelations between the 12 domain-specific subscales and measures of experiential avoidance (AAQ-II), cognitive fusion (CFQ), mindfulness (MAAS), and contact with values (Valued Living Questionnaire). Significant correlations in the expected directions—ranging from low to large—were observed between the PF and PI subscales of the MPFI-24 and other measures of PF and PI. Correlation coefficients between the PI subscales and the other measures of PF and PI were stronger than those observed between the PF subscales and the other measures. Overall, these results support the convergent validity of the MPFI-24 (see Table 3). Unexpectedly, no correlation was found between the acceptance subscale and the other measures. Although a very low positive correlation was found between the EA subscale and AAQ-II, no associations were found between this subscale and the other measures.

Criterion validity

Table 4 shows Pearson correlations between the MPFI-24 subscales and the criterion variables (the four dimensions of QoL, satisfaction with life, depression, anxiety, and positive and negative affect). There were significant correlations

Table 2 Means, standard deviations, internal consistency and test-retest reliability in Study 1 and Study 2

	Study 1 ($N=508$)				Study 2 ($N=406$)		
	M	SD	α	ICC [95% CI]	M	SD	α
Psychological flexibility subscales							
Acceptance	3.49	0.88	0.28	0.61** [0.45, 0.73]	3.76	0.98	0.60
Awareness	4.15	0.98	0.68	0.66** [0.51, 0.76]	4	0.97	0.69
Self-as-context	4.17	0.98	0.60	0.59** [0.40, 0.72]	4.1	1	0.66
Defusion	3.45	1.08	0.70	0.57** [0.38, 0.70]	3.52	1.22	0.74
Values	4.61	1.02	0.76	0.75** [0.64, 0.82]	4.5	1	0.72
Committed action	4.67	0.99	0.82	0.64** [0.50, 0.75]	4.62	0.94	0.81
Psychological inflexibility subscales							
Experiential avoidance	3.94	1.12	0.85	0.66** [0.52, 0.76]	3.37	1.11	0.66
Lack of contact with present moment	2.69	1.09	0.88	0.65** [0.50, 0.75]	2.73	1.09	0.84
Self-as-content	3.22	1.35	0.83	0.60** [0.43, 0.72]	3.24	1.32	0.84
Fusion	3.53	1.41	0.89	0.75** [0.63, 0.83]	3.56	1.37	0.88
Lack of contact with values	2.49	1.2	0.73	0.63** [0.47, 0.74]	3.14	1.09	0.67
Inaction	3.04	1.37	0.89	0.66** [0.51, 0.76]	3.15	1.29	0.83

Note: M = mean; SD = standard deviation; α = Cronbach's alpha for each subscale; ICC = Intraclass correlation coefficient; ** $p<.001$

Table 3 Pearson’s correlations between the MPFI-24 subscales and PF and PI related measures in Study 1 ($N=508$) and Study 2 ($N=406$)

	Study 1 ($N=508$)					Study 2 ($N=406$)				
	AAQ-II	Values consistence	Values discrepancy	MAAS	CFQ	AAQ-II	Values consistence	Values discrepancy	MAAS	CFQ
Psychological Flexibility										
Acceptance	0.07	0.07	-0.07	-0.05	-0.08	0.13**	0.03	-0.6	0.01	0.19**
Awareness	-0.24**	0.17**	-0.06	0.21**	-0.17**	-0.37**	0.19**	-0.05	0.29**	-0.33**
Self-as-context	-0.29**	0.17**	-0.11**	0.11**	-0.30**	-0.29**	0.23**	-0.14**	0.18**	-0.28**
Defusion	-0.41**	0.20**	-0.15**	0.16**	-0.44**	-0.48**	0.15**	-0.05	0.31**	-0.48**
Values	-0.30**	0.21**	-0.09	0.22**	-0.27**	-0.40**	0.24**	-0.10*	0.32**	-0.36**
Committed action	-0.28**	0.21**	-0.06	0.19**	-0.22**	-0.31**	0.21**	-0.9	0.28**	-0.25**
Psychological Inflexibility	AAQ-II	Values consistence	Values discrepancy	MAAS	CFQ	AAQ-II	Values consistence	Values discrepancy	MAAS	CFQ
Experiential avoidance	0.09*	0.04	-0.01	-0.06	0.06	0.11**	-0.10*	0.13**	-0.12**	0.16**
Lack of contact with present moment	0.31**	-0.11**	0.08	-0.41**	0.33**	0.24**	-0.14**	0.08	-0.39**	0.24**
Self-as-content	0.50**	-0.18**	-0.20**	-0.28**	0.60**	0.50**	-0.17**	0.07	-0.32**	0.55**
Fusion	0.63**	-0.19**	0.13**	-0.28**	0.69**	0.69**	-0.18**	0.06	-0.38**	0.71**
Lack of contact with values	0.52**	-0.17**	0.16**	-0.34**	0.56**	0.48**	-0.26**	0.13**	-0.41**	0.47**
Inaction	0.62**	-0.19**	0.15**	-0.33**	0.65**	0.64**	-0.22**	0.16**	-0.39**	0.61**

Note: MPFI-24 = Multidimensional Psychological Flexibility Inventory-24; PF = psychological flexibility; PI = psychological inflexibility; AAQ-II = Acceptance and Action Questionnaire; MAAS = Mindful Attention Awareness Scale; CFQ = Cognitive Fusion Questionnaire; * $p < .05$; ** $p < .001$

Table 4 Pearson correlations between the MPFI-24 subscales and the criterion variables in Study 1 ($N=508$)

Psychological Flexibility	QoL-Physical Health	QoL-Psychological Health	QoL-Interpersonal relationships	QoL-Environmental Health	SWLS	Depression	Anxiety	Positive affect	Negative affect
Acceptance	0.06	-0.00	0.07	0.04	0.04	-0.02	0.02	0.07	0.00
Awareness	0.18**	0.22**	0.20**	0.13**	0.24**	-0.22**	-0.15**	0.27**	-0.22**
Self-as-context	0.31**	0.36**	0.21**	0.23**	0.28**	-0.32**	-0.28**	0.37**	-0.31**
Defusion	0.29**	0.38**	0.28**	0.19**	0.26**	-0.34**	-0.34**	0.36**	-0.36**
Values	0.32**	0.33**	0.24**	0.17**	0.28**	-0.31**	-0.22**	0.40**	-0.27**
Committed action	0.31**	0.36**	0.23**	0.16**	0.30**	-0.34**	-0.18**	0.41**	-0.23**
Psychological Inflexibility	QoL-Physical Health	QoL-Psychological Health	QoL-Interpersonal relationships	QoL-Environmental Health	SWLS	Depression	Anxiety	Positive affect	Negative affect
Experiential avoidance	-0.04	-0.06	0.01	-0.00	-0.06	-0.00	0.06	-0.03	0.03
Lack of contact with present moment	-0.27**	-0.32**	-0.21**	-0.16**	-0.21**	0.32**	0.27**	-0.29**	0.28**
Self-as-content	-0.36**	-0.45**	-0.25**	-0.23**	-0.28**	0.39**	0.40**	-0.34**	0.39**
Fusion	-0.47**	-0.58**	-0.30**	-0.31**	-0.38**	0.49**	0.55**	-0.42**	0.51**
Lack of contact with values	-0.45**	-0.51**	-0.26**	-0.29**	-0.35**	0.44**	0.46**	-0.38**	0.47**
Inaction	-0.47**	-0.54**	-0.26**	-0.28**	-0.38**	0.48**	0.55**	-0.39**	0.53**

Note: MPFI-24 = Multidimensional Psychological Flexibility Inventory-24; QoL = quality of life; SWLS = Satisfaction with Life Scale; * $p < .05$; ** $p < .001$

in the expected directions—ranging from low to moderate—between the PF subscales and the criterion variables ($p < .001$). However, no statistically significant correlations were found between the acceptance subscale and any of the criterion variables.

Significant correlations in the expected direction were found between most of the PI subscales and the criteria, which were stronger than those found between the PF subscales and

the criteria ($p < .001$). No significant association was found between the EA subscale and any of the criterion variables.

Brief conclusions

In the light of the results, and despite the parsimonious process used to translate the MPFI-24 into Spanish, it appears that the acceptance and EA subscales were not appropriate measures of the constructs that they represent. This is

evidenced by the low correlations found between these subscales and the other subscales of the MPFI-24. Moreover, a positive correlation between these two subscales suggests that, contrary to the definitions of acceptance and EA, they measure a construct in the same direction. In addition, no statistically significant correlations were observed between these two subscales and other existing measures of PF and PI, and criteria variables. Therefore, we concluded that the meaning of these ACT processes was not well captured by our translation of items 1 and 2 and items 13 and 14, respectively, and that they would therefore require careful rewriting. Thus, a second study was needed to test these changes.

Study 2

The aim of the second study was to refine the wording of the items comprising the acceptance and EA subscales of the MPFI-24, and to test its factorial structure (using CFA), internal consistency, and convergent validity (using Pearson correlation coefficients with other measures of the components of PF and PI) in a sample of 406 university students. We expected to solve the limitations observed in Study 1 regarding the factorial structure of the PF construct, the internal consistency of the acceptance subscale, and the convergent validity of the acceptance and EA subscales, as well as intercorrelations between the MPFI-24 subscales.

Participants

The sample comprised 406 students (321 women and 81 men) from the Faculty of Psychology and Speech Therapy of the University of Málaga (Spain). The age range was 18–61 years ($M=20.85$, $SD=6.83$). The majority of the sample were single (91.9%), married or partnered (6.9%), divorced (0.7%), or widowed (0.5%). Regarding educational level, the sample comprised students following a 4-year Degree in Psychology. The breakdown by year was as follows: first year (44.1%), second year (51.5%), third year (3.7%), and fourth year (0.7%). Most of the participants were studying full-time (94.1%), followed by working and studying (5.4%), or retired (0.5%).

Procedure

Rewriting items of the MPFI-24

In order to solve the limitations observed in Study 1, we rewrote items 1 and 2, as well as 13 and 14, in the acceptance and EA subscales of the MPFI-24, respectively. We took into account the theoretical meaning of acceptance and EA, as well as cultural Spanish terms, in order to make them

clearer to Spanish speakers, while ensuring consistency with the original writing. As in Study 1, the new versions were also revised by a professional translator (see supplementary material S5 for more detailed information about the wording of the items).

Self-reported measures

The study participants were asked to complete a demographic questionnaire, the MPFI-24 (including the rewritten items in the acceptance and EA subscales), and the convergent validity measures described in Study 1 (AAQ-II, CFQ, MAAS, and Valued Living Questionnaire). Information on the measures is provided in the Self-reported measures section included in Study 1.

Results

Factorial structure, internal consistency, and corrected item-factor correlations

In an initial step, CFAs were performed to test three different models for each of the PF and PI-constructs: a six-related-factor model, a one-factor model, and second-order factor model. The results of the CFAs for the three models showed that the six-related-factor model had the best fit to the data, and further adjustments were made to the dimensions of PF and PI in order to obtain the final six-related-factor model. Regarding the PF construct, after correcting the negative error variance of item 2 (acceptance subscale) in the six-related-factor model and the second-order factor model, the analyses showed that the initial six-related-factor model had the best fit and approached an acceptable fit to the data. Adjustments to the six-related-factor model were made following the theoretical postulates concerning intercorrelations between the dimensions of PF (Hayes et al., 2012), while allowing correlations between errors of some of the items: 10 and 11 (contact with values and committed action subscales); 5 and 8 (self-as-context and defusion subscales); 2 and 3 (acceptance and present moment awareness); 6 and 4 (self-as-context and present moment awareness); 8 and 9 (defusion and contact with values subscales); and items 7 and 4 (defusion and present moment awareness subscales). These modifications yielded a better-fitting final six-related-factor model (Table 1), which had an acceptable fit to the data and was the most parsimonious. Regarding the PI construct, negative error variances of items 14 (EA) and 15 (lack of contact with the present moment) were corrected in the initial six-related-factor model and the second-order factor models. The results showed that the initial six-related-factor model had the best fit, followed by the second-order factor model, which was also adequate. Further adjustments were made to the six-related-factor model to improve its fit by allowing errors of the items of EA subscale (items 13 and 14) to covary with one of

the items of the lack of contact with present moment subscale (item 15). Table 1 shows that the final six-related-factor model had an excellent fit to the data.

Table 2 shows the corrected item-factor correlations and internal consistency for the 6 PF and PI subscales. As can be seen, the acceptance subscale still had the lowest internal consistency which, despite improvements, remained poor ($\alpha=0.60$). Nonetheless, items on the acceptance subscale had appropriate factor loadings (>0.30). Although the awareness, self-as-context, EA, and lack of contact with values subscales had questionable internal consistency ($\alpha=0.69$, $\alpha=0.66$, $\alpha=0.66$ and $\alpha=0.67$, respectively), they had appropriate factor loadings (>0.30). Supplementary information S3 shows more detailed data.

Intercorrelations between the MPFI-24 subscales

High to low positive correlations were found between the PF domain-specific subscales (ranging from $r=.13$ to $r=.66$, $p<.001$), and moderate to low negative correlations were found between the PF domain-subsubscales and the PI subscales (ranging from $r=-.12$ to $r=-.38$, $p<.001$). A similar pattern of correlations was found between the PI domain-specific subscales (see Supplementary Information S4 for more detailed information). Low positive associations were still found between the acceptance subscale and the other PF subscales, and some of the PI subscales. Moreover, no statistically significant correlations were found between EA and any of the PF subscales. Low correlations in the expected direction were found between EA and the PI domain-subsubscales. Overall, these results support the distinction between PF and PI processes and their components.

Convergent validity

There were significant correlations in the expected directions between the measures of the PF and PI components and the subscales of the MPFI-24 ($p<.001$, $p<.05$; Table 3). However, low correlations in the expected direction were found between the EA subscale and all these measures. Positive correlations were found between the acceptance subscale and AAQ-II and CFQ, which was contrary to expectations. These results suggest that the EA and acceptance subscales should undergo further improvement.

Discussion

The aims of these studies were to provide additional evidence for the reliability and validity of the MPFI-24 analysing its psychometric properties and temporal stability in undergraduate students from Spain.

The CFAs conducted in Study 1 did not support any factorial structure tested for the PF construct, although the six-related-factor model approached an acceptable fit. Regarding the PI dimension, the analysis showed that the most parsimonious model with the best fit was a six-related-factor model followed by the second-order factor structure, which also had good fit to the data. Regarding the PF and PI constructs, the analysis conducted in Study 2 showed that a six-related-factor structure was the most parsimonious model with the best fit. The PI dimension also had a good fit to the data for a second-order factor structure. These results only partially replicate the higher-order factor structure posited in the Hexaflex/Inflexahex Model (Hayes et al., 2012) and found in other studies testing both the MPFI-24 (Grégoire et al., 2020; Seidler et al., 2020; Simkin et al., 2023) and the MPFI-60 (Azadfar et al., 2022; Landi et al., 2021; Lin et al., 2020; Rolffs et al., 2016; Seidler et al., 2020; Simkin et al., 2023; Sundström et al., 2023; Tabrizi et al., 2022; Thomas et al., 2021), since this structure was only observed in the PI domain in this study. Regarding both PF and PI, the finding that the six-related-factor model of the MPFI-24 had the best fit partially supports the results of Tabrizi et al. (2022) and Thomas et al. (2021), as their results also showed that the six-related-factor model of the MPFI-60 had a good fit to the data.

Based on the theoretical formulation of the Hexaflex/Inflexahex Model, the results concerning the factorial structure suggest that PF and PI are not unidimensional constructs, given that a single-factor structure did not fit the data and that these constructs comprise 6 related factors (Hayes et al., 2012; Rolffs et al., 2016). The fact that the higher-order factor structure had a good fit to the data for the PI composite alone may suggest that the items of the PI subscales in the MPFI-24 have greater consistency, such that they represent the hierarchical structure of the PI factor, whereas the items of the PF subscales fail to represent the PF construct as a higher-order factor comprising 6 related dimensions. This finding may be due to the variety of questionnaires used to form the PF subscales, given that they were based on different theoretical perspectives. For instance, questionnaires that assess mindfulness were used to form the acceptance and defusion subscales. The present moment awareness subscale is comprised of items related to emotion regulation; the self-as-context subscale contains items related to self-compassion; and a questionnaire that assesses EA was used for the committed action subscale. Regarding the PI subscales, items from different questionnaires that assess mindfulness were used to form the EA, lack of contact with the present moment, and self-as-content subscales. Items aimed at assessing EA were used for the inaction subscale, and items related to the assessment of self-compassion were used for the fusion subscale. It appears to be easier to define items related to PI concepts than those related to PF concepts, given that most PF

questionnaires use items that define PI concepts, but score the items in reverse. This approach is based on the assumption that the scores represent a continuum on which one extreme represents a PF concept and the other its PI counterpart. The Facets of Mindfulness Questionnaire (FFMQ; Baer et al., 2008) scores the items in reverse to those of the non-judging and acting with awareness subscales and the MAAS (Brown & Ryan, 2003) also takes a similar approach. The Philadelphia Mindfulness Scale (PHLMS; Cardaciotto et al., 2008) measures acceptance by using an avoidance scale that also scores the items in reverse. Therefore, it is expected that there will be less variability in the formulation of PI items and in this way they will be more cohesive.

Regarding internal consistency, the low reliability of the 2-item subscales was expected, given that scales with fewer items have lower alphas (Tavakol & Dennick, 2011). Nonetheless, in Studies 1 and 2, most of the MPFI-24 subscales had appropriate internal consistency and factor loadings. However, in Study 1, the acceptance subscale had an unacceptable Cronbach's alpha and a low factor loading in one of its items. These values improved in Study 2, although Cronbach's alpha remained low, whereas the internal consistency of the EA became worse, as well as that of other subscales, which were not rewritten. Nonetheless, the results were similar to those found in the French validation of the MPFI-24 in a sample of university students (Grégoire et al., 2020).

In both studies, intercorrelations between the subscales support the results on internal consistency as well as the theoretical formulation of the Hexaflex/Inflexahex Model (Hayes et al., 2012), because correlations in the expected directions were found between the PF subscales themselves, between the PI subscales themselves, and between the subscales that comprise the PF and PI subscales. The latter correlations were low, suggesting that PF and PI are related, but different, constructs (Rolffs et al., 2016). However, in both studies, low positive correlations were found between the acceptance subscale and the other PF subscales and some of the PI subscales. This suggests that the meaning of this construct is not well captured by the wording of its items in the Spanish MPFI-24, as respondents understand it as a construct whose presence is related to an increased presence of other components of both PF and PI. This aspect could be because its 2 items were intended to represent different acceptance strategies. Specifically, the item "I was receptive to observing unpleasant thoughts and feelings without interfering with them" could be interpreted as resigning acceptance, which implies a passive strategy (Nakamura & Orth, 2005) that could be more related to PI, whereas the item "I tried to make peace with my negative thoughts and feelings rather than resisting them" could imply an active acceptance strategy (Nakamura & Orth, 2005) that could be more related to PF.

Low correlations were found between EA and the PI subscales and nonsignificant correlations between this subscale and the PF subscales, except for a positive correlation with acceptance in Study 1. These results improved in Study 2 after the items had been rewritten; low correlations were only found between EA and the PI subscales and nonsignificant correlations between this subscale and the PF subscales. These results are similar to those of Landi et al. (2021) and Tabrizi et al. (2022) regarding the EA subscale. They found low or nonsignificant correlations between this subscale and the other PI subscales, as well as a positive correlation between EA and the overall PF score, suggesting that this construct is also not well represented in the MPFI-60. Regarding temporal stability, the Spanish MPFI-24 subscales exhibited moderate stability over 2 weeks, with ICC values that were similar to those reported by Grégoire et al. (2020) for the French MPFI-24. The finding of moderate stability over a 2-week period supports Rolffs et al. (2016) in their assumption that even if PF and PI have static properties (trait-like properties), they are also dynamic constructs (state-like properties), which could fluctuate without any intervention depending on the individual's setting or the specific day on which they give their responses (Stabbe et al., 2019).

Regarding convergent validity, in Studies 1 and 2, correlations were found in the expected direction between most of the PF and PI subscales and validated measures of different components of PF and PI. Stronger correlations were found between the PI subscales and the other existing measures of PF and PI than between the PF subscales and these measures. This result could be due to the convergent measures used (AAQ-II, CFQ, and MAAS), which were written in the same direction as items in the PI subscales, and items in the lack of contact with the present moment subscale were taken from the MAAS. Moreover, low correlations between contact with values or its counterpart, lack of contact with values, and the Valued Living Questionnaire are expected because this questionnaire is more exhaustive in assessing consistency and discrepancy with values in every personal area, whereas the MPFI-24 only uses 4 general phrases to assess whether the respondents have pursued their values or not. No significant correlations were found between the acceptance subscale or the EA subscale and the other PF and PI-related measures in Study 1. However, in Study 2, a positive correlation was found between acceptance and AAQ-II, and an improved, but still low, correlation in the expected direction was found between EA and the PF and PI-related measures. Regarding the EA subscale, the results of Study 2 differ from those reported in the French validation of the MPFI-24 (Grégoire et al., 2020), where no significant correlations were found between the EA subscale and the PI and PF-related measures. The results are also in contrast with the Italian validation of the MPFI-60 (Landi et al., 2021),

which found no correlation between EA and AAQ-II. These results suggest that the acceptance and EA subscales should undergo further improvement.

Criterion validity was appropriate and the associations were in the expected direction in most of the MPFI-24 subscales, except for the acceptance and EA subscales; no significant correlations were found between these subscales and the criteria. These results are similar to those found by Landi et al. (2021) for the acceptance subscale of the MPFI-60 and by Grégoire et al. (2020) for the EA subscale of the MPFI-24. Low to moderate correlations were found between the PF subscales and criterion variables, whereas stronger correlations were found between the PI subscales and some of the criteria variables. Specifically, stronger correlations were found between some of the PI subscales and physical and psychological quality of life, depression, anxiety, and negative affect. These results are in line with studies that suggest that the PI composite is more strongly related to health problems and psychological distress (depression, anxiety), and therefore negative affect, and that PF is more strongly related to individual well-being (Stabbe et al., 2019; Thomas et al., 2021).

Limitations

The two studies have several limitations. Firstly, some of the items had negative error variances, which are indicative of outliers, misspecified models, empirical underidentification of the model (Kolenikov & Bollen, 2012), small sample size ($N < 100$ –150), or few indicators per factor (< 3) (Kline, 2016). In both studies, the effect of outliers was analysed and controlled for; we also tested those models that had showed an appropriate fit to the data in previous studies; finally, we determined that sample size was appropriate (Kline, 2016). These aspects may suggest that the negative error variances in the acceptance and EA subscales could be related to the empirical underidentification of these constructs due to the use of two items to represent them. These constructs are subtle and respondents who are not familiar with ACT may find them difficult to comprehend, especially when short items are used (Bond et al., 2011). Therefore, these subscales should be enlarged such that they fully express their meaning.

In both studies, Spanish speakers appeared to find it difficult to grasp the meaning of these items, especially those on the acceptance subscale; we hypothesize that participants understood the acceptance items as resignation or hopelessness (Palomera et al., 2022), which implies adopting a passive response (that could be more related to the PI domain) to negative feelings. Differentiating between acceptance and resignation is challenging, because Spanish speakers seem to use these words without distinction. Moreover, Tabrizi et al. (2022) stated that removing the first item of the acceptance subscale improved the internal consistency of this subscale

in the Swedish MPFI-60. In both of our studies, prior to the adjustments made, the first item had the lowest factor loading.

The EA subscale may be empirically underidentified in the MPFI-24 because its items are only framed as “distraction” from bad memories or unpleasant emotions, whereas the definition of EA includes different behaviours aimed at avoiding the distress produced by unpleasant emotions, memories, or physical sensations (Gámez et al., 2011). Moreover, items from the EA subscale come from the PHLMS rather than from a tool that specifically assesses EA (Grégoire et al., 2020).

Finally, our sample comprised university students, most of whom were women. In Study 2, the participants were psychology students, who may have been more knowledgeable about psychological concepts like PF than students from other majors or the general population. In addition, the ages of the participants in both studies ranged from 18 to 63 years, as the studies were open to all university students of legal age who were interested in taking part. Furthermore, the demographic questionnaire did not request information on ethnic identification, cultural background, income, or socioeconomic status. All of these issues limit the generalizability of our results; further studies should be conducted in both the general population and clinical samples to test the generalizability of the Spanish MPFI-24 across demographic groups. In addition, information was collected using self-report measures via an online survey, which may have led to common method variance.

Overall, the results suggest that the MPFI-24 is a promising tool that could be used in both clinical and research contexts to assess not only PF and PI as global dimensions, but also all the components of PF and PI. Specifically, prior to onset and during the therapeutic process, the MPFI-24 can be used to describe individual profiles of PF and PI, allowing effective treatments to be tailored to the needs and characteristics of clients. Moreover, the subscales of the MPFI-24 provide an opportunity to examine the potential mechanisms of change within ACT. The MPFI-24 also aids in disentangling the role of the dimensions of PF and PI in the onset of various disorders, as well as in individual health and well-being. Regarding its practical application, the MPFI-24 is a brief, useful tool for measuring PF and PI in clinical contexts where practitioners need to frequently screen or monitor patients, or when time for conducting extensive assessments is limited. It can also prove useful in future research that requires the development of extensive self-reporting protocols that could lead to fatigue and boredom among respondents. Nonetheless, the results of Study 1 and 2 also suggest that the EA and acceptance subscales of the MPFI-24 should undergo further improvement. Conducting focus groups with respondents could help to formulate the items such that they are more understandable for people who are not familiar with ACT. The addition of more items to these subscales could help to fully capture their meaning.

Funding Funding for open access publishing: Universidad de Málaga/CBUA. This study received Grants PRE2020-093204 and PID2019-106086RB-I00 funded by MCIN/AEI /10.13039/501100011033 by “ESF Investing in your future”, and the Regional Government of Andalusia (HUM-566). Funding for open access charge: Universidad de Málaga / CBUA.

Data availability Data is available at Barrado, Victoria (2023), “MPFI-24 SPANISH”, Mendeley Data, V1, doi: 10.17632/dnk3d4n8ws.1. Additional data is available upon reasonable request.

Declarations

Disclosure statement No potential conflict of interest was reported by the authors. All the authors declare no conflicts of interest. All the procedures involving human participants were conducted in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. Informed consent was individually obtained from all study participants. This article does not refer to any animal studies conducted by any of the authors. The study procedures were approved by the Experimentation Ethics Committee of the University of Málaga (CEUMA 24-2022-H).

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