Exploratory factor analysis of Kenny Music Performance Anxiety Inventory (K-MPAI) in a Brazilian musician sample

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Abstract

Background: The Kenny Music Performance Anxiety Inventory (K-MPAI) is very significant among the available instruments which measures Musical Performance Anxiety (MPA). **Objective:** The aim of this study is to find evidence of validity of the Kenny Music Performance Anxiety Inventory (K-MPAI), in its translated and adapted Brazilian version, through the study of its factor structure. **Methods:** A convenience sample of 230 amateur musicians completed the K-MPAI. **Results:** The initial factor analysis yielded eight factors, explaining 62.4% of variance. However, due to the factors' composition and internal consistency values lower than 0.50, the number of factors was later set at three, considering the internal consistency of those, the theoretical propositions and symptomatology aspects that supported the construction of scale. They were named "Worries and insecurity" ($\alpha = 0.82$), "Depression and hopelessness" ($\alpha = 0.77$) and "Early parental relationships" ($\alpha = 0.57$). **Discussion/Conclusions:** These results point to the scale's construct validity, since they support the theoretical basis used for the development of the K-MPAI and the clinical manifestations of the MPA.

Introduction

Reading a text, dancing, singing a song, engaging in sports activities or even calculating in public can cause immense anxiety in some individuals. When this suffering represents a persistent and distressing apprehension towards public performance, it is characterized as an impairing disorder called Performance Anxiety. When anxiety is specifically related to musical performance of any nature, it is described as Musical Performance Anxiety (MPA), which may be, in some cases, considered a Social Anxiety Disorder subtype[1].

MPA is a multidimensional phenomenon that often affects professional musicians and music students during their music performances and that can have strongly impact not just on an isolated performance, but also on the career and mental health of the affected ones[2,3]. It has, until recently, been conceptualized as a unidimensional phenomenon with career stress at the low end and stage fright at the high end[1]. However, Kenny[1] has argued for a typology of MPA, with three relatively distinct forms of the condition. However, the field is in need of studies that can link assessment and diagnostic factors of MPA, using validated psychometrical instruments in clinical use.

Burgués[4] and Kenny[1] conducted literature reviews of the available instruments to assess MPA, as well as their instruments' published psychometrical parameters. Both authors observed that most of the instruments were either inadequate or not assessed for their psychometrical qualities. Their studies concluded that there is lack of adequate instruments to assess MPA disorder and it renders the meaningful conduct of epidemiological studies even more challenging. Further, such instruments do not provide robust reference parameters for clinical use and MPA treatment.

The Kenny Music Performance Anxiety Inventory (K-MPAI)[2] is very significant among the available instruments. This scale takes the anxiety model proposed by Barlow[5] as reference. According to this model three facets make individuals more or less susceptible to anxiety: a) vulnerability/biological inheritance; b) general psychological vulnerability, based on the development of primary experiences and; c) specific psychological vulnerability, associated with learning processes.

The K-MPAI is composed of 26 items and is used to evaluate symptoms of anxiety expression, tension, memory alterations and negative cognitions due to MPA. It also seeks to asses MPA through elements related to individual history, especially regarding the history of parent-child relationships and the attention received from parents during childhood (primary experiences during development, according to Barlow[5]).

In the original study presented by Kenny et al.[2], the K-MPAI was tested for its internal consistency and demonstrated 0.94 Cronbach's alpha. It also presented positive and significant correlations with the state and trait subscales of the STAI (State-Trait Anxiety Inventory) – which is a general anxiety assessment instrument – and with the Cox & Kenardy MPA Scale (CK-MPA) – which is a specific instrument to assess MPA. All these correlations were higher than 0.80 and it attests to the concurrent validity of the K-MPAI.

Kenny[6] subsequently suggested an expanded version of this instrument with 40 items: the K-MPAI-R. She conducted two exploratory factor analyses using this version: one with professional musicians and another with tertiary level music students. It has also been the object of research by Rocha et al. in Brazil[7]. Nevertheless, the current study aimed to conduct a cross-cultural validation in order to validate the initial version of the scale adapted to the Brazilian context[8]. This validation was based on version's adequate psychometric properties and on its smaller number of items. Both aspects were essential for screening. The current article presents evidence of K-MPAI validity by analyzing its internal structure.

Methods

Participants

The current study used a convenience sample composed of 230 adult musicians (mean age 39.17 years – SD = 16.48). The musicians had different school levels (graduates or undergraduates were the majority: 53.9%), most of them were women (58.3%) and most of them classified themselves as amateur musicians (61.3%). All of the participants signed the Free and Informed Consent Term adopted by the present study. The inclusion criterion was the participation in frequent public musical performances and the exclusion criterion was the incorrect filling of the instruments and psychotic disorders. Approximately 41.6% of the participants had voice as their main musical instrument, and it was followed by chords (18%) and keyboard instruments (10.8%).

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Instruments

The following instruments were used to achieve the current study aims:

– Kenny Music Performance Anxiety Inventory (K-MPAI) – instrument proposed by Kenny et al.[2], translated and adapted to Brazilian Portuguese by Barbar et al.[8]. She used bilingual independent translators and her version was evaluated by a specialist committee which analyzed the *back-translation* and the pilot study, according to the recommendations of Beaton et al.[9]. The instrument is composed of 26 items to be punctuated according to the *likert* scale, which ranges from "strongly disagree" (-3) to "strongly agree" (+3);

– Identification Form – was developed for the present study and composed of 12 items used to obtain a social-demographic description of the sample.

Procedure

Data collection: An initial inquiry was conducted to contact many of the musical groups and active schools in Ribeirão Preto County where potential participants could be found. The instruments were individually completed by musicians gathered in groups. There were always two previously trained researchers assisting the groups. They were in charge of conducting the procedure.

Data analysis: The sample's clinical and social-demographic data were analyzed by means of descriptive statistic. An exploratory factorial analysis was carried out to investigate data related to the K-MPAI construct validity using the components analysis by *varimax* rotation, after the *promax* rotation analysis showed that the factors were not correlated with each other (following parameters suggested by Fabrigar et al.[10]). The criteria used to compose the factors were: Kaiser-Meyer-Olkin (KMO) index above 0.60; significant Bartlett's test, self-values above 1; minimum variance accounted by factors of approximately 60%; and minimum load factor of approximately 0.40[11].

Ethical considerations: The current study was approved by the Local Ethics Committee, according to process 12206/2009.

Results

The KMO was calculated to test the habituation of the sample before the factorial analysis and the outcome was favorable (0.81). Bartlett's test was also significant (χ^2 = 1364.43, p < 0.001). Kaiser's criteria – which considers all factors with self-values above 1 – were used to determine the number of factors: eight factors were found, as show in table 1.

All of the eight factors found on this analysis and presented on table 1 account for 62% of the variance, and Factor 1 contributes to more than 23% of the variance, whereas the other factors are responsible for less than 10% each. The same eight principal components were extracted by *varimax* rotation. Therefore, a new factorial matrix was created and it dealt with individual items of the scale that were related to the factors. However, the result seemed unsatisfactory, since some factors were composed of very few or even of only one item (Factor 7 had two, and Factors 6 and 8 had only one item). Besides, the *alpha* values were lower than 0.50 for some factors.

Hence, due to the theoretical structure on which this instrument was developed, other exploratory analyses were carried out by *a priori* fixing the factor number. Initially, different and random variable arrangements were tested. Finally, the models with three, four and five factors were preserved. After each model was qualitatively investigated, the content and the internal consistency indicators were analyzed. The present research team concluded that models 5 and 4 were inadequate due to the abovementioned with respect to the 8-factor model.

On the other hand, the same parameters showed that the 3-factor model was the most appropriate in view of the theoretical propositions and symptomatology used by the author by the time this assessment scale was developed. Table 2 shows the values of the rotated matrix of the K-MPAI components and it took a *varimax* rotation under consideration in the pre-fixed 3-factors model.

Table 1. Exploratory factor analysis of K-MPAI: self-values description and variance proportion explained by each factor (in percentage)

Factor	Self-value	% of variance
1	6.003	23.090
2	2.212	8.510
3	1.783	6.856
4	1.487	5.721
5	1.376	5.292
6	1.187	4.565
7	1.146	4.409
8	1.027	3.950
9	0.978	3.763
10	0.832	3.198
11	0.810	3.117
12	0.773	2.973
13	0.740	2.847
14	0.686	2.640
15	0.618	2.376
16	0.537	2.067
17	0.496	1.909
18	0.478	1.840
19	0.458	1.763
20	0.429	1.649
21	0.402	1.546
22	0.367	1.410
23	0.330	1.267
24	0.309	1.190
25	0.277	1.066
26	0.256	0.986

Table 2. Factor matrix to each K-MPAI item, considering a three-factor model and *varimax* rotation

Item	Factor		
	1	2	3
k20	**0.720**	0.152	-0.002
k12	**0.675**	0.182	0.133
k10	**0.661**	0.092	-0.055
k13	**0.624**	0.215	-0.212
k22	**0.624**	0.283	0.094
k18	**0.624**	0.133	-0.237
k15	**0.600**	0.168	0.025
k17	**0.544**	0.247	-0.113
k25	**0.544**	0.190	-0.197
k14	**0.448**	-0,022	0,324
k7	0.352	0.214	0.140
k11	0.192	**0.697**	0.015
k23	0.280	**0.678**	0.038
k4	0.195	**0.660**	-0.004
k1	0.110	**0.627**	0.077
k6	0.247	**0.604**	-0.030
k5	0.018	**0.545**	0.124
k3	0.139	**0.537**	0.067
k21	0.142	**0.477**	-0.076
k16	0.221	**0.458**	-0.247
k24	0.010	0.229	**0.718**
k19	-0.008	0.106	**0.687**
k9	-0.129	0.206	**0.544**
k26	0.322	-0.087	**0.428**
k2	-0.031	-0.207	0.265
k8	0.071	0.129	-0.215

As for the 3-factors model, it was observed that Factor 1 had ten items with loads ranging from 0.72 to 0.45. After the qualitative analysis, this factor was called "Worries and Insecurity", with 0.82 *alpha*. Factor 2 was composed by nine items, with 0.77 *alpha*. This factor was called "Depression and Hopelessness" due to the item content. Finally, Factor 3 was the one with the lowest number of items and it was composed of four items and 0.57 *alpha*. This factor was named "Early Parental Relationships", since these items mention the early experiences between musicians and their parents in childhood. Items 2, 7 and 8 were excluded from the factor arrangement because they didn't show significant load in any of the three factors. Table 3 presents the final factor composition suggested by the present analysis.

Discussion

The current article focused on the study of K-MPAI's construct validity, by means of an exploratory factor analysis of this scale. After testing different factor arrangements it was observed that the model with three factors ("Worries and Insecurity", "Depression and Hopelessness" and "Early Parental Relationships") was the most consistent one. These factors are closely bounded to some of the theoretical aspects pointed out in the literature as important etiological determinants of a clinical case in MPA. Some dimensions of the clinical framework in this disorder are also found on the following factors: the presence of strong negative cognition, feelings of insecurity and hopelessness.

The factors are associated not only with the theoretical principles used by the author when the scale was developed based on Barlow's theory[5], but also with the main expressions of the disorder. That being said, it can be observed that Factor 1 ("Worries and Insecurity") and Factor 2 ("Depression and Hopelessness") overlap with some of the symptoms of anxiety, depression and dysthymia within the MPA construct; especially when there is lack of trust in oneself and hopelessness regarding resources and cure likelihood. Such factors are closely related to biological inherited and learned vulnerability aspects[1], and it strengthens the multiaxial theories that describe MPA.

However, Factor 3 ("Early Parental Relationships") gathers items with weaker item-total correlation, as well as with internal consistency lower than that of the acceptable parameters. This factor maintains a direct association with the psychological vulnerability ideas based on early experiences, as it was highlighted by Barlow[5] and Kenny *et al.*[2]. An important discussion regarding the lower scores presented by this factor concerns the aspects related to parental relationships that are not seen as part of MPA development or maintenance processes. These aspects are not even mentioned in the theoretical framework proposed by Papageorgi *et al.*[12] as a relevant element to understand MPA. Therefore, the weak item-total correlation in Factor 3 and the consistency may pinpoint weaker correlations between the historical aspects of the individual and the MPA disorder development (and other possible comorbidities). It points towards the diminished importance of early experiences to MPA onset. It should be taken into account that Factor 3 had the smallest number of items and it has a negative effect on the *alpha* value.

The elements related to professional and environmental events associated with MPA and mentioned by Kenny *et al.*[13] and Papageorgi *et al.*[14], Lamont[15], Kenny[1], Ryan and Andrews[16], Yoshie *et al.*[17] and Taborsky[18], are not taken under consideration in the K-MPAI's items. This could be a limitation for the scale, since these variables are considered relevant in the literature and to the experience of MPA. On the other hand, responses to professional and environmental events such as solo *vs* ensemble performance, adjudicated *vs* non-adjudicated performances, or rehearsals *vs* performances show considerable uniformity of response among musicians, since most of them reported that auditions are the most stressful performance types, and rehearsals and private practice the least stressful ones. The K-MPAI is primarily focused on the psychological factors related to MPA, which are more poorly understood than these other factors.

The current study presents some guidelines to fulfill the absence of previous studies on the composition of the K-MPAI factors. However, the study used a convenience amateur musician sample from a specific Brazilian region.

Therefore, further studies must test this factor arrangement through confirmatory factor analysis to corroborate K-MPAI validity. The search for evidence of validity and reliability is also important in order to substantiate the psychometric properties of this scale and to stimulate its clinical use, as an assessment instrument for this impairing and underdiagnosed disorder[19,20]. Thus, it could open doors for the musicians seeking treatment to finally perform with success and reach the best of their musical careers.

Acknowledgments

Table 3. Final result of the exploratory factor analysis of K-MPAI considering the three-factor model and *varimax* rotation

Factor	Alpha	Items in factor
1. Worries and Insecurity	0.82	10 – I never know before a concert whether I will perform well 12 – During a performance I find myself thinking about whether I'll even get through it 13 – Thinking about the evaluation I may get interferes with my performance 14 – Even in the most stressful performance situations, I am confident that I will perform well 15 – I am often concerned about a negative reaction from the audience 17 – From the beginning of my music studies, I remember being anxious about performing 18 – I worry that one bad performance will ruin my career 20 – I give up worthwhile performance opportunities due to anxiety 22 – I often prepare for a concert with a sense of dread and impending disaster 25 – I worry so much before a performance, I cannot sleep
2. Depression and Hopelessness	0.77	1 – Sometimes I feel depressed without knowing why 3 – I rarely feel in control of my life 4 – I often find it difficult to work up the energy to do things 5 – Excessive worrying is a characteristic of my family 6 – I often feel that life has not much to offer me 11 – I often feel that I am not worth much as a person 16 – Sometimes I feel anxious for no particular reason 21 – As a child, I often felt sad 23 – I often feel that I have nothing to look forward to
3. Early Parental Relationships	0.57	9 – My parents were mostly responsive to my needs 19 – My parents almost always listened to me 24 – My parents encouraged me to try new things 26 – My memory is usually very reliable

References

1. Kenny DT. The psychology of music performance anxiety. New York: Oxford University Press; 2011.
2. Kenny DT, Davis P, Oates J. Music performance anxiety and occupational stress amongst opera chorus artists and their relationship with state and trait anxiety and perfectionism. J Anxiety Disord. 2004;18(6):757-77.
3. Kenny DT, Driscoll T, Ackermann B. Psychological well-being in professional orchestral musicians in Australia: a descriptive population study. Psychology of Music. 2014;42(2):210-32.
4. Burgués AO. Music Performance Anxiety – a review of the literature [trabalho inaugural para a tese de doutorado]. Faculdade de Medicina, Universidade de Freiburg im Bresgau, Alemanha; 2009.
5. Barlow DH. Unraveling the mysteries of anxiety and its disorders from the perspective of emotion theory. Am Psychol. 2000;55(11):1247-63.
6. Kenny DT. The factor structure of the revised Kenny Music Performance Anxiety Inventory. Paper presented at the International Symposium on Performance Science; Auckland, New Zealand; 2009.
7. Rocha SF, Dias-Neto E, Gattaz WF. Music performance anxiety: translation, adaptation and validation of the Kenny Music Performance Anxiety Inventory (K-MPAI) to the Portuguese language. Rev Psiquiatr Clin. 2011;38:217-21.
8. Barbar AEM, Crippa JAS, Osório FL. Kenny Music Performance Anxiety Inventory (KMPAI): transcultural adaptation for Brazil and study of internal consistency. J Depress Anxiety. 2014;3(4):1-3.
9. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. Spine (Phila Pa 1976). 2000;25(24):3186-91.
10. Fabrigar LR, Wegener DT, MacCallum RC, Strahan EJ. Evaluating the use of exploratory factor analysis in psychological research. Psychological Methods. 1999;4(3):272-99.
11. Floyd FJ, Widaman KF. Factor analysis in the development and refinement of clinical assessment instruments. Psychological Assessment. 1995;7(3):286-99.
12. Papageorgi I, Hallam S, Welch GF. A conceptual framework for understanding musical performance anxiety. Research Studies in Music Education. 2007;28(1):83-107.
13. Kenny DT, Fortune JM, Ackermann B. Predictors of music performance anxiety during skilled performance in tertiary flute players. Psychology of Music. 2013;41(3):306-28.
14. Papageorgi I, Creech A, Welch G. Perceived performance anxiety in advanced musicians specializing in different musical genres. Psychology of Music. 2013;41(1):18-41.
15. Lamont A. Emotion, engagement and meaning in strong experiences of music performance. Psychology of Music. 2012;40(5):574-94.
16. Ryan C, Andrews N. An investigation into the choral singer's experience of music performance anxiety. Journal of Research in Music Education. 2009;57(2):108-26.
17. Yoshie M, Kudo K, Murakoshi T, Ohtsuki T. Music performance anxiety in skilled pianists: effects of social-evaluative performance situation on subjective, autonomic and electromyographic reactions. Exp Brain Res. 2009;199(2):117-26.
18. Taborsky C. Musical performance anxiety: a review of literature. Update: Applications of Research in Music Education. 2007;26:15-25.
19. Barbar AEM, Crippa JAS, Osório FL. Parameters for screening music performance anxiety. Rev Bras Psiquiatr. 2014 (ahead of print).
20. Barbar AE, de Souza Crippa JA, de Lima Osório F. Performance anxiety in Brazilian musicians: prevalence and association with psychopathology indicators. J Affect Disord. 2014;152-154:381-6.