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Articles

**The 26-item version of the Kenny-Music Performance Anxiety Inventory: Italian validation and analysis of its psychometric properties**

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**Abstract**

Music Performance Anxiety is a specific type of performance anxiety, impairing musical performers around the world. To explain this condition, a model composed of three different and integrated factors was proposed: a factor associated to concerns related to the performance setting, a factor associated to psychological vulnerability (i.e., depressive thinking style), and a factor associated to early parental relationships sustain the development of music performance anxiety. Based on this model, the 26-item version of the Kenny – Music Performance Anxiety Inventory (K-MPAI, Kenny et al., 2006) was developed. The aim of the present study was to assess the psychometric properties of an Italian version of this measure. A sample of 319 music performers was recruited and completed this measure, as well as measures related to depression, general anxiety, and social anxiety. After several adjustments, an Exploratory Factor Analysis and a Confirmatory Factor Analysis highlighted a three-factor structure as the best factorial solution for this questionnaire, matching the proposed model. Sex invariance was supported, internal consistency was good, and no strong correlations with age emerged. Moreover, convergent validity and temporal stability were achieved. Accordingly, validity and reliability of the 26-item Italian version of the K-MPAI were confirmed. This questionnaire emerged as a reliable tool to assess music performance anxiety among different Italian music performers. Finally, due to its brevity, it emerged as a viable measure to assess music performance anxiety in both research and clinical settings.

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## 1. Introduction

Musical Performance Anxiety (MPA) is a specific type of performance anxiety related to musical performance in both solo and group presentations, involving any music instruments (Papageorgi et al., 2007; Taborsky, 2007); this condition afflicts numerous musical performers around the world (i.e., 16.5% to 60%; Fernholz et al., 2019; Kenny, 2011). In some cases, MPA impaired the musicians' ability to perform in public (Burin & Osório, 2017) and could be an obstacle for those who want to start a musical career (Zarza Alzugaray et al., 2016).

MPA can be influenced by numerous factors such as sex, age, and expertise (Papageorgi et al., 2007). Regarding sex, studies have revealed that women tend to feel higher levels of MPA than men (Fernholz et al., 2019). As far as concern age, MPA has been found more frequently in young musicians, while older performers report to be less affected (Fernholz et al., 2019; Steptoe, 2001); however, non-significant correlations between K-MPAI scores and age were also found (Dobos et al., 2019). Similarly, a negative correlation between expertise and MPA has been described: expert performers report lower levels of MPA than students (González et al., 2018).

To explain MPA, Kenny utilized Barlow's (2000) emotion-based model of anxiety disorders (Kenny, 2009). Barlow proposed three different and integrated types of vulnerabilities that account for the development of an anxiety disorder: a generalized biological vulnerability (which is heritable); a general psychological vulnerability, based on early experiences regarding the development of control over events; and a specific psychological vulnerability, determined by certain environmental stimuli and reinforced through learning processes (i.e., respondent and vicarious learning; Barlow, 2000). Kenny (2009) adapted this model and introduced three interacting factors which sustain the development of MPA (Kenny, 2009): a factor that pertains to the early relationship context and to parent-child relationship; a factor that includes psychological vulnerability (i.e., depressive thinking patterns); and a factor that pertains to specific concerns regarding different performance situations (such as proximal somatic anxiety and pre and post-performance rumination; Kenny, 2009; 2011).

To assess MPA in the adult population, two different instruments are available: the 26-item version of the Kenny Music Performance Anxiety Inventory (K-MPAI, Kenny et al., 2004) and the revised Kenny Music Performance Anxiety Inventory, which contains 40 items (K-MPAI-R, Kenny 2009). Both instruments were based on Barlow's theory of anxiety disorders (2000) and items were specifically constructed or selected from other scales to address this model.

Thus, these instruments measure etiological aspects, as well as psychological, behavioral, and physiological symptoms of the MPA (Kenny, 2009). These symptoms include depressive and anxiety symptoms, attentional shift (e.g., focus on the evaluation settings, fear of a negative evaluation), memory bias, excessive arousal, and avoidance of certain situations (Kenny et al., 2004). Items of both versions could be grouped into the three factors described by Kenny's (2009) adaptation of Barlow's (2000) model (Kenny, 2009; Zarza Alzugaray et al., 2016).

The 26-item version of the K-MPAI was tested originally in an Australian sample, showing an excellent internal consistency ( $\alpha = .94$ ); however, the small sample size did not allow for a factor analysis (Kenny et al., 2004). Later, the 26-item version of the K-MPAI was validated in Brazilian (Barbar et al., 2014, 2015), Spanish (Zarza Alzugaray et al., 2016), and Ukrainian samples (Ksodnizyk, 2020a), and its factorial structure was explored. For the Brazilian version, an Exploratory Factor Analysis (EFA) was carried out, and eight factors emerged. However, since some factors were composed of very few or even only one item and some alpha values were lower than .50, an EFA with a priori fixed number of factors was conducted. By comparing models with three, four and five factors, the Authors concluded that the three-factor model was the most appropriate. This version showed a total Cronbach's alpha of .82 (Barbar et al., 2014) and three factors: "Worries and Insecurity" with ten items ( $\alpha = .82$ ), "Depression and Hopelessness" with nine items ( $\alpha = .77$ ), and "Early Parental Relationships" with four items ( $\alpha = .57$ ). Items 2, 7 and 8 were excluded for low factor loading (Barbar et al., 2015). In the Spanish version, an EFA showed lack in parsimony (five factors were finally extracted). Then, Confirmatory Factor Analyses (CFAs) were conducted referring to Kenny's (2009) adaptation. Through different adjustments (e.g., removing items 2 and 8 from analyses) and a comparison among three, four and five factor models, the Authors concluded that the Spanish version was well represented by three factors: "Specific cognitions" with eleven items ( $\alpha = .87$ ), "Helplessness" with ten items ( $\alpha = .79$ ), and "Early relationships context" with three items ( $\alpha = .57$ ). The overall internal consistency was good ( $\alpha = .87$ ; Zarza Alzugaray et al., 2016). In the Ukrainian version, an EFA initially highlighted seven factors. By conducting a parallel analysis, Ksodnizyk (2020a) obtained three factors: "Proximal performance concerns" with eleven items ( $\alpha = .90$ ), "Psychological vulnerability" with eight items ( $\alpha = .82$ ), "Early relationship context" with three items ( $\alpha = .66$ ). Items 2, 3, 8 and 26 were excluded for low factor loading; overall internal consistency of this version was good ( $\alpha = .87$ ; Ksodnizyk, 2020a).

All these K-MPAI versions (Brazilian, Spanish, and Ukrainian) showed a three-factor structure that matched Barlow's model (2000) and Kenny's adaptation (2009): 1) a factor pertaining to concerns related to performance settings and to specific psychological vulnerability; 2) a factor related to a general psychological vulnerability and a depressive thinking style; and 3) a factor related to vulnerability based on early parental relationships (Barbar et al., 2015; Ksodnizyk, 2020a; Zarza Alzugaray et al., 2016). Each of these versions named differently each factor (Barbar et al., 2015; Ksodnizyk, 2020a; Zarza Alzugaray et al., 2016), even though they referred to the same aspects (Ksodnizyk, 2020a). Each of these versions showed questionable to poor internal consistency for the factor related to the early relationship context, since few items were loaded in (three to four items; Barbar et al., 2015; Ksodnizyk, 2020a; Zarza Alzugaray et al., 2016).

Pertaining to convergent validity, the 26-item version of the K-MPAI emerged to be highly correlated with trait anxiety assessed with the State-Trait Anxiety Inventory (STAI) and with MPA assessed with the Cox & Kenardy Music Performance Anxiety scale (CK-MPA) (Kenny et al., 2004). Furthermore, this measure demonstrated good test-retest reliability ( $r = .84$ ; Ksodnizyk, 2020a).

To better address MPA, the 26-item version of the K-MPAI was later expanded into the 40-item version by Kenny (2009). This version was originally validated in Australia (Kenny, 2009, 2011), then translated and adapted in Brazil (Rocha et al., 2011), Peru (Chang-Arana, 2015; Chang-Arana et al., 2018), Germany (Peschke & von Georg, 2015; Spahn et al., 2016), Romania (Faur et al., 2021), Korea (Oh et al., 2020), Ukraine (Ksondzyk, 2020b), and Turkey (Çiçek & Güdek, 2020). In general, the 40-item versions showed more than three factors, revealing more complexity within the MPA construct. Each of the 40-item versions extracted a different number of factors: for example, scholars found three factors in the German and in the Turkish versions (Çiçek & Güdek, 2020; Peschke & von Georg, 2015), four factors in the Romanian version (Faur et al., 2021), six factors in the Ukrainian version (Ksondzyk, 2020b), and seven factors in the Korean version (Oh et al., 2020). Furthermore, lack of coherence could be found also within the original version: in the original 40-item Australian version, Kenny initially found twelve factors conducting a principal axis factor analysis on a sample of tertiary level music students (Kenny, 2009), then eight factors with a sample of professional musicians (Kenny, 2011). The structure utilized for the official scoring of the Australian 40-item version of the K-MPAI comprehends the following factors: "Proximal somatic anxiety and worry about performance" (eleven items;  $\alpha = .91$ ), "Worry/dread (Negative cognitions/ruminations)

focused on self/other scrutiny” (eight items;  $\alpha = .86$ ), “Depression/hopelessness (Psychological vulnerability)” (eight items;  $\alpha = .85$ ), “Parental empathy” (four items;  $\alpha = .75$ ), “Memory” (two items;  $\alpha = .92$ ), “Generational transmission of anxiety” (three items;  $\alpha = .72$ ), “Anxious apprehension” (three items;  $\alpha = .59$ ), “Biological vulnerability” which contains a single item (Kenny, 2011). Cronbach’s alphas are similar to the ones of the 26-item versions and some factors remain problematic. For example, as for the 26-item versions, the early parental relationship experiences dimension seems problematic also for the 40-item versions. Concerning the number of items, several versions deleted some of them (e.g., Chang-Arana et al., 2018; Çiçek e Güdek, 2020; Faur et al., 2021; Ksondzyk, 2020b), while others considered all of them among the factors (e.g., Kenny, 2009, 2011; Oh et al., 2020).

Furthermore, a comparison between the 26-item version and the 40-item version of the Ukrainian version of the K-MPAI highlighted some similarities. A CFA conducted on the 40-item version extracted six factors; through this process, 13 items were deleted (Ksondzyk, 2020b). Cronbach’s alphas emerged to be similar to the ones of the 26-item version: for example, both versions highlighted questionable internal consistency for the factor related to vulnerability based on early parental relationship experiences (“Early relationship context”:  $\alpha = .66$  vs “Parental empathy”: three items;  $\alpha = .65$  and “Generational transmission of anxiety”: two items;  $\alpha = .66$ ).

In conclusion, compared to the 40-item versions, the 26-item versions showed more coherence in the number of factors detected and in items deleted across culturally different countries; as a result, findings could be more comparable. Moreover, the 26-item version could be more useful for screening purposes due to its brevity (Ksondzyk, 2020a).

Due to poor availability of measures assessing MPA within the Italian context, the current study aims to validate an Italian translation of the 26-item version of the K-MPAI by administering it in a sample of music performers. First, the factor structure of the Italian version will be explored, aiming to replicate the one proposed in the other 26-item versions. Moreover, since invariance across male and female music performers was not addressed in previous validation studies of the 26-item version of the K-MPAI, sex invariance will be tested. Finally, internal consistency, the relationship between the K-MPAI scores and age, temporal stability, and convergent validity will be examined.

## 2. Method

### 2.1 Participants

#### 2.1.1 Main sample

A total of 319 musicians (women  $n = 90$ , 28.2%) entered the study. Participants' age ranged between 18 and 62 ( $M = 25.51$ ;  $SD = 8.07$ ), their education ranged between 7 and 23 years ( $M = 14.34$ ;  $SD = 2.75$ ), and their musical expertise ranged between 1 and 45 years ( $M = 12.60$ ;  $SD = 7.04$ ). A statistically significant difference on age was found between males and females: males were older than females ( $t_{(317)} = 2.65$ ;  $p = .001$ ;  $d = .412$ ). No sex differences emerged concerning musical expertise ( $t_{(317)} = .73$ ;  $p = .47$ ;  $d = .091$ ). Regarding marital status, 46.1% of participants were single, 41.7% were in a relationship, 11.3% were married or cohabitants, 0.9% were separated or divorced. As for current occupation, the sample mainly included students (63.6%), while some participants had a full-time job (12.9%), a part time job (4.4%), a temporary job (5.6%), or were unemployed (6.3%), retired or unable to work (both 0.3%). Twenty-one participants (6.6%) did not classify themselves in any of the previous job categories.

Participants' musical status was assessed with a self-report question: 230 (72.1%) individuals described themselves as habitual performers and 89 (27.9%) as beginners; no sex differences emerged on this dimension ( $\chi^2_{(1)} = 1.30$ ;  $p = .25$ ): 161 males and 69 females identified as habitual performers, while 68 males and 21 females identified as beginners. Pertaining to the type of instrument played, 53.9% of participants played stringed instruments, 24.1% played keyboard instruments, 11% played air instruments, and 11% played percussions. A statistically significant difference has been found on this variable between females and males ( $\chi^2_{(3)} = 16.13$ ;  $p < .001$ ; Table 1).

**Table 1.** Frequency of the distribution of the type of instrument played according to sex in the main sample.

	String instrument	Keyboard instrument	Air instrument	Percussions
Males	128	47	21	33
Females	44	30	14	2

#### 2.1.2 Retest sample

Forty-two musicians (women  $n = 19$ , 45.2%), out of the 319 in the whole sample, completed the test-retest of the K-MPAI: their age ranged from 18 to 46 years ( $M = 24.74$ ;  $SD = 6.20$ ), their education ranged between 8 and 20 years ( $M = 14.95$ ;  $SD = 3.20$ ), and their musical expertise ranged between 4 and 26 years ( $M = 13.81$ ;  $SD = 4.99$ ). No sex differences emerged

concerning age ( $t_{(40)} = -.91; p = .37; d = -.281$ ) and musical expertise ( $t_{(40)} = 1.80; p = .08; d = .557$ ). Regarding marital status, 38.1% were single, 47.6% were in a relationship, and 14.3% were married or cohabitants. Most of participants were students (59.5%), while few had a full-time job (16.7%), part time job (9.5%), or temporary job (11.9%); one participant was unemployed. Thirty-two musicians described themselves as habitual performers (76.2%) and 10 as beginners (23.8%). No sex differences pertaining to musical status emerged ( $\chi^2_{(1)} = .12; p = .73$ ): 18 males and 14 females identified as habitual performers, while 5 males and 5 females identified as beginners. Pertaining to the type of instrument played, 52.4% of participants played stringed instruments, 11.9% played keyboard instruments, 28.6% played air instruments, and 7.1% played percussions. No sex differences were found on type of instrument played ( $\chi^2_{(3)} = 4.92; p = .18$ ).

## 2.3 Measures

### 2.3.1 Adaptation of the K-MPAI

The Italian version of the Kenny - Music Performance Anxiety Inventory (K-MPAI; Kenny et al., 2004) consisted of 26 items on a 7-point Likert scale (from 0 = *strongly disagree* to 6 = *strongly agree*; see Appendix A for the items). Items that matched the original 26 version were selected and extracted from the certified Italian translation of the K-MPAI, available from the Author of the measure.

### 2.3.2 Other self-report measures

All participants completed:

A brief informative form regarding personal information (i.e., age, marital status, years of education, occupational status) along with anamnestic details (i.e., current or past psychological or psychiatric issues, regular pharmaceutical assumption) and information regarding musical career (e.g., musical status, type of instrument played, years of expertise).

The Beck Anxiety Inventory (BAI; Beck et al., 1988; Italian version by Sica et al., 2006): a 21-item, self-report inventory that measures the severity of anxiety, characterized by a 4-point Likert scale (from 0 = *not at all* to 3 = *much*). Previous studies, conducted on non-clinical and clinical samples (654 undergraduates, 831 community controls, and 64 patients with anxiety), suggested that the Italian version of the BAI had good psychometric properties (Sica & Ghisi, 2007). In the current sample, the McDonald's  $\omega$  was .91 (95% Confidence Interval [CI]: .90, .93).

The Beck Depression Inventory-II (BDI-II; Beck et al., 1996; Italian version by Ghisi et al., 2006): a 21-item, self-report scale that assesses the severity of affective, cognitive, motivational, vegetative, and psychomotor components of depression. In previous studies, the Italian version of the BDI-II was administered to 733 undergraduates, 354 community controls, and 135 depressed patients; results showed that the BAI-II was characterized by excellent psychometric properties (Sica & Ghisi, 2007). In the current sample, the McDonald's  $\omega$  was .90 (95% CI: .88, .92).

The Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998; Italian version by Sica et al., 2007): a 19-item self-report measure designed to assess social interaction anxiety on a 5-point Likert scale ranging from 0 (*not at all*) to 4 (*very much*); higher scores indicate higher levels of social interaction anxiety. The Italian version proved to be highly reliable and a stable measure (Sica et al., 2007). In the current sample, the McDonald's  $\omega$  was .91 (95% CI: .89, .92).

## 2.2 Procedure

Recruitment of participants was mostly executed via Internet, through groups on social networks and on forums created and moderated by musicians and Conservatory students. These groups and forums were entirely dedicated to information regarding activities and courses in the Conservatory, as well as activities related to musical profession.

Musicians interested in participating were sent a link in a private message including the informed consent form, which contains information about the study goals, the voluntary nature of the participation, and the possibility to withdraw without penalty. Then, participants were asked to answer items related to personal and musical-related information, followed by self-report questionnaires.

Participants who completed the retest were also asked to add their e-mail address and to create a personal code with the first letters of their name and surname followed by their date of birthday. The code was utilized to guarantee privacy and to associate test-retest compilations. These participants were contacted after 1 month to complete the K-MPAI a second time.

The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethical Committee of the Psychological Sciences of the University of Padova.

## 2.4 Data analysis

There were no missing responses in the dataset. To examine the factor structure of the K-MPAI and, eventually, reduce the original set of items, we used data from the main sample to conduct an Exploratory Factor Analysis (EFA) and a Confirmatory Factor Analysis (CFA).



First, we analyzed the distribution of each item of the K-MPAI to estimate their mean, standard deviation, skewness, and kurtosis in the sample. Since skewness and kurtosis indices violated the assumption of normality (some of the items were not included in the  $\pm 1$  interval), a Weighted Least Square (WLS) was chosen for the EFA and a Diagonally Weighted Least Square (DWLS) was chosen for the CFA (Mîndrilă, 2010; see Appendix B).

Then, we split this sample in two datasets. The first one was used for the EFA (women  $n = 48$ ; men  $n = 111$ ) and the second one for the CFA (women  $n = 42$ ; men  $n = 118$ ). There were no significant differences between the two subsamples with respect to age ( $t_{(317)} = -.50, p = .62$ ), years of expertise ( $t_{(317)} = .08, p = .93$ ), as well as sex distribution ( $\chi^2_{(1)} = .61, p = .43$ ), musical status ( $\chi^2_{(1)} = 1.79, p = .18$ ), and type of instrument played ( $\chi^2_{(3)} = 1.57, p = .67$ ).

The EFA was conducted using the WLS estimation method, an oblimin oblique rotation, and fixed numbers for factor extraction based on the scree-plot analysis. According to Yong and Pearce (2013), a model with the number of factors proposed by the scree plot was compared to a model with one more factor and a model with one less factor (Yong & Pearce, 2013). Data factorability was assessed using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity. To assess a desirable data factorability, the KMO should be  $\geq .80$  and Bartlett's test of sphericity should be significant (Hair et al., 2009). To estimate the number of factors to extract and factor structure adequacy, we examined the following fit indices: the model chi-square ( $\chi^2$ ); the Root Mean Square Error of Approximation (RMSEA) and its 90% CI, and the Tucker-Lewis Index (TLI). The RMSEA should show values  $< .06$ , and the TLI should show values  $\geq .95$  for good fit (Hu & Bentler, 1999). Items' factor loadings were considered appropriate when  $> .30$  (Tabachnick & Fidell, 2001). The CFA was conducted using the DLWS as an estimator. The main purpose was to test the factorial model extracted with the EFA to estimate the best solution. We choose as indices of good fit the factor model  $\chi^2$ , the Comparative Fit Index (CFI), the TLI, the RMSEA, and the Standardized Root Mean Square Residual (SRMR). The CFI should show values  $\geq .95$  for adequate fit, and the SRMR should show values  $< .09$  for good fit (Hu & Bentler, 1999).

A multi-group CFA was performed to assess sex invariance at configural, metric, and scalar levels (Chen, 2007). Configural invariance examines if the unconstrained model is equal across sexes. Metric invariance implies that the magnitude of loading is similar across the two sexes. Scalar invariance implies similarity on factor loadings and item intercepts between the male and female groups. Since the sample size is small ( $n \leq 300$ ), we considered  $\Delta CFI \leq -.005$  and the  $\Delta RMSEA \geq .010$  or  $\Delta SRMR \geq .005$  ( $\geq .025$  for loading invariance) for non-invariance (Chen, 2007).

Then, Pearson's correlations between the K-MPAI total score and each subscale and age were computed to assess variability of these scores. According to Cohen (1992), correlations  $\leq .10$  were considered weak,  $\sim .30$  were considered moderate, and  $\sim .50$  were considered strong.

Furthermore, internal consistency of the factors in the final model was assessed by means of the McDonald's omega ( $\omega$ ) coefficient and its 95% CI (Dunn et al., 2014). To confirm adequate internal consistency, values should be greater than .70 (Nunnally, 1978).

As for convergent validity, Pearson's correlations among the K-MPAI total score and each subscale and other measures of similar constructs (the BAI, the BDI-II, and the SIAS) were computed. Finally, data collected with the retest sample was used to assess temporal stability of the K-MPAI by Pearson's correlations.

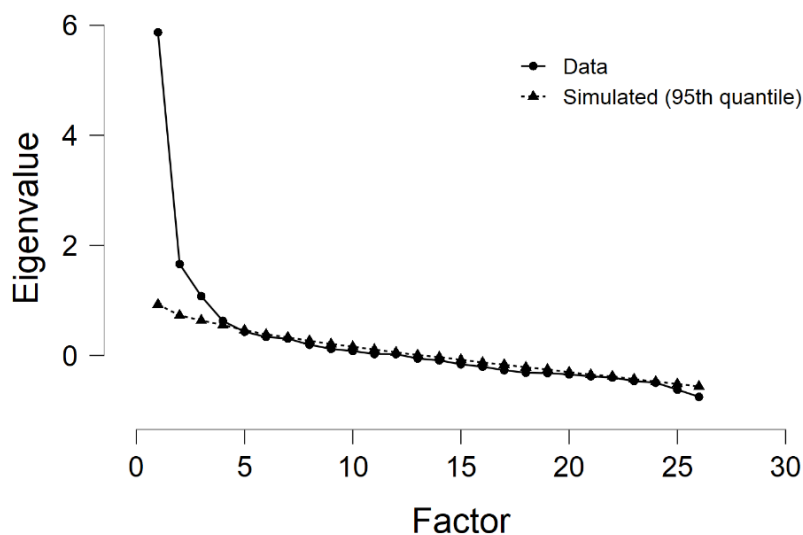
All these analyses were performed using the software JASP, version 0.14.1.0. (JASP Team, 2020).

### 3. Results

#### 3.1 Exploratory Factor Analysis

Following Yong and Pearce's guideline (2013) and according to the scree plot inspection, three distinct EFA were conducted, fixing a priori two, three, and four factors (Figure 1).

**Figure 1.** Scree plot for the EFA originated by JASP



The first EFA was conducted with two factors fixed a priori. The KMO (.814) and Bartlett's test of sphericity ( $\chi^2_{(325)} = 1450.60, p < .001$ ) demonstrated that the data were suitable for factor analysis. Since item 2 and 8 demonstrated low factor loadings and high uniqueness (.918, .937, respectively), they were excluded from the analyses. After excluding these items, the KMO was .825 and Bartlett's test of sphericity remained significant ( $\chi^2_{(276)} = 1380.58, p < .001$ ). This model

demonstrated problematic fit indices: the model  $\chi^2$  was significant ( $\chi^2_{(229)} = 444.75, p < .001$ ), the RMSEA had a value of .083 (90% CI: .066, .088), and the TLI was .762. The first factor extracted explained 24.1% of the variance and was related to proximal performance anxiety symptoms and depressive thinking style (“Proximal performance concerns and psychological vulnerability”), while the second factor explained 8.8% of the variance and comprised items related to early relationship with parents and memory reliance (“Early parental context and memory reliance”; Table 2).

**Table 2.** Results for EFA conducted with two fixed factors

K-MPAI Items	Factor loading	
	1	2
Factor 1 - Proximal performance concerns and Psychological vulnerability		
K-MPAI 1	<b>.43</b>	.02
K-MPAI 3	<b>.61</b>	-.03
K-MPAI 4	<b>.54</b>	-.01
K-MPAI 5	<b>.36</b>	.07
K-MPAI 6	<b>.40</b>	-.11
K-MPAI 7	<b>.43</b>	-.003
K-MPAI 10	<b>.58</b>	.10
K-MPAI 11	<b>.58</b>	-.06
K-MPAI 12	<b>.74</b>	-.003
K-MPAI 13	<b>.72</b>	.03
K-MPAI 14 (R)	<b>-.31</b>	.19
K-MPAI 15	<b>.49</b>	.06
K-MPAI 16	<b>.57</b>	-.01
K-MPAI 17	<b>.48</b>	.08
K-MPAI 18	<b>.48</b>	.10
K-MPAI 20	<b>.53</b>	-.04
K-MPAI 21	<b>.40</b>	-.22
K-MPAI 22	<b>.71</b>	.001
K-MPAI 23	<b>.59</b>	-.06
K-MPAI 25	<b>.54</b>	.05
Factor 2 - Early parental context and memory reliance		
K-MPAI 9 (R)	-.03	<b>.81</b>
K-MPAI 19 (R)	.03	<b>.85</b>
K-MPAI 24 (R)	.03	<b>.70</b>
K-MPAI 26	-.13	<b>.34</b>

*Note.* The extraction method was weighted least squares with an oblique rotation. Factor above .30 are in bold. Reverse-scored items are denoted with (R).

Then, a second EFA was conducted fixing a priori three factors. Since items 2, 7, and 8 did not have a significant loading for any of the three factors, and demonstrated high uniqueness (.914, .821, .930, respectively), they were excluded from the analyses. After removing the items, the overall KMO (KMO = .828) and Bartlett's test of sphericity ( $\chi^2_{(253)} = 1321.45, p < .001$ ) still suggested suitability for data analysis. The EFA with three fixed factor was repeated: the model  $\chi^2$  test was significant ( $\chi^2_{(187)} = 293.30, p < .001$ ), the RMSEA had a value of .066 (90% CI: .046, .073), and the TLI was .863. The model demonstrated a better fit compared to the previous one, meaning that the structure of the questionnaire was better represented by three factors than two. The first factor explained 15.4% of the variance, the second factor explained 14.6% of the variance, and the third factor explained 9.2% of the variance. Each item demonstrated a strong, single loading in each one factor: no double factor loading emerged (see Table 3). Thus, after analyzing the content of the items in each factor, the first factor was named "Proximal performance concerns", the second factor was named "Helplessness – psychological vulnerability", and the third factor was named "Early parental context and memory reliance".

**Table 3.** Results for EFA conducted with three fixed factors

K-MPAI Items	Factor loading		
	1	2	3
Factor 1 - Proximal performance concerns			
K-MPAI 10	<b>.53</b>	.13	.07
K-MPAI 12	<b>.67</b>	.16	-.03
K-MPAI 13	<b>.80</b>	.03	-.01
K-MPAI 14 (R)	<b>-.40</b>	.04	.22
K-MPAI 15	<b>.78</b>	-.22	.01
K-MPAI 17	<b>.33</b>	.22	.08
K-MPAI 18	<b>.52</b>	.03	.07
K-MPAI 20	<b>.42</b>	.19	-.05
K-MPAI 22	<b>.55</b>	.26	-.01
K-MPAI 25	<b>.34</b>	.26	.04
Factor 2 - Helplessness – psychological vulnerability			
K-MPAI 1	.01	<b>.50</b>	.05
K-MPAI 3	.07	<b>.66</b>	.01
K-MPAI 4	-.02	<b>.68</b>	.04
K-MPAI 5	-.02	<b>.45</b>	.11
K-MPAI 6	-.11	<b>.60</b>	-.07
K-MPAI 11	.19	<b>.46</b>	-.04

K-MPAI 16	.16	<b>.49</b>	.02
K-MPAI 21	-.003	<b>.48</b>	-.19
K-MPAI 23	.10	<b>.59</b>	-.03
Factor 3 - Early parental context and memory reliance			
K-MPAI 9 (R)	-.02	-.02	<b>.80</b>
K-MPAI 19 (R)	.03	.003	<b>.86</b>
K-MPAI 24 (R)	.001	.03	<b>.70</b>
K-MPAI 26	-.12	-.03	<b>.34</b>

*Note.* The extraction method was weighted least squares with an oblique rotation. Factor above .30 are in bold. Reverse-scored items are denoted with (R).

The last EFA was conducted with four fixed factors. Items 2, 7, and 8 did not showed significant factor loading and demonstrated high uniqueness; thus, they were excluded from the analysis. After removing these items, item 25 showed a weak factor loading and was deleted from the analyses. The KMO was .822 and Bartlett's test of sphericity remained significant ( $\chi^2_{(231)} = 1247.00, p < .001$ ). According to the fit indices, the four-factor structure was more appropriate compared to the ones previously found: the  $\chi^2$  test was significant ( $\chi^2_{(149)} = 196.57, p = .005$ ), the RMSEA had a value of .051 (90% CI: .025, .061), and the TLI was .926. The first and the third factors extracted enclosed items related to depressive thinking patterns and early parental relationship ("Helplessness – psychological vulnerability" and "Early parental context and memory reliance"), while the second and the fourth contained items that relate to anxiety symptoms concerning the performance setting ("Proximal performance concerns 1" and "Proximal performance concerns 2"). The factor extracted explained 15.1%, 14.2%, 9.7%, and 4.3% of the variance. Even though the model demonstrated a good fit, the factor structure presented some problems, as shown in Table 4. The fourth factor was made up of only one item, item 10, that demonstrated a strong crossloading in the second factor. Similarly, the other items that significantly loaded in the fourth factor demonstrated crossloadings with other factors: more specifically, item 12 loaded both in Factor 4 and Factor 2, while item 23 loaded both in Factor 4 and Factor 1. Notably, these items are the only one with crossloadings. In the other EFAs, item 10, 12, and 23 loaded significantly in a single factor: they loaded in the "Proximal performance concerns and psychological vulnerability" factor in the two-factor model, while item 10 and 12 loaded in the "Proximal performance concerns" factor and item 23 loaded in the "Helplessness – psychological vulnerability" factor in the three-factor model.

**Table 4.** Results for EFA conducted with four fixed factors

K-MPAI Items	Factor loading			
	1	2	3	4
Factor 1 - Helplessness – psychological vulnerability				
K-MPAI 1	<b>.50</b>	.06	.05	-.15
K-MPAI 3	<b>.66</b>	.04	.02	.11
K-MPAI 4	<b>.66</b>	.01	.04	-.08
K-MPAI 5	<b>.44</b>	.04	.11	-.11
K-MPAI 6	<b>.58</b>	-.16	-.07	.13
K-MPAI 11	<b>.47</b>	.14	-.04	.15
K-MPAI 16	<b>.52</b>	.26	.02	-.23
K-MPAI 21	<b>.50</b>	.09	-.19	-.22
K-MPAI 23	<b>.61</b>	-.05	-.02	<b>.32</b>
Factor 2 - Proximal performance concerns 1				
K-MPAI 12	.17	<b>.52</b>	-.03	<b>.43</b>
K-MPAI 13	.06	<b>.82</b>	-.01	-.01
K-MPAI 14 (R)	.03	<b>-.32</b>	.21	-.21
K-MPAI 15	-.18	<b>.77</b>	.01	.02
K-MPAI 17	.24	<b>.38</b>	.07	-.13
K-MPAI 18	.05	<b>.52</b>	.06	-.01
K-MPAI 20	.21	<b>.49</b>	-.06	-.15
K-MPAI 22	.28	<b>.48</b>	-.02	.13
Factor 3 - Early parental context and memory reliance				
K-MPAI 9 (R)	-.02	-.02	<b>.80</b>	.03
K-MPAI 19 (R)	.01	.06	<b>.86</b>	-.07
K-MPAI 24 (R)	.03	-.06	<b>.71</b>	.13
K-MPAI 26 (R)	-.03	-.04	<b>.34</b>	-.17
Factor 4 - Proximal performance concerns 2				
K-MPAI 10	.12	<b>.36</b>	.08	<b>.48</b>

*Note.* The extraction method was weighted least squares with an oblique rotation. Factor above .30 are in bold. Reverse-scored items are denoted with (R).

Thus, by comparing the results for the EFAs, the three-factor model emerged as the most adequate and parsimonious. In fact, both the two-factor and the four-factor structures presented some problems related to the fit of the model or within the structure itself.

### 3.2. Confirmatory Factor Analysis

Since the factor structure of the four-factor model was problematic, only two distinct CFAs with DWLS as an estimator were performed to match the two, and three factor structures emerged from the EFAs. Pertaining the two-factor model, it demonstrated an adequate, but still problematic fit ( $\chi^2_{(208)} = 340.18, p < .001$ ; CFI = .942; TLI = .935; RMSEA = .063 [90% CI: .051, .075;  $p = .040$ ]; SRMR = .097). Furthermore, the two factors demonstrated a weak relation ( $r = -.10, p < .001$ ). As for the CFA conducted with the three-factor structure, the factor model  $\chi^2$  was non-significant ( $\chi^2_{(227)} = 241.96, p = .24$ ), and the fit indices were adequate: CFI = .994, TLI = .994, RMSEA = .020 (90% CI:  $< .001, .040$ ;  $p = .998$ ), SRMR = .077. To improve the overall fit of the model, items 26 was removed from the analyses according to low standardized estimate (.193), and to item content. The overall fit of the model remained stable ( $\chi^2_{(186)} = 222.23, p = .21$ ; CFI = .994; TLI = .993; RMSEA = .022 [90% CI:  $< .001, .042$ ;  $p = .995$ ]; SRMR = .077). Factor 1 (“Proximal performance concerns”) and Factor 2 (“Helplessness – psychological vulnerability”) demonstrated a strong relation ( $r = .62, p < .001$ ), while Factor 3 (“Early parental context”) demonstrated moderate relation with Factor 2 ( $r = -.19, p < .001$ ) and was not significantly related with Factor 1 ( $r = .02, p = .64$ ). Standardized factor loadings of each item were significant, as shown in Table 5.

**Table 5.** Standardized factor loadings for CFA conducted with three factors

K-MPAI Items	CFA with 3 factors	
Factor 1 - Proximal performance concerns		
K-MPAI 10	.65**	
K-MPAI 12	.73**	
K-MPAI 13	.69**	
K-MPAI 14 (R)	-.56**	
K-MPAI 15	.60**	
K-MPAI 17	.67**	
K-MPAI 18	.66**	
K-MPAI 20	.57**	
K-MPAI 22	.74**	
K-MPAI 25	.56**	
Factor 2 - Helplessness – psychological vulnerability		
K-MPAI 1		.62**

K-MPAI 3	.63**	
K-MPAI 4	.64**	
K-MPAI 5	.49**	
K-MPAI 6	.53**	
K-MPAI 11	.78**	
K-MPAI 16	.59**	
K-MPAI 21	.39**	
K-MPAI 23	.65**	
Factor 3 - Early parental context		
K-MPAI 9 (R)		.76**
K-MPAI 19 (R)		.77**
K-MPAI 24 (R)		.64**

*Note.* The estimator method was diagonally weighted least squares. Reverse-scored items are denoted with (R).

\* =  $p < .05$ ; \*\* =  $p < .001$

By comparing the two and three-factor models, the three-factor solution was preferred, since it demonstrated a better fit compared to the two-factor one. Moreover, the final three-factor structure closely matched the one described in other 26-item versions. Finally, the three-factor structure emerged from the EFA was confirmed.

### 3.3. Sex invariance

A multi-group CFA was performed to assess sex invariance in the final three-factor structure with the second subsample. As reported in Table 6, configural, metric, and scalar invariance was supported across sex.

**Table 6.** Measurement of Invariance Across Sex

Model	$\chi^2$	<i>df</i>	CFI	RMSEA	SRMR	Model comparison	$\Delta\chi^2$	$\Delta$ <i>df</i>	$\Delta$ CFI	$\Delta$ RMSEA	$\Delta$ SRMR
Configural	506.22	434	.971	.046	.112						
Metric	481.78	431	.980	.039	.110	Metric vs Configural	-24.44	-3	.009	-.007	-.002
Scalar	506.74	450	.977	.040	.108	Scalar vs metric	24.96	19	-.003	.001	-.002

*Note.* The estimator method was diagonally weighted least squares. CFI = comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Square Residual.



### 3.4. Internal consistency

For the overall sample, the mean total score of the K-MPAI was 46.01 (SD = 21.23), while the means for the three subscales were 20.48 (SD = 12.38) for the “Proximal performance concerns” subscale, 18.33 (SD = 10.77) for the “Helplessness – psychological vulnerability” subscale, and 7.21 (SD = 4.88) for the “Early parental context” subscale. Moreover, the “Proximal performance concerns” subscale (McDonald’s  $\omega = .86$ , 95% CI: .84, .89), the “Helplessness – psychological vulnerability” subscale (McDonald’s  $\omega = .82$ , 95% CI: .79, .85), the “Early parental context” subscale (McDonald’s  $\omega = .80$ , 95% CI: .76, .84) demonstrated good internal consistency, as well as the K-MPAI total score (McDonald’s  $\omega = .87$ ; 95% CI: .85, .89).

### 3.5. Age correlations

For the overall sample, age demonstrated weak negative correlations with the “Proximal performance concerns” subscale ( $r = -.12$ ,  $p = .03$ ), and the “Helplessness – psychological vulnerability” subscale ( $r = -.15$ ,  $p = .01$ ), and a weak positive correlation with the “Early parental context” subscale ( $r = .18$ ,  $p = .002$ ), while correlation with the total score was not significant ( $r = -.11$ ,  $p = .05$ ).

### 3.6. Convergent validity

The K-MPAI total score showed positive correlations with the BAI total score ( $r = .51$ ,  $p < .001$ ), and the SIAS total score ( $r = .61$ ,  $p < .001$ ). Similarly, the “Proximal performance concerns” subscale demonstrated correlations with the BAI total score ( $r = .41$ ,  $p < .001$ ), and the SIAS total score ( $r = .51$ ,  $p < .001$ ), while the “Helplessness – psychological vulnerability” subscale showed a strong correlation with the BDI-II total score ( $r = .64$ ,  $p < .001$ ).

### 3.7. Temporal reliability

The K-MPAI total score ( $r = .87$ ,  $p < .001$ ), the subscale “Proximal performance concerns” ( $r = .83$ ,  $p < .001$ ), the subscale “Helplessness – psychological vulnerability” ( $r = .82$ ,  $p < .001$ ), and the subscale “Early parental context” ( $r = .60$ ,  $p < .001$ ) showed good test-retest reliability.

## 4. Discussion

The three factors structure of the K-MPAI described in previous studies was confirmed (Barbar et al., 2015; Ksondzyk, 2020a; Zarza Alzugaray et al., 2016). This structure followed Barlow’s (2000) model of anxiety and Kenny’s (2009) adaptation of this model for the MPA, and comprised aspects related to concerns occurring within the performance setting, to

psychological vulnerability (i.e., a depressive thinking style), and to early parental relationships. The first factor was named “Proximal performance concerns” since it held items addressing dysfunctional beliefs and preoccupation that could precede or occur during the performance. The second factor contained items related to a general psychological vulnerability that mainly pertains to a depressive thinking pattern and was named “Helplessness – psychological vulnerability”. Finally, the third factor was named “Early parental context” since it contained items related to the relationship with parents.

Items 2, 7, and 8 demonstrated high uniqueness and low factor loadings in the EFA and were removed during the analyses: items 2 and 8 have been excluded in all the other 26-item versions of the K-MPAI (Barbar et al., 2015; Ksondzyk, 2020a; Zarza Alzugaray et al., 2016), while item 7 was excluded in the Brazilian version (Barbar et al., 2015). Moreover, item 26 was removed during the CFA since it demonstrated a weak standardized estimate; accordingly, this item is removed or loads in different factors in other versions (Barbar et al., 2015; Ksondzyk, 2020a; Zarza Alzugaray et al., 2016). In general, the excluded items were related to trust (item 2: “I find it easy to trust others”) and reliance on others (item 8: “I find it difficult to depend on others”), and to memory (item 26: “My memory is usually very reliable”), features that may not be well represented by this measure. Thus, other measures seem needed to specifically assess musicians’ relationship with others and their reliance on memory. Sex invariance was confirmed at configural, metric, and scalar levels for the K-MPAI: this is the first study that tested sex invariance of the 26-item version of the K-MPAI. This analysis revealed that the factorial structure of the K-MPAI is stable among males and females; thus, results obtained with music performers of both these sexes are comparable.

Concerning psychometric properties, the good internal consistency of the overall scale and the subscales “Proximal performance concerns” and “Helplessness – psychological vulnerability” was in accordance with other studies conducted with the 26-item versions of the K-MPAI (Barbar et al., 2015; Ksondzyk, 2020a; Zarza Alzugaray et al., 2016). However, contrary to other studies, also the subscale “Early parental context” showed an adequate internal consistency. Thus, this subscale might be susceptible to cultural influences. Concerning age, the K-MPAI total score and its subscales did not show a strong correlation. As previously described (e.g., Dobos et al., 2019), age could not be a relevant aspect for MPA. The Italian 26-item version of the K-MPAI demonstrated good convergent validity; similarly, Kenny and colleagues (2004) have described significant correlations with measures that evaluate general anxiety and MPA for the 26-item Australian version (Kenny et al., 2004). However, no studies have explored its

associations with measures related to depression and social anxiety symptoms during the validation process (Zarza Alzugaray et al., 2016). Interestingly, these results confirmed the relationship between MPA and social anxiety symptoms (Dobos et al., 2019). Finally, as found for the Ukrainian version (Ksondzyk, 2020a), the 26-item Italian version of the K-MPAI demonstrated good temporal stability.

This study is characterized by several limitations. First, music performers were identified according to their self-reported musical status, and no other objective criteria were used. Secondly, the small sample size did not allow to further explore the structure of the K-MPAI between male and female performers or among performers according to their main played instrument. Thirdly, recruitment was carried out online, reducing the availability of music performers that could not access to Internet. Finally, measures related to general performance anxiety and to the relationship with parents could have been useful to further test convergent validity.

Future studies should try to address sex differences exploiting larger samples of musicians. Increasing the sample size, and recruiting older, more experienced performers seem necessary. Moreover, differences among music performers should be examined: according to the studies conducted with the 40-item version (e.g., Kenny, 2009, 2011), different factorial structures could be described among music performers specialized in different musical instruments. Thus, comparing the factorial structure of the 26-item version among different types of music performers seems needed.

Despite these limitations, this study provided evidence of the robust psychometric properties of the 26-item Italian version of the K-MPAI. This instrument emerged as a reliable measure to assess MPA among Italian music performers. Moreover, this study corroborated Kenny's (2009) conceptualization of MPA by confirming the three-factor structure of the 26-item version of the K-MPAI. Finally, as for the other versions (Barbar et al., 2015; Ksondzyk, 2020a; Zarza Alzugaray et al., 2016), the 26-item Italian version of the K-MPAI emerged as a brief and reliable tool for assessing MPA, available both for the research setting and for clinical interventions, since it guarantees to identify core feature related to this condition.

### **Disclosure and conflict of interest**

The authors report no declaration of interest.

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**Authors' contribution**

PM: Data Curation, Formal Analysis, Writing – original draft. SC: Conceptualization, Data Curation, Methodology, Writing – Review & Editing. AS: Formal Analysis, Writing – Review & Editing, Supervision. AG: Data Curation, Writing – Review & Editing. MG: Conceptualization, Writing – Review & Editing, Supervision.

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**Appendix A**

The 26-item Italian version of the K-MPAI.

	0 = fortemente in disaccordo	1	2	3	4	5	6 = fortemente d'accordo
<b>1. Qualche volta mi sento depresso senza sapere perché.</b>							
2. Trovo che sia facile fidarsi degli altri.							
<b>3. Raramente sento di avere il controllo sulla mia vita.</b>							
<b>4. Spesso trovo difficile avere l'energia per fare le cose.</b>							
<b>5. Preoccuparsi eccessivamente è una caratteristica della mia famiglia.</b>							
<b>6. Spesso sento che la vita non ha molto da offrirmi.</b>							
7. Più lavoro duramente per							

prepararmi ad un concerto e maggiore è la possibilità che io commetta un grave errore.							
8. Trovo difficile dipendere dagli altri.							
<b>9. I miei genitori erano quasi sempre sensibili alle mie necessità.</b>							
<b>10. Prima di un concerto non so mai se la mia <i>performance</i> sarà buona.</b>							
<b>11. Spesso sento di non valere molto come persona.</b>							
<b>12. Durante una <i>performance</i> mi ritrovo a pensare se ce la farò mai a superarla.</b>							
<b>13. Pensare a come potrei essere giudicato</b>							

interferisce con la mia <i>performance</i> .							
14. Anche nelle situazioni di <i>performance</i> più stressanti sono fiducioso del fatto che mi esibirò bene.							
15. Spesso mi preoccupa di una reazione negativa del pubblico.							
16. Qualche volta mi sento ansioso senza una particolare ragione.							
17. Fin dall'inizio dei miei studi musicali mi ricordo di essere stato ansioso rispetto alla <i>performance</i> .							
18. Mi preoccupa che una cattiva <i>performance</i>							

<p>possa rovinare la mia carriera.</p>							
<p>19. I miei genitori mi hanno quasi sempre ascoltato.</p>							
<p>20. Mi capita di rinunciare ad opportunità di <i>performance</i> di valore a causa dell'ansia.</p>							
<p>21. Da bambino spesso mi sentivo triste.</p>							
<p>22. Preparandomi per un concerto spesso provo una sensazione di terrore e di disastro incombente.</p>							
<p>23. Spesso sento che non ho speranze verso il futuro.</p>							
<p>24. I miei genitori mi hanno incoraggiato a</p>							

<b>provare cose nuove.</b>							
<b>25. Prima di una performance sono così preoccupato da non riuscire a dormire.</b>							
26. Generalmente la mia memoria è molto affidabile.							

*Note.* Items are rated on a Likert scale from 0 (“Fortemente in disaccordo”) to 6 (“Fortemente d’accordo”). Item in bold are included in the final version of the K-MPAI.

**Appendix B**

Means, standard deviations, skewness, and kurtosis of the items of the K-MPAI.

Item	Mean (SD)	Skewness (SE)	Kurtosis (SE)
KMPAI 1	2.04 (1.93)	.60 (.14)	-.87 (.27)
KMPAI 2	2.47 (1.66)	.18 (.14)	-.82 (.27)
KMPAI 3	1.91 (1.65)	.73 (.14)	-.40 (.27)
KMPAI 4	2.16 (1.78)	.58 (.14)	-.67 (.27)
KMPAI 5	2.66 (2.04)	.27 (.14)	-1.26 (.27)
KMPAI 6	1.65 (1.86)	.95 (.14)	-.34 (.27)
KMPAI 7	1.07 (1.47)	1.55 (.14)	1.73 (.27)
KMPAI 8	3.40 (1.81)	-.15 (.14)	-1.06 (.27)
KMPAI 9 (R)	3.71 (1.91)	-.45 (.14)	-1.02 (.27)
KMPAI 10	3.03 (2.01)	.08 (.14)	-1.31 (.27)
KMPAI 11	1.81 (1.87)	.77 (.14)	-.64 (.27)
KMPAI 12	1.83 (1.92)	.84 (.14)	-.59 (.27)
KMPAI 13	2.71 (2.10)	.22 (.14)	-1.31 (.27)
KMPAI 14 (R)	3.18 (1.90)	-.08 (.14)	-1.24 (.27)
KMPAI 15	2.62 (1.93)	.27 (.14)	-1.19 (.27)
KMPAI 16	2.50 (2.00)	.36 (.14)	-1.20 (.27)
KMPAI 17	2.31 (2.07)	.51 (.14)	-1.15 (.27)
KMPAI 18	1.92 (1.92)	.70 (.14)	-.76 (.27)
KMPAI 19 (R)	3.82 (1.95)	-.49 (.14)	-1.06 (.27)
KMPAI 20	.93 (1.57)	1.78 (.14)	2.15 (.27)
KMPAI 21	1.75 (1.87)	.84 (.14)	-.51 (.27)
KMPAI 22	1.06 (1.55)	1.64 (.14)	1.92 (.27)
KMPAI 23	1.85 (1.86)	.73 (.14)	-.72 (.27)
KMPAI 24 (R)	3.27 (1.94)	-.16 (.14)	-1.20 (.27)
KMPAI 25	1.27 (1.56)	1.29 (.14)	.76 (.27)
KMPAI 26	3.59 (1.89)	-.27 (.14)	-1.23 (.27)

*Note.* SD = Standard Deviation; SE = Standard Error.