Original Article

# Differences in anger depending on sport performance in table tennis players

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## ABSTRACT

The aim of this study is to determine if there are differences in anger levels depending on sport performance in table tennis players. The sample consisted of 93 Spanish table tennis players, 20 players were professionals (21.50%) and 73 were amateur (78.49%). An *ad hoc* Sociodemographic Questionnaire and the Trait-State Anger Expression Inventory (STAXI 2), were used to measure the different variables. The results showed significant differences in external anger expression ($p$<.05), depending on league level where the players who took part in greater leagues showed lower levels of anger. Additionally, internal anger control ($p$<.05) and anger expression index ($p$<.05) reported significant differences depending on league level where the players who took part in greater leagues showed greater levels. It was concluded that there are differences in anger levels depending on division level. Therefore, it is important to coach players towards anger control in table tennis. **Keywords:** Emotion; Racket sport; Emotional control; Behaviour.

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## INTRODUCTION

In the last two decades, the investigation into anger in sports has increased considerably (Davis, 2011; Davis, Woodman, & Callow, 2010; Tamir, Mitchell, & Gross, 2008). The main reason for this increase is that there are many anger variables that have shown a positive and negative relationship with sports (Davis, 2011). Anger is a primary, normal, universal and adaptive emotion that everyone experiences in their daily life (Deffenbacher & McKay, 2000; Spielberger, 1999). This emotion presents an adaptive character, activates the organism, and facilitates and enhances attack. It is an important adaptive function with an evolutionary meaning, although it does not always cause aggression (Deffenbacher & McKay, 2000; Lench, 2004). In addition to possessing an imminently physiological and behavioural component, anger also has a moral, cultural and social character. Consequently, the way of expressing anger, the intensity of this experience and the triggers of this emotion, are learned from childhood (Deffenbacher & McKay, 2000). On the other hand, following Pelegrín, Serpa, and Rosado (2013), the variables that have the most influence on anger are: emotional instability, intolerance, lack of social skills, hostility, insecurity and lack of confidence.

The relationship between anger and sport performance is understood to be that anger may increase or decrease sport performance depending on the type of sport (Davis et al., 2010; Hanin, 2007; Martinent & Ferrand, 2009; Robazza & Bortoli, 2007; Ruiz & Yuri, 2011). There are sports in which anger can act as a performance facilitator such as: strength tasks, collision sports, and sports with less technical components (Martinent & Ferrand, 2009; Oliva-Mendoza, Calleja, & Hernández-Pozo, 2010; Robazza & Bortoli, 2007; Ruiz & Yuri, 2011). On the other hand, in more technical sports an excess of activation may hinder coordination and anger may act as a depressor of performance, especially if the athletes feel that they cannot control that excess of energy (Hanton, Jones, & Mullen, 2000; Martinent, Campo, & Ferrand, 2011; Martinent & Ferrand, 2009). As a result, anger in table tennis could be understood as a depressing factor of performance (Martinent & Ferrand, 2009). If the table tennis player does not have emotional control over this surplus of energy, anger could decrease sport performance (Martinent et al., 2011). The characteristics of table tennis make it an extremely technical sport, in which an excess of energy may lead to a depression of technical control and this could force a poor performance (Martinent & Ferrand, 2009). In fact, table tennis is a sport in which anger is the most prevalent emotion in a competitive match (Martinent et al., 2011). Moreover, in another study with a sample of different sports, such as: tennis, basketball, table tennis, football, swimming, cycling, handball and nautical sports, it was demonstrated that there are differences in anger levels depending on sport performance level. As a result, the athletes who have greater sport performance level showed lower anger levels (González-García, 2017). Thus, in the present study it is interesting to check the link with anger and sport performance in table tennis, due to the important of this emotion to have a good performance and the prevalence of anger emotion in table tennis.

Even though, there are several studies that has shown that personality characteristics and emotions can help anger control in competition, for example: self-confidence, self-efficacy, excitement and happiness (Cantón & Checa, 2012; Mowlaie, Besharat, Pourbohlool, & Azizi, 2011; Robyn, Robyn, & Robert, 2010). Cantón and Checa (2012) and Mowlaie et al. (2011) demonstrated that self-confidence and self-efficacy could help anger control during competition. In these studies, self-confidence has shown a negative significant correlation with anger and a positive significant correlation with sport performance. In addition, excitement and happiness have shown to be positively related to concentration and concentration is linked with sport performance; while discouragement, anxiety, and anger have shown to be negative related to concentration (Robyn et al., 2010). Positive emotions lead to greater automation of movement, greater concentration and greater performance. On the contrary, anger enhances maximum strength in extroverted athletes, while happiness does not

 

influence strength results. Therefore, in strength tasks, extroversion is a moderator in the relationship between anger and performance (Davis et al., 2010).

Anger also influences sport selection from the beginning, and anger levels are different in individual and team athletes (Maxwell, Visek, & Moores, 2009; Pelegrín et al., 2013). Consequently, several studies have shown greater anger levels in collective sports (football, handball, volleyball, basketball, etc) and lower levels in individual sports (tennis, table tennis, badminton, judo, karate, paddle, taekwondo, cycling, etc) (González-García, 2017; Pelegrín et al., 2013). On the other hand, regarding sport selection in the beginning, Maxwell et al. (2009) found that athletes with greater anger levels were inclined to choose more rugby than individual sport.

In addition, anger has shown an important relationship with sport performance in table tennis. Firstly, anger is the most prevalent emotion in competition (Martinent & Ferrand, 2009). Secondly, there is a relationship between anger and sport performance (Davis, 2011; Davis et al., 2010; Martinent et al., 2011). And Thirdly, several studies have shown differences in anger levels in other sports depending on competition level (González-García, 2017; Hanin, 2007; Hanton et al., 2000; Menéndez-Santurio & Fernández-Río, 2015). Therefore, the aim of this study was to determine if there are differences in anger levels depending on sport performance level in table tennis players. As a hypothesis, it was established that greater leagues players and professional players may have lower anger levels and greater anger control levels, because of to succeed in table tennis it is important to have good emotional control (Martinent & Ferrand, 2009). In this study, it was quantified sport performance in terms of the division level and professional players, because it was the more objective index to quantify sport performance in Spanish table tennis players.

## METHOD

### *Participants*

The total study sample consisted of 93 Spanish table tennis players, five were women (8.6%) 88 were men (91.4%) and with an age range from 18 to 64 years old (*M*=31.55; *SD*=13.91). In addition, 20 were professional players (21.50%) and 73 were amateur players (78.49%). Furthermore, 90 were federated players (97.8%) and two were not federated (2.2%). On the one hand, the average age of the regional players and second national players were 34.16 years old (*SD*=14.12) and the average age of superdivision, honour division and first national division players were 28.94 years old (*SD*=11.38). On the other hand, the average age of professional table tennis players were 24.10 years old (*SD*=4.84) and the amateurs average age were 33.48 years old (*SD*=13.78).

As inclusion criteria of the sample, there were selected those participants who played table tennis and were older than 18 years old. On the other hand, those who did not play table tennis or did not comply the age requirement were excluded from their participation in the study.

### *Variables and instruments*

Sport performance variables: Division level, professional and amateur players. To assess these factors a sociodemographic questionnaire *ad hoc* was developed. The questionnaire examined aspects related to: biological variables (height, gender, age, etc.); labour and academical variables (educational level, employment status, etc.) and sociological sport variables (sport type, professional or amateur, etc.) "*Did you achieve international success?" "Are you professional in your sport?"*. The total questionnaire is made up of 28 items, 5 evaluated biological variables, 5 evaluated labour and academic variables, 18 measured sociodemographic and sport performance variables. Most questions were closed-ended, but there were also

Likert, dichotomous, and polytypical questions. In case of the division level measurement, the question was polytomic and was categorized into two options (*"What is your league number? For example: Second National is forth league*). In case of the evaluation whether the athletes were professionals or not (*"Are you professional in your sport?"*.), the question was dichotomous (Yes/No) and the criterion of the response depended on each participant perception.

Anger. To assess anger, the State-Trait Anger Expression Inventory (STAXI-2) Spanish Version was used (Spielberger, Miguel-Tobal, Casado, & Cano-Vindel, 2001). The State-Trait Anger Expression Inventory-2 (STAXI-2) is a 57-item inventory which measures the intensity of anger as an emotional state (State Anger) and the disposition to experience angry feelings as a personality trait (Trait Anger). In this study, the sub-scale of anger trait was assessed. Each item consists of a 4-point scale that assesses intensity of anger at a particular moment and the frequency of anger experience, expression, and control. The questionnaire assesses: Anger Trait, External Anger Expression, Internal Anger Expression, Temperament, Anger Reaction, Internal Anger Control, External Anger Control and Anger Expression Index. The Trait Anger scale measures how often angry feelings are experienced over time. The Anger Expression and Anger Control scales assess four relatively independent anger-related traits: expression of angry feelings toward other persons or objects in the environment, holding in or suppressing angry feelings, controlling angry feelings by preventing the expression of anger toward other persons or objects in the environment, and controlling suppressed angry feelings by calming down or cooling off. The Anger Trait Scale obtained a test-retest correlation of .71 and a Cronbach alpha coefficient of .82. On the other hand, in a study by Oliva-Mendoza and Calleja (2010) in which the scale was validated in the sports field, was obtained a Cronbach alpha of .81 in Mexican athletes.

### *Procedure*

First, the ethics committee of the Miguel Hernández University of Elche evaluated and approved the study. Subsequently, the Spanish table tennis federation was contacted online; and coaches and athletes in person. The federation announced on their website the conditions to participate in the study. Then, the interested athletes contacted the main researcher. The volunteer participants sent an e-mail to the researchers, and once they claimed their interest in participating, they received the link to the research questionnaire. In the case of contact with the athletes and coaches in person, the interested athletes would give their email to researchers to receive the instructions and the research questionnaire was sent to their email. In both cases, the questionnaire was filled out online by the athletes and anonymity was preserved. Once the participants accessed the questionnaire, they signed an informed consent form. After signing the form, they began to complete the research questionnaire. After completing the questionnaire, the data was uploaded to the application "Google Drive" (Google LLC, 2018). Then the research questionnaires were saved in Excel electronic format (Microsoft Corporation, 2016).

### *Data Analysis*

The data analysis was performed using software SPSS version 19.0 (IBM Corporation, 2012). In order to verify that the sample followed a normal distribution the Komolgorov-Smirnov test was performed, and it was found that the sample did not follow a normal distribution ($p<.05$); therefore, nonparametric tests were used. Consequently, the *U* Mann-Whitney test for independent samples was performed to find the mean differences when the variables were quantitative, using a confidence interval of 95% level. Linear regression was performed in order to estimate the predictive value of anger on the level of table tennis performance. The Rosenthal *R* (Rosenthal, 1991) was used to analyse the effect size and thus to know the magnitude of the differences found in the *U* Mann-Whitney test. Following Cohen (1988) the effect size results can be considered as: *R*=.05 (small), *R*=.2 (moderate), *R*=.33 (medium effect), *R*=.45 (large effect).

 

## RESULTS

Firstly, to check if there were differences in anger levels between professional and amateur players, the *U Mann Withney test* for independent samples was performed, in which the sample is divided into two groups: professional players (PP; *n*=20) and amateur players (AP; *n*=73). The subdivision was based on how table tennis players answered the question *"Are you professional in your sport?"* and according to the answer the groups were divided. Subsequently, Rosenthal *R* was calculated from those variables that had obtained significant differences.

Table 1. Anger levels, professional and amateurs table tennis players

| Anger Variables | PP (*n*=20) *M* (*SD*) | AP (*n*=73) *M* (*SD*) | *Z* (*p*) |
|---|---|---|---|
| Anger Trait | 22.45 (4.52) | 21.83 (5.05) | .516 (.95) |
| Temperament | 10.55 (3.25) | 10.27 (3.46) | .510 (.95) |
| Anger Reaction | 13.40 (3.21) | 13.36 (3.19) | .554 (.91) |
| External Anger Expression | 16.05 (4.51) | 16.30 (5.48) | .586 (.88) |
| Internal Anger Expression | 18.65 (5.11) | 17.23 (4.33) | .982 (.28) |
| External Anger Control | 19.10 (7.01) | 21.87 (7.50) | 1.091 (.18) |
| Internal Anger Control | 12 (5.57) | 11.19 (5.03) | .605 (.85) |
| Anger Expression Index | 21.50 (10.09) | 17.39 (9.04) | .966 (.30) |

Note. PP=Professional Player; AP=Amateur Player.

Table 1, the results did not show significant differences in anger variables between professional and amateur table tennis players ($p$>.05).

Secondly, to determine if there are differences in anger levels depending on division level in table tennis players, the *U Mann Withney test* for independent samples was performed, in which the sample is divided into two groups: Superdivision, Honour Division and First National Division players (SHF; *n*=44) and Second National Division and Autonomics Leagues (SA; *n*=49). The subdivision was based on how table tennis players answered the question *"What is your league number? For example: Second National is forth league"* and according to the answer the groups were divided. Subsequently, Rosenthal *R* was calculated from those variables that had obtained significant differences.

Table 2, the results showed significant differences in external anger expression ($p$<.05), in favour of SHF table tennis player who scored lower levels. On the other hand, internal anger control ($p$<.05) and anger expression index ($p$<.05) reported significant differences in favour of SHF table tennis players who showed greater levels.

Table 3, a linear regression was performed to obtain the predictive value of each statistically significant variables in the *U Mann Whitney Test*, external anger expression, internal anger control and anger expression index. The predictive model was significant ($F$=34.13; $p$<.01). In addition, the model showed high predictability ($R^2$=.54). The results showed that internal anger control was positively related to play in grater leagues (SHF).

Table 2. Anger levels depending on division level

| Anger Variables | SHF (*n*=44) *M* (*SD*) | SA (*n*=49) *M* (*SD*) | *Z* (*p*) | Rosenthal *R* |
|---|---|---|---|---|
| Anger Trait | 22.27 (4.80) | 21.69 (5.07) | .505 (.961) | |
| Temperament | 9.84 (3.63) | 10.77 (3.15) | 1.012 (.258) | |
| Anger Reaction | 13.79 (3.23) | 13 (3.12) | .594 (.872) | |
| External Anger Expression | 15.02 (5.31) | 17.34 (5.02) | 1.425 (.034)* | .14 |
| Internal Anger Expression | 17.25 (4.52) | 17.79 (4.55) | .554 (.919) | |
| External Anger Control | 20.15 (6.21) | 22.28 (8.35) | 1.19 (.113) | |
| Internal Anger Control | 12.84 (5.36) | 10.04 (4.57) | 1.39 (.041)* | .14 |
| Anger Expression Index | 20.90 (9.70) | 15.91 (8.48) | 1.39 (.042)* | .14 |

*Note. SHF= Superdivision, Honour Division and First National Division; SA= Second National Division and Autonomic Leagues. *p<.05*

Table 3. Linear regression to predict anger variables influence on competition level

| Variables | B | Error tip. | Beta | *T* | *p* |
|---|---|---|---|---|---|
| External Anger Expression | .001 | .005 | .030 | .235 | .81 |
| Internal Anger Control | .024 | .008 | .436 | 3.014 | .003** |
| Anger Expression Index | .010 | .005 | .301 | 1.924 | .058 |

*Note. *p<.05; **p<.01*

## DISCUSSION

The aim of this study was to determine if there are differences in anger levels depending on sport performance level in table tennis players. Firstly, there were no differences in anger levels between professional and amateur Spanish table tennis players. These results may be due to other variables that are mediating the findings. The age range of the sample, or the fact that there were table tennis players who were professional in the past and currently they are amateur. Perhaps the concept that athletes are professionals is too big and wide to predict table tennis performance or may be the difficult perception of players to quantify that they are professionals without any clue. For example, another study did not find differences in anger levels depending on professional and non-professional athletes (González-García, 2017). Therefore, there might not be differences in anger levels depending on the professional table tennis player.

Secondly, the results showed that SHF table tennis players scored lower levels of external anger expression and greater levels of internal anger control. Moreover, regression analysis showed that internal anger control was related to play in greater leagues (SHF). As previous studies showed, anger control is necessary to perform in table tennis because this surplus energy can lead to poor sport performance (Martinent et al., 2013; Steffgen, 2017). Table tennis players who compete in greater leagues express their external anger less than those who compete in lower leagues due to the greater control that anger requires (Menéndez-Santurio & Fernández-Río, 2015). Even, these outcomes could be determined by the application of rules, because of the rules are taken less seriously in lower competition levels, whereas in higher leagues or competitions a bad behaviour could lead to an admonishment. In contrast, the previous analysis did not find differences between professional and amateur players in anger levels. Perhaps, professional table tennis players have other pressure factors that influence anger levels, such as: more extrinsic motivation, environmental pressure and potentially their salary depends on their winning matches. Furthermore, internal anger control is required to manage this excess of energy in order to maintain a high level of performance.

 

Therefore, more internal anger control and lower external anger expression could be linked to better performance in table tennis.

On the other hand, SHF table tennis players showed greater levels on the anger expression index. This shows that higher-performance table tennis players can express anger more easily overall than table tennis players who compete in lower leagues. This could be due to other variables which can influence anger expression, like extraversion which can modulate the anger expression style (Martin, Wan, David, Wegner, & Olson, 1999). Furthermore, previous studies have shown that athletes with greater sport performance have a greater level of extraversion than athletes with poorer performance (García-Naveira, Ruiz, & Pujals, 2011; Ruiz, 2004). In a concrete study, Graydon and Murphy (1995) showed that extraversion influences table tennis performance during a competition match. Therefore, there are other variables which can modulate the results in anger expression index, and the results could be different if the variables are measured separately.

As future proposal lines, due to anger has shown a huge importance in table tennis performance, it is important that coaches and sport psychologists know the need to educate towards emotional control in table tennis. Consequently, it would be important to give strategies of emotional control during competition for players, because it is not taught in the coaching programs and there are other studies that have proved the importance of anger in table tennis (Martinent et al., 2011; Martinent & Ferrand, 2009) and to perform in sport (Davis et al., 2010; Hanin, 2007; Martinent & Ferrand, 2009; Robazza & Bortoli, 2007; Ruiz & Yuri, 2011). As a proposal, it would be interesting to change the competition rules during the trainings, such as shorter matches where players must focus all the time, in order to force players to control anger in different training situations with the goal to develop their emotional control for future competitions. Therefore, an emotional education program is necessary for table tennis players during talent development programs.

The main limitation of the present study is the difficulty of being able to focus the findings found on a sample with a smaller age range. Another limitation is to conceptualize the term sport performance depending on being professional or competing in a major or minor league. Following this criterion, there may be athletes who have poorer performance and compete in greater leagues. Another limitation is the difficulty to find a bigger sample, due to the online administration of the survey. As a result, there were many experimental deaths maybe most of them were not motivated to complete the survey. On the other hand, the wide age range take in this study could have an influence on anger subjective feeling.

## CONCLUSIONS

The conclusions of this research work were:

- There are differences in anger levels depending on division level. Consequently, table tennis players who play in greater leagues scored lower levels in external anger expression and greater levels in internal anger control and anger expression index. Furthermore, anger levels could influence competition level so that internal anger control is linked with participation in greater leagues. Therefore, the improvement of anger control is very important to achieve a greater competition level in table tennis.

- There are no differences in anger levels depending on if the table tennis player plays as a professional or amateur. It could be influenced by other factors that mediate the relationship with these variables, such as: salary, wide number of professional players, scholarships, time of training, physical condition, etc.

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