**Freeing the performer's mind: A network analysis of mindfulness, music
performance anxiety, negative affect, and self-consciousness
among music performers**

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Abstract

Objectives: Music performance anxiety (MPA) is a common damaging phenomenon for any musician's career. Mindfulness stands as a promising construct to prevent MPA. However, the relationships between mindfulness and MPA are still not fully explored, alongside other relevant attention-based (e.g., self-consciousness) or emotion-based constructs (e.g., negative affect). This study explores the relationships between mindfulness, MPA, self-consciousness, and negative affect.

Methods: A sample of 151 musicians were assessed to explore the relationships between these constructs. Self-reports of mindfulness, MPA, negative affect, and self-consciousness were applied. We implemented network analysis, a novel technique, following a general (second-order) and specific (first-order) framework.

Results: The second-order network showed dispositional mindfulness as negatively associated with negative affect and MPA in both general and facet levels, while mindfulness in past performances was only negatively associated with negative affect. MPA was positively associated with negative affect and self-consciousness. Mindfulness displayed light or no associations with self-consciousness. The first-order network showed mindfulness facets with specific roles: Describe and acting with awareness were negatively associated with MPA components and general negative affect, while Non-Judging of Inner Experiences and ecentering in performance situations were negatively associated with negative affect in performance situations.

Conclusions: Mindfulness seems to be a relevant construct towards MPA. We propose a preliminary model to improve mindfulness research and interventions applied to music performers. We also outline limitations and future directions.

Keywords: mindfulness; music performance anxiety; self-consciousness; negative affect; network analysis

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Music performing can be a challenging, intense, and touching experience for many musicians. It requires musicians to have high levels of attention and concentration to ensure a good outcome (for a review, see Rodríguez-Carvajal & Lecuona, 2014). This heightened attention also involves being attentive on how the audience reacts, this is, their scrutiny. Therefore, this social context may result in a stressful, threatening experience, or, as it is called, Music Performance Anxiety (MPA) (Dianna T. Kenny & Osborne, 2006). MPA, also known as stage fright, consists of a disrupting group of phenomena (e.g., high physiological arousal, catastrophizing bias, or negative emotions such as fear) that can profoundly impair or even completely shatter performance careers (Kenny, 2011; Steptoe & Fidler, 1987). It appears to be higher in females, pianists (Kenny, Davis, & Oates, 2004) and also classical string performers when compared to jazz musicians (Kaspersen & Götestam, 2002). MPA can be very aversive to musicians and seems to be one major reason for young musicians to abandon their musical career (Lin, Chang, Zemon, & Midlarsky, 2008). Thus, scientific literature addresses this problem and generates theoretical frameworks to understand and prevent MPA processes. Some description in what follows.

Firstly, if we regard MPA as a specific type of social anxiety, some provisional models are applicable, like Barlow's vulnerability model (2002a) or Clark and Watson's tripartite model (1991). Barlow's model states psychological vulnerabilities as one of the primary sources to develop anxiety disorders, with three main factors: (1) The early context, which is the set of learning experiences in early development; (2) general

psychological vulnerability, which includes a large number of elements (e.g. affect, cognitive bias or personality traits) that contribute to generate these disorders; and (3) specific vulnerability, which are specific events associated with the disorder (in this case, music performance anxiety). Moreover, this etiology applies to risk factors (which increase the probability of developing MPA) but also protective factors (which decrease such probability), such as peak experiences or flow in music performing (Wrigley & Emmerson, 2011, among others).

Secondly, the tripartite model states three groups of symptoms in anxiety, but also depression: (1) Negative affect, which includes emotions such as fear or disgust and is common to anxiety and depression; (2) positive affect, which includes emotions such as enthusiasm or joy, and is key to differentiate depression from anxiety; and (3) physiological hyperarousal, which includes stress phenomena such as shortness of breath, dry mouth, trembling or dizziness, and is key to differentiate anxiety from depression. Therefore, these aspects could be regarded as relevant risk factors in MPA development. Nevertheless, given the present study is only focused on MPA, negative affect and hyperarousal were selected.

Based on these two models, the Kenny Music Performance Anxiety Inventory (K-MPAI, Chang-Arana, Kenny, & Burga-León, 2017; Dianna T Kenny, 2009; Kenny et al., 2004) developed a working model of MPA. However, despite including several essential areas of the model (e.g., early context or hyperarousal) some theoretically relevant vulnerability factors (e.g., negative affect or cognitive biases) did not end up in the final forms of the self-report. Among those cognitive biases, two of them stand out as especially relevant: (1) Attentional bias towards socially threatening information, and (2) heightened self-focused attention (Barlow, 2002b; Mogg & Bradley, 2002). These two cognitive biases are related to an increased negative affect (Mor & Winquist, 2002).

More concretely, negative situational affect in a person with MPA could produce a change in attention process where the focus is placed firstly on external tasks and secondly on the self (Osborne & Franklin, 2002). An interesting feature of these two cognitive biases is that both can be regarded as part of the construct of self-consciousness (SC) (Fenigstein, Scheier, & Buss, 1975). SC is defined as the disposition to focus the attention towards internal or external stimuli, but specifically to social aspects of the self. It divides into private (i.e., the focus on our behaviors and reactions) and public self-consciousness (i.e., the focus on our expectations and interpretations of others' reactions to our behavior). High SC seems to be a common transdiagnostic dimension to many psychological disorders (similarly to how negative affect). Findings in this field suggest that high levels of SC are positively related to maladaptive cognitive processes, such as social anxiety, negative self-evaluation and poor social performance (Lindsay & Lusia, 2008; Smith, Ingram, & Roth, 1985). These effects could be seen as a result of turning the attention inward because it would be more likely to find something to be anxious about (Fenigstein et al., 1975). Therefore, SC could be regarded as a relevant risk factor.

However, literature considers high SC as not necessarily a negative psychological feature. Indeed, high SC seems to have a maladaptive effect only with stressful contexts and absent or insufficient coping strategies (Bögels & Mansell, 2004). As an example, the same original authors of SC acknowledged attentional training (such as meditation practices) could easily achieve high SC (Fenigstein et al., 1975). This could mean that heightened attention does not necessarily risk the individual into developing MPA but preventing it as a coping skill. Thus, in a high SC context, this could lead to increase protective factors, if a performer has adequate coping skills. An example of those protective factors could be mindfulness, the underlying process of

meditation practices, which is defined as being deliberately aware of the present moment without judging the experience (Kabat-Zinn, 1990). Thus, mindfulness could change the quality of awareness present in SC, more concretely, as non-judgmental and accepting, as recent models of mindfulness suggest (Lindsay & Creswell, 2017).

This hypothetic relation is supported by preliminary results in this field, suggesting that dispositional mindfulness and its specific dimensions (e.g., acting with awareness) are associated with lower levels of MPA, supposedly giving musicians protective coping skills to face the stressful situation by gaining awareness (Farnsworth-Grodd, 2012). Moreover, preliminary evidence on meditation programs applied to musicians also suggests decreases in MPA after the intervention (Diaz, 2018; Hauffman, 2015; Lin et al., 2008), or more broad approaches such as Acceptance and Commitment Therapy (Juncos et al., 2017). Consequently, we could consider mindfulness as a protective or preventive factor for MPA maintenance and exacerbation (Kocovski, Fleming, & Rector, 2009).

In summary, negative affect and self-consciousness may increase the probability of suffering from MPA as vulnerability factors when no effective coping skills are present. However, mindfulness might be one effective coping skill and therefore stand as a protective factor. Therefore, this study aims to explore the role of (1) negative affect, (2) self-consciousness, and (3) mindfulness skills, in MPA's processes. The state-of-the-art does not count with an elaborated model on these relations, thus we adopt an exploratory outlook, where hypotheses will be broad and flexible, and the description of results is prioritized. These hypotheses are: A positive relation between MPA and negative affect, a positive relation between MPA and SC, and negative relations between mindfulness with MPA and negative affect.

Method

Participants

A total of 151 Spaniard music performers participated by completing a set of self-reports. Gender was relatively equal (45% male, 55% female), while young performers were more present (70.2% between 14 and 22 years old, 29.8% onwards). Also, conservatory-educated performers were the most frequent (76.5%), followed by private music schools/tutors (14.6%), local public music schools (7.3%) and finally amateur/self-taught (2%). Instruments varied widely, string (25.8%) and wind (22.5%) being the most frequent; piano (18.5%) as the third most frequent instrument, followed by guitar (11.9%) and voice (11.9%), and other unspecified instruments (9.3%).

Measures

Kenny-Music Performance Anxiety Inventory (K-MPAI): This instrument was developed to measure Music Performance Anxiety (Kenny, 2009; Kenny et al., 2004; validated to Spanish population by Zarza, Orejudo, Casanova, & Mazas, 2015). As a self-report measure, it consists of 26 items with a Likert response format from -3 (strongly disagree) to 3 (strongly agree). It has shown good reliability ($\alpha = 0.94$) and validity indices. The dimensional structure of the Spanish version includes three factors: (1) Psychological helplessness, characterized as depression cognitions, lack of trust or lack of control; (2) early relationship context, composed of anxiety transmitted through parental ties; and (3) Specific cognitions, composed of items regarding specific anxiety-related thoughts or concerns regarding scrutiny (for more details, see Zarza et al., 2015).

Five Facets of Mindfulness Questionnaire (FFMQ): This instrument was developed to measure mindfulness as a disposition or trait (Baer et al., 2008; validated to Spanish population by Cebolla et al., 2012). As a self-report measure, it consists of 39 items with a Likert response format from 1 (strongly disagree) to 5 (strongly agree).

The self-report has shown good reliability ($\alpha = 0.75 - 0.91$) and validity indices. The dimensional structure includes eight factors (Aguado et al., 2015), consisting in an overall mindfulness factor, two method wording factors, and five specific factors or facets: Observing (capability to observe reality as it is), Describing (capability to describe events, mainly with words), Acting with awareness or Actaware (capability to perform actions with awareness of the action itself), Non-judging of inner experience (capability to experiencing inner events without judging them), and Non-reactivity to inner experience (capability to experiencing inner events without reacting to them).

Toronto Mindfulness Scale (TMS): This instrument was developed to measure mindfulness as a state (Lau et al., 2006). As a self-report measure, it consists of 13 items with a Likert response format from 0 (not at all) to 4 (very much). The self-report has shown good reliability ($\alpha = .95$) and validity indices. The dimensional structure includes three factors (Aguado et al., 2015), consisting of an overall mindfulness factor and two facets: Curiosity (tendency to be curious towards present experiences) and Decentering (tendency to detach from present experiences). We instructed the participants that TMS applies to their past performances situations, not to the present moment. This was decided to explore mindfulness in a performance context.

Self-Consciousness Scale (SCS): This instrument was developed to measure self-consciousness as a disposition or trait (Baños, Belloch, & Perpiña, 1990; Fenigstein et al., 1975; validated to Spanish population by Ruipérez & Belloch, 2003; Scheier & Carver, 1985). As a self-report, it consists of 23 items with a Likert response format from 1 (strongly disagree) to 5 (strongly agree). It has shown good reliability ($\alpha = 0.75 - 0.84$) and validity indices. The dimensional measure includes three main factors: Private self-consciousness (being aware of internal sensations, thoughts, and emotions), Public self-consciousness (being aware of impressions and effects on other of personal image

or behaviors) and Social anxiety (feelings of anxiety due to social situations or interactions).

Positive and Negative Affect Schedule (PANAS): This instrument was developed to measure a general view of affective experiences (Crawford & Henry, 2004; validated to Spanish population by Robles & Páez, 2003; Sandín et al., 1999; Watson, Clark, & Tellegen, 1988). It consists of 20 items with a Likert response format from 1 (strongly disagree) to 5 (strongly agree). It has shown good reliability ($\alpha = 0.85 - 0.89$) and validity indices. The dimensional structure includes two factors with a state and trait form: Positive affect (e.g., joy) and Negative affect (e.g., anger or sadness). We instructed the participants that the state facets were applied to their past performances situations, not to the present situation. This was decided to explore negative affect in performance situations. As mentioned, only the negative affect dimensions were selected.

Procedure

After obtaining the approval of an ethics committee, participants were reached using a snowball sampling in two phases: (1) A group of musicians of the Orchestra of the Autonomous University of Madrid were contacted and asked for participation, and (2) they were asked to contact other musicians to participate in the study via social networks. Also, a public announcement was posted on Facebook to recruit any musician willing to participate, while current participants were asked to repost the announcement in their networks. To qualify for the study, participants needed to state clearly their musical expertise, primary instrument, and other data related to their musical studies and practice. All participants signed an informed consent of participation, stating their data as confidential and anonymous according to the Helsinki protocol. Also, it was made explicit to all participants that we will not administer any material compensation

in exchange for their participation. Finally, we instructed all participants that the state measures (two facets of the PANAS and the TMS) were applied to their past performances, not to the present situation. Measures were recorded virtually using Google Forms.

Analysis

Firstly, factor scores for all instruments were computed as the mean of their corresponding items. Descriptive statistics were calculated, and histograms were examined. Regarding overall SC, this construct has not been modeled as a latent variable in the SCS, although literature suggests its existence as an aversive form of self-attention. To assess this issue, we implemented a hierarchical latent model, using the first-order factors of the SCS (private SC, public SC, and social anxiety) as facets of a general SC factor and compared to the existing three-factor correlated model. We performed a Confirmatory Factor Analysis (CFA) in order to contrast the hierarchical model versus the three-factor model. Given the Likert response format, we considered all items as ordinal, and thus polychoric correlations with Weighted Least Squares Mean-and-Variance Adjusted estimation method (WLSMV) were chosen (Flora & Curran, 2004; Forero, Maydeu-Olivares, & Gallardo-Pujol, 2009; Proitsi, 2009). Fit measures selected to assess the models were the χ^2 test (with $p > .05$ indicating a fair fit), the χ^2/df ratio, with values below 3 indicating a fair fit, the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), the Root Mean Square Estimation Approximation and its 95% confidence interval (RMSEA), and the Weighted Root Mean Square Residual (WRMR). Both the CFI and the TLI have the criteria of values $\geq .95$ as good fit, while the RMSEA has the criteria of values below $\leq .05$ as a good fit and the WRMR with values ≈ 1 .

Afterwards, a network analysis was performed using Regularized Partial Correlation Networks (RPCNs, Epskamp, Borsboom, & Fried, 2018). RPCNs use as input the correlation matrix of a set of variables and use methods of partializing and regularizing said correlations to remove common variability among them. Given that all our variables were continuous, the estimation method was the Extended Bayesian Inference Criterion (EBIC) with graphical Least Absolute Shrinkage and Selection Operator (gLASSO) regularization (Epskamp & Fried, 2018). Also, some variables reported normality issues, thus the non-paranormal transformation method was chosen as the correlation method. We produced two networks: One with the first-order factors of the questionnaires, and other with the second-order factors (or the first-order if not applicable). A sparsity index was calculated as the proportion of non-zero edges, which is expected to present medium-to-high values in stable networks (e.g., 0.40 to 0.60). Correlations (or 'weights'), centrality, and clustering measures, were obtained. Centrality is defined as the tendency of a variable to be interconnected to other variables in the network, and is composed of three measures: degree, or the numerical amount of correlations with other variables; closeness, or the number of variables associated with a certain variable; and betweenness, or the number of variables interconnected by a certain variable. Clustering is defined as the tendency of a variable to be associated closely with a group of variables, measured with a series of estimators. All networks were bootstrapped with non-parametric implementation and 5,000 samples. Descriptive and network analysis were computed with the JASP software (<http://jasp-stats.org/>). Confirmatory factor analysis was computed with the *lavaan* package (Rosseel, 2012) of the R environment (R Development Core Team, 2010). Data and scripts are available at the Open Science Framework (<https://osf.io/rvgb2/>).

Results

Descriptive statistics are present in Table 1. Medium levels on average were present in almost all variables with acceptable dispersion levels. Skewness and kurtosis statistics with histograms revealed somewhat normal distributions for most variables except for social anxiety (SCS) and all KMPAI dimensions except for early contexts and specific cognitions (skewness or kurtosis indices > 1 or a non-normal histogram). Therefore, robust techniques were applied in subsequent analyses.

(Table 1 goes here)

Confirmatory Factor Analysis – Self-Consciousness Scale

The three-correlated factor model did not report good enough fit indices ($\chi^2(226) = 585.703^{***}$, $\chi^2/df = 2.580$, CFI = .938, TLI = .931, RMSEA = .103, 90% CI = [.092 ; .113], WRMR = 1.260), although could not be compared to the hierarchical model due to problems of convergence. Therefore, a modification index was included. This is, an error covariance between items 17 (“One of the last things I do before leave my house is look in the mirror”) and 21 (“I’m usually aware of my appearance”), which can be explained as referring specifically to physical appearance. With this covariance included, the three factor model still reported bad fit ($\chi^2(225) = 545.006^{***}$, $\chi^2/df = 2.411$, CFI = .945, TLI = .939, RMSEA = .097, 90% CI = [.087 ; .107], WRMR = 1.204). However, this one was able for comparison with the hierarchical model, which showed better fit ($\chi^2(226) = 548.351^{***}$, $\chi^2/df = 2.426$, CFI = .978, TLI = .975, RMSEA = .098, 90% CI = [.087;.108], WRMR = 1.211). As a conclusion, the hierarchical model seems to be supported in this sample. Following this conclusion, the mean of all the SCS items was used as the second-order factor (general self-consciousness) estimate in the structural model.

Network Analysis

The second-order factor network (Figure 1) produced a low sparsity (0.33), which is expectable due to the low number of variables involved. Attending to the network in detail, mindfulness scores were positively associated between them and negatively associated with the rest of the variables except for the SCS (the TMS was negatively associated only with the negative performance affect). In addition, both performance and negative dispositional affect were associated with KMPAI, especially the dispositional dimension. Finally, the SCS was positively associated with the KMPAI but negatively associated with negative performance affect.

(Figure 1 goes here)

Attending to centrality (Figure 2), the KMPAI was the most central of the network except for closeness, which was the second-highest. Apart from that, the FFMQ is the second-highest in degree (possibly caused by being associated with almost all dimensions and a strong association with TMS). The highest score in closeness is for dispositional negative affect, which indicates that it is the most generally proximate dimension of the network. Finally, the second-highest score in betweenness is for the FFMQ, which indicates that it connects a great deal of the dimensions of the network. Attending to clustering (Figure 2), the TMS seems to be the most clustered dimension, while performance negative affect is the lesser, although is the highest with the Zhang estimator, followed by the TMS and FFMQ.

(Figure 2 goes here)

The first-order facet network (Figure 3) produced a medium sparsity (.561) which is interpretable as a good signal for the network stability. As shown in the network plot (Figure 3), several associations were encountered that expand the findings of the second-order network: The facets tended to be grouped instrument-wise, except for the observe facet of the FFMQ, displaying stronger connections with curiosity

(TMS) and with private and public SC. A curious outcome is that dispositional negative affect is connected to all the KMPAI's facets, therefore plotted as the central variable. Meanwhile, all SC facets correlated positively with only the depression facet of the KMPAI, while specific anxiety cognitions were only connected with social anxiety. Regarding mindfulness facets, only actaware and describe were associated with KMPAI's facets (uncontrollability and early contexts, respectively), but other facets were associated with facets positively associated with KMPAI's ones. Concretely, non-judge is negatively associated with negative affect at a performance level; describe is also negatively associated with dispositional negative affect; observe is negatively associated with both public and private SC; curiosity (TMS, at a performance level) is negatively associated with private SC; and decentering (TMS, also at a performance level) is associated with negative affect at a performance level. Therefore, the network could be seen with one sector (the mindfulness-related one) grouping all the mindfulness measures in the shape of a half-circle, a second sector (the MPA/negative affect one) grouping all the KMPAI and negative PANAS dimensions, and a third sector (the SC one) with the dimensions of the SCS. The connections between these sectors are the depression facet of MPA (heavily interconnected with the SCS dimensions), performance negative affect (connected with non-judge and decentering), uncontrollability (connected with Actaware) and describe (connected with dispositional negative affect and contexts of anxiety development).

(Figure 3 goes here)

Regarding centrality measures (Figure 4), negative dispositional affect seems to be the most central overall, only topped by private and public SC and decentering in degree level. The first two could be explained by their strong paired connection. However, decentering could be a somewhat central dimension regarding mindfulness,

due to the majority of its connections is with FFMQ or TMS dimensions. Regarding closeness, uncontrollability and performance negative affect come as the second and third highest scores. This could reflect their state as mediators between MPA and mindfulness dimensions. Regarding betweenness, non-judge and decentering show the second and third highest scores, which could reflect their interconnectedness regarding other mindfulness measures, and connecting with the MPA/negative affect sector of the network. Regarding the clustering measures, dispositional negative affect, non-judging, and uncontrollability seem to be the most clustered variables, while social anxiety appears as the most clustered by far on only the Zhang estimation method.

(Figure 4 goes here)

Discussion

The present study was designed to explore the role of three variables (self-consciousness, negative affect, and mindfulness) in the development and maintenance of MPA. This led to our exploratory hypothesis. The second-order network confirmed our hypothesis of a positive relation between MPA and SC and its facets. These results, translated to the first-order network, indicates that SC was associated mainly with the depression facet of MPA (which was already observed by Smith & Greenberg, 1981). This unexpected behavior modifies to some extent the previous conclusion about the association between MPA and SC, as SC seems only to associate towards a proximate but different construct of MPA.

Network analysis also confirmed the hypothesis of a negative relation between mindfulness and its facets with MPA and negative affect, which replicates previous research (Stephoe, 2001). Regarding the first-order network, the facets related to MPA (acting with awareness and describing the present) related inversely only to the uncontrollability and early contexts of anxiety development. While the first inverse

relationship between said facets and MPA could be theoretically sound (mindfulness increasing the self-efficacy and control perception), the second stands as a more complex scenario. One possible explanation could be of specific caretaker styles that stimulated mindfulness skills, but more research is needed to explore the said relation. Attending to the facets that related to negative affect (non-judging and describing), this could show a profile of facets regarding how music performers damper their negative affect (in this case, labeling said emotions as baseline behavior, and viewing them as neither good nor bad when performing). An interesting and unexpected finding was that dispositional negative affect is the most central variable in the first-order network, accompanied by SC and decentering. Hence, it seems that in a more concrete set of variables, negative affect, SC, and capacity of decentering in performance situations can be the most predictive variables towards MPA.

However, the relation between SC and mindfulness seems to be non-significant, although they can be indirectly connected by other variables. This outcome could lead to hypothesize more complex relations, like moderation effects of mindfulness between SC and MPA, or SC and negative affect. Regarding the first-order network, the observe facet related inversely with both public and private SC. This outcome slightly modifies the previous conclusion of the second-order network. Moreover, this outcome could be interpreted as follows: the tendency to be attentive is somewhat not compatible with being self-conscious at that moment, so it could be used as a skill to decrease SC.

As a more general note, the second-order network put MPA variables as the most central, which confirms how all these proposed variables of interest are relevant to understanding MPA. It also points out how mindfulness is a relevant variable towards MPA, as it stands as the second most central variable in the network. These conclusions seem to replicate in the first-order network. Consequently, mindfulness seems to be one

of the most present aspects regarding MPA, and therefore, mindfulness-based interventions could make a meaningful impact on performers stage fright, as some studies point out (Chang, Midlarsky, & Lin, 2003; Lin et al., 2008). Highlighting other practical implications, assessment of emotional distress (this is, negative affect) and self-consciousness levels could lead to detect and prevent MPA development or exacerbation. However, given the exploratory nature of this study, more robust confirmatory research needs to take place and build a robust model in order to generate scalable recommendations.

Limitations

The most significant limitation of the study is using self-report instruments with Likert response format. Thus, the impossibility of comparison between methods hinders the power of our conclusions. Another limitation is regarding some instruments, which showed psychometric ambiguities, especially the K-MPAI, showing variations of structure and properties across validations. The sample could show some representativeness issues, more concretely in age (majority of youngsters). Also, the design was exploratory, which needs confirmatory studies and theoretical model-building for further progress; in addition, our exploratory outlook risks to make overfitted interpretations of the obtained data, and therefore, decreasing replicability. Finally, as music performance quality was not measured; about this issue, interesting hypothesis present in literature could not be explored.

Future research

Future research should focus on exploring in a deeper way the encountered relationships. One example could be the early contexts of anxiety development leading to mindfulness skills (with parental styles as a possible explanation). Another possibility

could be on how self-consciousness relates to mindfulness theoretically and empirically, and if possible complex interactions (e.g., moderation effects) take place in MPA development. Structural equation modeling could be applied to study these hypotheses. Future studies should implement behavioral measures in order to expand these results, for example, on how mindfulness can relate to MPA in a real-world situation. Also, future studies could test how these results interact with music performance quality and search for robust outcomes. Finally, considering the recent replication issues (see Munafò et al., 2017, for a review), replication studies should be performed in order to confirm these results.

Conclusions

This study aimed to find associations between mindfulness, music performance anxiety, and other relevant constructs, such as negative affect and self-consciousness using an exploratory outlook. To the authors' knowledge, this is the first study to implement network analysis as a novel technique in the field. Results show that negative affect and self-consciousness are positively related to music performance anxiety, while mindfulness is negatively related to all of them. Facet-wise, describe and acting with awareness seem to relate negatively with MPA and general negative affect, while non-judging of inner experience and decentering in performance situations seem to relate negatively with negative affect in performance situations. Therefore, the assessment of mindfulness, self-consciousness and emotional distress could help to target potential cases of MPA, and mindfulness-based interventions could prevent its development.

Ethical Approval

Ethical approval for this project was given by the Research Ethics Committee of the Autonomous University of Madrid, Spain [CEI-48-920].

Funding

The author(s) received no financial support for the research, authorship, or publication of this article.

Conflict of Interest

The authors declare no conflict of interest between the authors of this article.

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Table 1. Descriptive statistics of the study variables (N=151).

Variables	Mean	Median	Std. Deviation	Skewness (SE = .197)	Kurtosis (SE = .392)
SCS	3.271	3.031	0.694	0.929	-0.173
Private SC	3.351	3.100	0.811	0.764	-0.243
Public SC	3.336	3.140	0.756	0.768	-0.009
Social Anxiety	3.063	2.878	0.707	1.346	1.787
KMPAI	3.251	3.192	0.496	1.325	4.13
Depression	2.877	2.500	1.077	1.398	1.771
Uncontrollability	2.973	3.000	0.731	1.107	3.75
Early contexts	3.114	3.000	0.800	0.586	0.943
Specific cognitions	3.501	3.455	0.598	0.197	2.40
PANAS – NAS	2.599	2.800	0.750	-0.486	-0.627
PANAS – NAT	2.18	2.000	0.811	0.846	0.303
TMS	2.71	2.692	0.608	0.392	0.761
Curiosity	2.694	2.667	0.717	0.076	-0.018
Decentering	2.714	2.714	0.685	0.465	0.400
FFMQ	2.895	2.897	0.387	-0.315	0.066
Observe	2.647	2.571	0.682	0.388	-0.113
Describe	2.921	3.000	0.671	-0.122	0.218
Actaware	3.149	3.250	0.652	-0.289	-0.219
Non-Judge	2.703	2.667	0.631	0.601	0.112
Non-React	2.934	3.000	0.705	-0.251	-0.373

Note SC = Self-Consciousness; NAS = Negative Affect State; NAT = Negative Affect Trait.

Figure 1: Network for the second-order factors

Blue lines = positive correlations, red lines = negative correlations. The intensity of the lines is determined by the strength of the correlation, starting with the maximum of the whole network (.39). Variables are (clockwise): TMS = Toronto Mindfulness Scale; FFMQ = Five Facets of Mindfulness Questionnaire; SC = Self-Consciousness Scale; KMPAI = Kenny Music Performance Anxiety Inventory; NAT = Negative Affect Trait (PANAS); NAS = Negative Affect State.

Figure 2: Centrality and clustering measures for the second-order factor network.

TMS = Toronto Mindfulness Scale; FFMQ = Five Facets of Mindfulness Questionnaire;
SC = Self-Consciousness Scale; KMPAI = Kenny Music Performance Anxiety
Inventory; NAT = Negative Affect Trait (PANAS); NAS = Negative Affect State.

Figure 3: Network for the first-order factors

Blue lines = positive correlations, red lines = negative correlations. The intensity of the lines is determined by the strength of the correlation, starting with the maximum of the whole network (.57). Variables are (instrument-wise): PrSC = Private Self-Consciousness; PuSC = Public Self-Consciousness; Sanx = Social Anxiety; HLDepr = Hopelessness-Depression; HLUnc = Hopelessness-Uncontrollability; Contexts = Early Contexts of Anxiety Development; Cogn = Specific Cognitions; NAS = Negative Affect State; NAT = Negative Affect Trait; Obs = Observe; Des = Describe; Act = Actaware; NoJ = Non-Judge; NoR = Non-React; Cur = Curiosity; Desc = Decentering.

Figure 4: Centrality and clustering measures for the second-order factor network.

PrSC = Private Self-Consciousness; PuSC = Public Self-Consciousness; Sanx = Social Anxiety; HLDepr = Hopelessness-Depression; HLUnc = Hopelessness-Uncontrollability; Contexts = Early Contexts of Anxiety Development; Cogn = Specific Cognitions; NAS = Negative Affect State; NAT = Negative Affect Trait; Obs =

Observe; Des = Describe; Act = Actaware; NoJ = Non-Judge; NoR = Non-React; Cur = Curiosity; Desc = Decentering.