

Anxiety and perceived performance in athletes and musicians: Revisiting Martens

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Abstract

The relationship between anxiety and performance in athletes and musicians has been studied for some time. In the present study, 132 participants from the football ($n = 100$) and musical ($n = 32$) areas participated and had an average age of 20,49 years ($SD = 6,62$) and an average of 11,29 ($SD = 4,5$) years of experience in their respective fields. The analysis have shown that there are no correlations between performance and anxiety experienced, although there are differences in the perception of anxiety between musicians and athletes, since musicians have obtained higher scores in the component of somatic anxiety.

Keywords: Anxiety; Performance; Sports; Music

An unresolved issue in the field of performance psychology, and more specifically in the sports field, is the possible relationship between psychomotor performance and the anxiety suffered by people who perform the actions. From a psychological perspective, it has been tried repeatedly to demonstrate the existence of this relationship, with respect to various variables and psychological states (Sánchez, González, Ruiz, San Juan, Abando, Nicolás and García, 2001) without obtaining conclusive data.

Focusing in the sport, Martin (2001), as an example, defines sports performance as the result of a sport activity, according to previously established rules. However, this definition does not cover the complexity of the concept, which has tried to be defined and operationalized repeatedly. Also, recently there has been presented a “Great Unified Theory of Sport Performance” (GUT) that attempts to combine the definitions of performance coming from different sports sciences regarding the concept of “degrees of freedom” (Glazier, 2015), but has not reached consensus and has received numerous criticisms (Cardinale, 2017).

In part, this difficulty in operationalizing performance is given by its own ambiguity, since it can be understood either as a process or as a result. Also, it can be interpreted either by the practitioner (Self-perceived) or by agents external to them (Others-perceived), such as the coach or the public (Bohórquez, Delgado and Fernández, 2017). Finally, adding more complexity to the concept, psychomotor performance has to be framed in a specific context, e.g., sports practice or musical interpretations, which will also be determined by the tasks that must be performed in each situation.

Going in parallel, the concept of anxiety associated with performance has been evolving, but although it has never

been unified, it does seem that recently it has consolidated as a multidimensional construct with several facets.

From the general and abstract concept of arousal, which alluded to a state of activation of the organism, it has evolved from a conception based on the anxiety's degree of stability and persistence, consequently differentiating between anxiety emergent from the situation (state) and the anxiety as part of the temperament of the person (trait) (Spielberger, 1966), until arriving at models in which both sources are combined (Martens, 1990), such as the one proposed by Smith and Smoll (2004), in which they described the performance (competitive) anxiety as formed of three components; somatic, worry for the performance and concentration disruption. The somatic component refers to the subjective experiences of physical changes, such as sweating, tachycardia or muscle rigidity, while the cognitive component refers both to thoughts of concern and worry about their own performance, and to the difficulty in focusing attention on the task at hand.

In this sense, one of the classic works and most cited in the field of study of the relationships between anxiety and performance is the pioneer study from Simon and Martens (1979). In this work it is revealed how in different fields such as musical interpretation, sports or school exams, high levels of state anxiety can occur in competitive situations (exams, competitions, or concerts), although not was related to performance in any case.

The results of the study indicate that the group of non-required non-sport activities presented the highest average levels of anxiety, due, in part, to the fact that the activity band solo was the activity with the highest average level of anxiety of all the activities.

Secondly, the highest average levels of anxiety were found in the group of non-school competitive sports. In

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this group wrestling was the activity with the highest levels of anxiety, while soccer was the one with the lowest levels of anxiety.

Finally, the group with lower average levels of anxiety was the group of required school activities, with the physical education class competition activity having the lowest anxiety levels of all the activities evaluated.

In a review of this classic work of Simon and Martens (1979), carried out by Ramis, Torregrossa and Cruz (2013), levels of anxiety in sports or non-sporting activities (Castellers) are analyzed, taking into account, if required open or closed skills (Knapp, 1963), and whether they are individual or collective activities.

In conclusion, participants in sports activities that require habitual or closed skills have higher levels of somatic anxiety than those who participate in sports that require perceptive or open skills. In addition, those who participate in individual activities have higher levels of anxiety in the variable concern and deconcentration, ahead of those who participate in collective activities.

Finally, there are no significant differences in the levels of somatic anxiety between organized sports and non-sporting activities, but the levels of deconcentration and concern are lower in non-sporting activities (castellers). These results bear similarities with those found in the original work of Simon and Martens (1979).

However, they clearly shown that the performance of the athlete or musician during practices and rehearsals are not subject to the same constraints as the performance manifested during the competition or the musical interpretation.

Performance anxiety in a musical context, is known as Music performance anxiety (MPA).

MPA is a situational manifestation of social anxiety, characterized by fear of failure, fear of social disapproval, and irrational and self-defeating thought patterns in a musical context (Osborne and Franklin, 2002).

In the music research literature, MPA is commonly viewed as a constellation of three factors: cognitions, arousal and behavioural responses (Craske and Craig, 1984).

In the musical field there is no agreement on the role played by MPA. Authors such as Zinn, McCain and Zinn (2000), argue that MPA is at first a psychophysiological event in which the autonomic nervous system (ANS) initiates and maintains anxiety. On the contrary, Kirchner (2003) affirms that the symptomatology of the MPA is activated by the perception of threat and not by the SNA.

Some studies suggest that women are more likely to experience MPA more frequently and more intensely than men (Osborne and Franklin, 2002). This relationship is more complex in children (Ryan, 2003) although the presence of MPA in children has already been identified by Simon and Martens (1979).

Recently, it has been seen that the symptomatology of MPA in children is the same as in adult musicians, and that it correlates negatively with self-esteem or with the quality of performance (Ryan, 1998, 2004).

In a recent work it has become clear that musicians who report a low musical performance, refer to high levels of MPA and secondly that negative thoughts are better predictors of MPA in adolescents than the somatic and emotional components. (Osborne and Kenny, 2005b).

In a review of the literature on MPA carried out by Ortiz (2011a, 2011b), it is suggested that musical performance in children generates more anxiety than in other tasks, that the MPA experience in musicians is common and that the levels of Anxiety varies depending on the musical instrument.

Trying to explain the relationship between performance and anxiety in any field, different theoretical models have been proposed. One of the most important is the classic "U" inverted Yerkes-Dodson Law (Yerkes and Dodson, 1908), which relates the level of bodily activation or arousal with the performance in a given task.

In a posterior development and sophistication of this theoretical line, the theory of Individual Zones of Optimal functioning (IZOF, Hanin, 1997), indicates that this optimal point can be found anywhere within the continuum of anxiety, without optimal normative zone. Indeed, each person would possess his or her own optimal performance zone for each given task. Nowadays, one of the most powerful models is derived from the CAPS theory (Mischel and Shoda, 1995). This model focuses on the person's across-situational stability regarding the tasks to be performed and the activation needed, and that has resulted in the three-dimensional model of performance anxiety cited above (Smith, Smoll, Cumming and Grossbard, 2006).

But when we look for evidence about the relationship between anxiety and performance, the results obtained in the numerous studies carried out are at least inconclusive, and, in some cases, even contradictory (Abenza, Alarcón, Leite, Ureña and Piñar, 2009; Raglin and Turner, 1993; Thelwell and Maynard, 1998). In any case, surely the lack of clarity and accuracy in the definition of the performance contributes to this lack of consistency in these results. However, it has been possible to demonstrate that one of the cognitive components of anxiety (concentration disruption) does in part determine the performance objectively measured in swimmers (Ponseti, Sesé and García-Mas, 2016), as well as the self-perceived performance in chess players (García-Mas, Núñez, Ponseti and Lara, 2017), while the other two factors -somatic and worry- did not show a negative impact on performance.

In the same vein, and regarding the somatic factor of anxiety, in a recent study on combat helicopter pilots it became clear that this kind of anxiety (evaluated by measuring the salivary cortisol) decreased from the baseline towards the end of the task, which contradicted the subjective perception that the pilots had previously, according to which the higher the perceived work load, the more anxiety have to appear. On the contrary, the results shown that the correlation was negative between work load and somatic anxiety (García-Mas, Ortega, Ponseti, De Teresa and Cárdenas, 2016), putting in some way into

question the popular belief about the always negative impact that competitive anxiety has on psychomotor tasks.

Therefore, we can assume that this relationship is not simple or direct, and that it is also mediated by the coping strategies of perceived anxiety and the use that athletes make of them (Pons, Ramis, Garcia-Mas, López de la Llave and Pérez-Llantada, 2016; Pons, Viladrich, Ramis and Polman, 2018; Ponseti, Garcia-Mas, Cantallops and Vidal, 2017; Romero, Zapata, Garcia-Mas, Brustad, Garrido and Letelier, 2010), and even is also partly dependent on the motivational climate generated within the teams of performance and its associated anxiety (Smith, Smoll and Cummins, 2007).

Finally, and as a summary of the theoretical argumentation about this issue, in a recent systematic review (Núñez and García-Mas, 2017) it became clear that there is not enough evidence to accept any of the predominant theoretical models, regarding the supposed relationship between anxiety and performance (in both detrimental and incremental ways), or at least to determine the weight that competitive anxiety exerts on performance.

Thus, considering all these rationale, the aim of this study is to analyze levels of anxiety in two fields that have certain similarities, such are the musical interpretation and the sports practice -since both have a psychomotor component and were performed with present public- and also study if the associated anxiety is related to the musicians and athletes' self and others-perceived performance, and objective results.

Method

Participants

A non-probability convenience sampling was carried out to obtain the sample. The authors contacted the Professional Conservatory of Music and Dance of the island of Majorca (Spain) and the direction of the Sports Association Son Sardina (Majorca, Spain), to obtain the sample of musicians and footballers, respectively.

The sample for the present study consists of 132 subjects from the football ($N = 100$) and musical ($n = 32$) areas who had an *average age* of 20,49 years ($SD = 6,62$) and an *average* of 11,35($SD=5,05$) years of experience in their respective fields of action. The distribution of the sample is 50% male and 50% female.

The sample of football players ($n=100$) had an *average age* of 18,81 ($SD=7,10$) and an *average* of 10,28 ($SD=5,28$) years of experience. In the other hand the sample of musicians ($n=32$) had an *average age* of 22,73 ($SD= 5,40$) and an *average* of 14,24 ($SD=2,83$) years of experience.

Measures

A battery of questionnaires formed by the following instruments was carried out to evaluate the anxiety associated with performance, and the performance

perceived by athletes and musicians. In addition, additional information was requested such as age, sex, years of experience, the position occupied in the team or the instrument played in the orchestra.

Competitive anxiety in sport was measured using the Spanish-language adaptation (*Escala de Ansiedad Competitiva*, SAS-2, Ramis, Torregrosa, Viladrich and Cruz, 2010) of the *Sport Anxiety Scale 2* (SAS-2) (Smith, Smoll, Cumming and Grossbard, 2006; Ramis, Viladrich, Sousa and Jannes, 2015). The SAS-2 consists of three 5-item scales to measure three factors: somatic anxiety, worry, and impaired concentration. Each item was answered on a Likert 4-point scale with a range between "nothing" and "a lot". The reliability (Cronbach's *alpha*) of the SAS-2 subscales was: .84, .88, and .82, respectively. These results exhibit acceptable internal consistency at both the total score and subscale levels, and its reliability is quite similar to that found for both the original SAS-2 (Smith et al., 2006): .84, .89, .84. This questionnaire was adapted for the musicians population, specifying "audition" in the necessary items, e.g. "Before or during the competition, or the audition..."

Questionnaire created ad hoc, based on the *Others and Self-perceived Performance Scale* (Bohórquez, Delgado and Fernández, 2017). It allows evaluating how the subject perceives his performance within his team or group, and how he perceives the performance of his own sports team members. It consists of three-response options; High, Medium and Low performance.

To the items proposed by Bohórquez Et al., in their *Others and Self-perceived Performance Scale*, (R1 = Perceived performance of your teammates, R2 = Self-perceived performance related your teammates) we have added two more items following the general recommendations made up by Leo et al. (2013). The first one is referred as Objective Result (R3), alluding to the last result that the athlete/musician had obtained, in their respective competitions/auditions. This item is made of an open response, to be classified for analysis into three results: *Victory/Great* (1), *Defeat/Bad* (-1) or *Draw/Not relevant* (0). It should be noted that this item is intended to analyse whether the result has been positive or negative in an objective manner, taking into account the difficulties that this entails for its interpretation, especially in the musical field, since unlike in sport it does not there is an objective result or a purely numerical score that allows to determine such categories. The answers' classification has been made up by a group of three experts Sport Psychologists.

The second new item added (R4) refers to the subjective perception that the subject has of his performance in his/her last competition/audition in which he/she participated. In this item, the answers are: *Expected outcome* (0); *better than expected* (1), or *worse than expected* (-1).

Procedure

Once the entities had been contacted, the object of the investigation and the questionnaires we wanted to use

with the athletes and musicians were explained to them, obtaining their approval for the study. The participants were invited to participate voluntarily, providing all of them an informed consent according to the protocols of the Helsinki Rules for scientific studies.

The time of information gathering was, in the case of musicians during the week prior to a public concert, and, in the case of athletes, was made during the week prior to a competition match. Both situations were considered as of medium difficulty by both the coach and the conductor of the orchestra.

Data Analysis

Descriptive univariate analysis and normality tests were estimated for all variables of the study in order to check statistical assumptions. For the treatment of missing or missing data, it was decided to carry out a simple imputation based on the substitution of these by the average score of the participant in this sub-scale. The number of lost values did not exceed 5% of the total data points, so this imputation should not have consequences on the analyses carried out (Graham, 2009). A multivariate analysis of co-variances (MANCOVA) with the three subscales of the SAS-2 as dependent variables, sex and activity fields as independent variables, and experience as a covariate was implemented. In case of the Box test was significant, multivariate

contrasts (Wilk's λ) have to be estimated. Levene's test for contrasting homoscedasticity about between-subjects variables was applied. Both post-hoc comparisons and Mann-Whitney U non-parametric tests were applied to test differences among the means of the three types of anxiety and the two fields: musicians and football players. Finally, Spearman's non-parametric correlation matrix among the factors of anxiety and performance measures was estimated. All statistical analyses were performed using the statistical program SPSS v 22.

Results

When the descriptive data of the total sample and of the two sub-samples are studied, we can observe (Table 1) that the levels of anxiety are in low-medium values and that the most relevant factor is the worry for performance, being the other two factors in similar and smaller values.

Furthermore, we can observe at the same table, that the values of self or other perceived performance are more bigger than the other two factors (Objective last outcome and Perceived last outcome), despite, the most relevant factor is the Other perceived performance at the total sample. Finally, the values of years of experience are similar and smaller values.

Table 1.

Correlations between anxiety, perceived performance, experience, and the total simple group and two sub-groups

	Football-Music X (DS) (N = 132)	Football X (DS) (n = 100)	Music X (DS) (n = 32)
Anxiety Factors			
Somatic	1,71 (0,65)	1,52 (0,46)	2,29 (0,82)
Worry	2,82 (0,80)	2,81 (0,08)	2,9 (0,83)
Concentration Disruption	1,61 (0,55)	1,57 (0,48)	1,73 (0,73)
Perceived Performance			
Other-Perceived	3,35 (0,55)	2,42 (0,55)	2,13 (0,49)
Self-perceived	2,29 (0,58)	2,28 (0,60)	2,32 (0,53)
Objective last outcome	1,20 (0,54)	1,25 (0,60)	1,06 (0,24)
Perceived last outcome	1,81(0,68)	1,74(0,69)	2,03(0,64)
Experience	11,29 (4,5)	10,44 (4,67)	13,94 (2,86)

To start the MANCOVA analysis, the Box's test was significant, which leads us to perform multivariate contrasts to analyze if the factors generate significant differences. Multivariate contrasts (Wilk's λ) showed that only the Field of Action (FoA: football players vs. musicians) was statistically significant ($p < .001$) with an *Partial squared Eta* of 0,233, that is, that the 23.3% of the variability

of the scores across the three levels of anxiety are due to the variable Field of action (FoA). Multivariate contrasts also showed that the interaction FoA x Sex was non-significant ($p = .08$), and also the effect of the years of experience as covariate ($p = .38$). The results obtained with MANCOVA in relation with FoA, shows that, the somatic anxiety has obtained $F(1, 31,27)$, $p = .00$; worry about performance

anxiety $F(1, 0,00)$, $p = .973$, and deconcentration disruption $F(1, 0,58)$, $p = .446$. MANCOVA results converged with the multivariate contrasts tests about the statistical significance of only Somatic anxiety subscale ($p < .001$; $Eta^2 = .198$). Both parametric post-hoc comparisons and Mann-Whitney U non-parametric tests supported that the differences found between soccer players and musicians only occur in Somatic anxiety ($Z = -5,156$; $p < .001$).

Also, we find that the anxiety factors don't correlate with performance. In order to study the eventual relationships among the studied variables, we have performed a Pearson canonical analysis. After that was done, we obtained positive values between perceived performance and the anxiety factors, but aren't significant in any case. The values of correlations are moving between .14 (Objective Last Outcome at Total Sample) and .98 (Perceived last outcome at Total sample). Indeed, any of the three anxiety factors (Worry, Concentration disruption and Somatic) correlates with any of four types of performance analysed (R1 = Perceived performance of your teammates; R2 = Self-perceived performance related your teammates; R3 = Objective last performance, and R4 = Perceived last performance). This result is obtained the same when considering the total sample and with the two sub-samples of football players and musicians.

It's important to highlight the showed correlation between somatic anxiety and R3 (Objective last Outcome) at the total sample have a value of .14; and that the correlation between R4 (Perceived last outcome) and the anxiety factor of concentration disruption at the musicians sample was .16, because are stronger correlations, although they are not significant.

Discussion

The results obtained in our study show that there is no significant relationship between anxiety and performance (in any of its forms) in both situations (musical interpretation and sport practice) when anxiety is evaluated and theoretically understood in a complex and three-dimensional way. These results go against the "traditional" line of research in this field (García Mas, Fuster, Ponseti, Palou, Olmedilla and Cruz, 2015; González-Campos, Valdivia-Moral, Zagalaz and Romero, 2015; Scanlan, Babkes and Scanlan, 2005), which argues that the competitive associated anxiety negatively affects the athlete's performance, but align with other studies that provide a more global view of anxiety.

These studies emphasize that beyond the direct impact of anxiety, whether positive (Cervelló, Santos-Rosa Jiménez, Nerea and García, 2002), neutral or negative, the most relevant is the appraisal that the athletes make of the anxiety clues they perceive (Brooks, 2014; Garcia-Mas et al., 2017; Gardner, Vella and Magee, 2015; Pons et al., 2018), even taking into account the personal disposition of the athletes (Dias, Cruz and Fonseca, 2012; Ries, Castañeda, Campos and Del Castillo, 2012).

In addition, in an earlier study by some of the authors it was evidenced the difficulty of obtaining reliable and valid data of the possible relationships between the competitive anxiety and performance (Núñez et al., 2017), finding several cases in those this link between both concepts is confuse and even contradictory (Ponseti et al., 2016; Raglin and Turner, 1993; Thelwell and Maynard, 1998). This could be due -in part- to the heterogeneity and fuzzy description of the concept "performance", despite recent attempts -such as the generation of a Unified Theory (Glazier, 2015) - that have not been very successful (Cardinale, 2017). In this study we have opted for a combination of different sources of performance evaluation, (objective, and self and others-perceived, Bohórquez et al., 2017), due to the great difficulties of operationalizing individual performance observed in team players (Leo et al., 2013), and also in orchestra musicians (Ribot et al., in preparation).

As for the findings directly related to anxiety, differences have been found between the components of the orchestra and the players of the soccer teams, just with respect to the somatic factor of the anxiety, coinciding with the results of Simon and Martens (1979). The values of anxiety are significantly higher in the musicians than in the athletes group, in the same way as this classical work of Simon and Martens (1979). In this same vein, in a study on workload and physiological activation measured with cortisol levels (García-Mas et al., 2017) it was found that the two concepts had opposite values, both at the beginning and at the end of the tasks performed in the flight simulator. In addition, it seems that the observers' perceptions are relevant to award pilots, in this case, the label "nervous", being the body component of anxiety the most relevant in many cases. This point has not been adequately studied until now, but should be a focus of interest to know the effects of feedback between the anxiety perceived by the subject and that perceived by an observer.

That is, if we look beyond these findings regarding the levels and factors of anxiety observed by musicians and football players, the results have shown the absence of a general or specific relationship between the performance of both samples and the multidimensional anxiety.

If we consider them globally, we can say that more attention should be paid to other collectives who have their performance self and others-evaluated too, especially regarding the inferences that observers (and themselves) can make of the somatic changes associated with Performance anxiety. Moreover, these results should be contrasted and generalized to the maximum possible extent to try to show to observers, coaches, orchestra directors, managers and even the subjects themselves, that their perception of the detrimental effect of the anxiety (especially the somatic component) upon the subject's performance is not always right and the "hardness" of this belief must be reconsidered. For example, we can show the effect of a reappraisal to understand the somatic changes traditionally associated with anxiety and fear, as some bodily components of

“excitement” through a relatively simple psychological intervention (Brooks, 2014).

The limitations of a cross-sectional study imply that causal inferences from the obtained results cannot be carried out. Although an attempt has been made to compare two very homogeneous groups -all the musicians’ in the same orchestra and all the players of the different teams of the same club- it is evident that the samples are different in number and that, as a whole, the sample size could be increased. Moreover, the variability of the factor “years of experience” was too narrow, and it could be a limitation, because it’s possible that the years of experience influence to the anxiety perception and on the performance, in any way. Furthermore, although SAS-2 has good conceptual and psychometric validity characteristics, it would be

interesting to find out more about the meaning of its subscales, especially of the somatic and worry ones.

Finally, this study suggests that the anxiety associated with performance does not have the maximum expression in the sports situation, as Martens (1990) had already shown pretty early. On the contrary, the anxiety associated with musical performance is the one that obtains the highest values. Likewise, and from a practical point of view, the absence of a relationship between performance (taken as a whole) and anxiety opens the door to rethinking the training in applied psychological interventions in athletes and other people in situations of performance such the application of activation-relaxation techniques-; the training in coping strategies, or when evaluating the perception of somatic symptoms of anxiety by significant observers.

Ansiedad y rendimiento percibido en atletas y músicos: Revisitando Martas

Resumen

La relación entre ansiedad y rendimiento en deportistas y músicos, se ha venido estudiando desde tiempo atrás. En el presente estudio han participado 132 participantes de los ámbitos futbolístico ($n = 100$) y musical ($n = 32$) que contaban con una M edad de 20,49 años ($DE = 6,62$) y una media de 11,29 ($SD = 4,5$) años de experiencia en sus respectivos campos de actuación. Los resultados han puesto de manifiesto que no hay correlaciones entre el rendimiento y la ansiedad experimentada, aunque existen diferencias en la percepción de la ansiedad entre músicos y deportistas, ya que los músicos han obtenido mayores puntuaciones en el componente de ansiedad somática.

Palabras clave: Ansiedad; rendimiento; deporte; música

Ansiedade e desempenho percebido em atletas e músicos: Revisitando a Marta

Resumo

A relação entre ansiedade e desempenho em atletas e músicos tem sido estudada desde há muito tempo. No presente estudo, 132 participantes dos campos de futebol ($n = 100$) e musical ($n = 32$) apresentaram idade M de 20,49 anos ($DP = 6,62$) e média de 11,29 ($DP = 4,5$) anos de experiência em seus respectivos campos de atividade. Os resultados mostraram que não há correlação entre desempenho e ansiedade vivenciada, embora existam diferenças na percepção de ansiedade entre músicos e atletas, uma vez que os músicos obtiveram pontuações mais altas no componente de ansiedade somática.

Palavras-chave: Ansiedade; desempenho; esporte; musica

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