
Head Title: ANGER PROFILES

Perceived anger profiles in table tennis players: Relationship with athlete burnout symptoms and coping

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Abstract

Objectives: This study aimed to identify dispositional anger profiles in table-tennis players and examine whether participants from distinct profiles significantly differed on athlete burnout symptoms and coping.

Design: A quantitative cross-sectional design was used in the present study.

Method: A sample of 244 table tennis players (\(M_{age} = 31.29; SD = 9.72\)) completed a series of self-report questionnaires designed to assess anger (the State-Trait Anger Expression Inventory; STAXI-2), coping (the Coping Inventory for Competitive Sport; CICS) and athlete burnout symptoms (the Athlete Burnout Questionnaire; ABQ).

Results: Three-profile solution showed best fit to data, to analyse them LPA models were run by first testing a one-class model and then exploring models with more classes in order to identify the anger profiles: The anger profiles were labelled as: (a) High anger profile comprising players with moderate scores of temperament, external expression, external control, reaction and high scores, internal expression and control (\(n = 91\)); (b) Overwhelmed anger profile comprising players with high scores on temperament, reaction, internal and external expression, and low scores of internal and external control (\(n = 13\)); and (c) Low anger profile comprising players with low levels of temperament, reaction, internal and external expression and high levels of internal and external control (\(n = 140\)). Results of BCH method revealed significant differences across profiles in athlete burnout symptoms and coping. In particular, table-tennis players from the high anger profile reported significant higher scores of physical and emotional exhaustion, sport devaluation, reduced sense of accomplishment, resignation, distancing and venting emotions than players belonging to the low anger profile.

Conclusions: Three different anger profiles among table-tennis players emerged from the cluster analyses. Players from the overwhelmed anger profile were characterized by the worst psychological adjustment based on their scores of coping and athlete burnout symptoms. Thus,
it would be interesting to develop empirically proven interventions designed to help such athletes modify their maladaptive anger profile in order to maximize their psychological adjustment to the inherent demands of table-tennis.

*Keywords: anger management, athlete burnout, cluster analysis, coping, emotion.*
Perceived anger profiles in table tennis players: Relationship with burnout and coping

Several scholars have highlighted the salient influence of anger on athletes’ performance in the sporting context (Davis, 2011; González-García, Pelegrín & Trinidad, 2019; Martinent & Ferrand, 2009; Robazza & Bortoli, 2007; Steffgen, 2017). Anger can increase or decrease performance depending on the characteristics of the sport, the athlete’s way of handling that emotion and the environmental variables (contextual factors of task) (Davis, Woodman & Callow, 2010; Martinent & Ferrand, 2009; Robazza & Bortoli, 2007; Ruiz & Hanin, 2011). For instance, in contact sports (strength tasks characterised by a somewhat low fine skills component), anger can enhance sporting performance (Davis, 2011; Davis et al., 2010; Robazza & Bortoli, 2007), whereas, in sports involving fine skills (e.g. racket sports), anger can lead to a worsening of performance, due to the difficulty in controlling this emotion and the fine technical skills required by the sport (Davis, 2011; Davis et al., 2010; Martinent & Ferrand, 2009; Martinent, Campo & Ferrand, 2012). For that reason, several investigations have studied the impact of anger in table tennis players (González-García et al., 2019; Martinent et al., 2012; Martinent & Ferrand, 2009). Martinent and collaborators (Martinent & Ferrand, 2009; Martinent et al., 2012) found that anger and anxiety were the most difficult emotions to handle in table tennis players. Moreover, some studies showed that high anger levels were experienced by amateur table-tennis players but not professional and international ones (González-García et al., 2019; Menéndez-Santurio & Fernández-Río, 2015).

Despite controversies around the definition of emotions, because emotions are considered shorter than moods and are a response to a stimulus (Gross, 1998; Hanin, 2007; Lazarus, 2000), anger can be conceptualized as an emotion (including a facial expression component; Ekman, 1984; Frijda, 1986; Izard, 1977) that evokes an alert state and can provoke aggression (Deffenbacher & McKay, 2000; Lench, 2004). Anger can be experienced as a state or can be conceptualised as a personality trait (Spielberger, Miguel-Tobal, Casado & Cano-
Vindel, 2001). If it is experienced as a state, it means that the feeling of anger is triggered by a situation of increasing anger levels (Davis, 2011; Hanin, 2007; Spielberg et al., 2001). Otherwise, a person can frequently feel anger in a number of situations (trait anger) (Davis, 2011; Hanin, 2007; Spielberg et al., 2001). In line with Spielberg et al. (2001), the anger trait can be conceptualised as a multidimensional concept including temperament (anger quickly experienced with little provocation), reaction (the tendency to become angry or agitated when the respondent is criticized, receives negative feedback, or believes he/she is being treated badly), internal anger expression (individual holds things in or suppresses anger when he/she is angry or furious), external anger expression (a person expresses his/her emotional experience of anger in an outwardly negative and poorly controlled manner), internal anger control (how often a person’s tendency to relax, calm down and reduce angry feelings before they get out of control) and external anger control (the expenditure of energy to monitor and control the physical or verbal expressions of anger). Since the aim of the present study was to identify anger profiles in table-tennis players, we focused on dispositional anger (trait anger). This choice was based on the rationale that the effects of dispositional anger profiles would potentially be more salient than the effects of state anger profiles, as dispositional anger profiles were representative of participants’ anger experience in a number of situations (Deffenbacher & McKay, 2000; Spielberg et al., 2001).

As a whole, the literature on anger in sport is mainly focused on bivariate relationships between anger and some other variables (Robazza & Bortoli, 2007; Steffgen, 2017). For example, previous research showed that higher anger levels were significantly related to disengagement-oriented coping (Diong et al., 2007) and higher external and internal anger control were related to more positive coping strategies (Casado & Franco, 2010). This approach has neglected the multivariate nature of the dispositional anger construct. However, the various dimensions of the dispositional anger construct could operate in conjunction with each other.
based on the rationale that the effect of a particular anger component can depend on the scores of other anger components. Thus, much information might be lost if dispositional anger dimensions are examined discretely and in isolation from one another, as this does not encompass the systemic nature of the anger construct (interplay among dispositional anger dimensions). As such, identifying distinct profiles of athletes based on the various dispositional anger dimensions might provide new insights on the anger construct. In this perspective, person-centred approaches (e.g. latent profile analysis) describe differences among individuals in how the several dispositional anger dimensions are related to each other and could further the literature on anger in sport (Ichiro, 2012). Moreover, multivariate anger profiles could offer a promising platform to examine not only the different combinations of anger dimensions that exist in real-world settings but also their complex interplay with salient psychological variables (athlete burnout and coping). Athlete burnout and coping were selected because they seem particularly poignant for competitive table tennis players (González-García & Martinent, 2019), and they have a direct impact on performance in table-tennis (Martinent, Cece, Elferink-Gemser, Faber, & Decret, 2018).

Lazarus’ (2000) Cognitive-Motivational-Relational Theory (CMRT) is one of the emotion theories most used in sport settings. CMRT points out that the emotions experienced (e.g. anger) and coping strategies used by athletes depend on the way the athletes evaluate events and situations that occur in competition (appraisals) (Lazarus, 2000; Lazarus & Folkman, 1984; Martinent & Ferrand, 2015). Coping strategies can be defined as athletes’ cognitive and behavioural efforts implemented to control the internal and/or external demands evaluated as exceeding their perceived resources (Lazarus & Folkman, 1984). Congruent with findings that individual coping strategies can be assigned to different macro dimensions of coping (e.g. Lazarus & Folkman, 1984; Skinner, Edge, Altman, & Sherwood, 2003), Gaudreau and collaborators (Gaudreau & Blondin, 2002; Nicolas, Gaudreau & Franche, 2011) identified three
coping dimensions in the context of sporting competition: Task-oriented coping (strategies aimed at dealing directly with the stressful situation and the resulting thoughts and affects) such as logical analysis, imagery/thought control or social support; disengagement-oriented coping (strategies through which a person withdraws from the process of actively striving toward the realization of desirable outcomes) such as resignation or venting emotions; distraction-oriented coping (strategies used to momentarily focus attention on external and internal stimuli unrelated to the stressful situation) such as distancing or mental distraction. Within the context of table tennis, some studies pointed out that task-oriented coping led to better performance outcomes (Kurimay, Pope-Rhodius, Kondric, 2017; Martinent & Decret, 2015). In line with these outcomes, Doron and Martinent (2016) provided evidence in a dual sport (fencing) that task-oriented coping was related to challenge appraisal, positive emotions and performance, whereas disengagement-oriented coping was linked with threat appraisal and negative emotions.

Concerning previous studies examining the anger-coping relationship, Bolgar, Janelles and Giacobbi (2006) revealed that tennis players reporting the greatest trait-anger levels were those who used the most problem and emotion-focused coping strategies (task-oriented coping). Likewise, Steffgen (2017) designed an intervention to reduce trait-anger in table tennis players, and after one year the intervention group reported reductions in trait-anger levels and improvements in coping skills. As such, this study provided further indirect evidence for the positive relationship between anger and coping among table-tennis players.

Growing empirical research has provided evidence that athlete burnout can be defined as a syndrome characterized by physical/emotional exhaustion, sport devaluation, and a reduced sense of accomplishment (Martinent, Louvet & Decret, in press; Raedeke, 1997; Raedeke & Smith, 2001). Athlete burnout can be conceptualized as a response to chronic demands that exceeds the athlete’s resources (Raedeke, 1997). Athlete burnout was related to a bulk of negative sport outcomes, such as drop out, decreased performance, lack of enthusiasm or loss.
of social cohesion (Fletcher, Hanton & Wagstaff, 2012; Martinent et al., 2018; Nicholls & Polman, 2007). For instance, athlete burnout is one of the leading factors of dropout among table tennis players (Martinent et al., 2018, in press; Martinent, Decret, Guillet-Descas & Isoard-Gautheur, 2014). Of particular importance in the context of the present study, previous research has suggested that unpleasant emotions (such as anger) are related to emotional exhaustion (Lee, Hyungil, Andrew & Richards, 2018). Identifying anger profiles in table tennis players could reveal which players are particularly at risk for developing athlete burnout symptoms. Such information could ultimately be especially valuable for researchers and sport psychologists for implementing practical interventions designed to prevent athlete burnout symptoms.

As a whole, examination of anger profiles could go further in our understanding of how the several dimensions of trait anger may operate. In turn, this could help practitioners to adapt their intervention according to the needs of specific groups of athletes. Thus, this study aimed to identify dispositional anger profiles among a sample of table tennis players. We also examined whether participants with distinct anger profiles significantly differed on athlete burnout and coping. It was deemed premature to formulate specific hypotheses regarding the number or characteristics of anger profiles because of the lack of studies grounded within an anger profile approach. Nevertheless, on the basis of existing research (Kurimay et al., 2017; Lee et al., 2018; Martinent & Decret, 2015; Steffgen, 2017), we broadly hypothesized that: (a) anger profiles characterized by high temperament, low internal control and external control and high external and internal anger expression will be characterized by higher levels of athlete burnout, distraction-oriented and task-oriented coping; (b) anger profiles characterized by low temperament, high anger internal and external control and low external and internal anger expression will be characterized by lower levels of athlete burnout and disengagement-oriented coping.
The research was carried out following international APA ethical guidelines, Declaration of Helsinki and Spanish ethical guidelines, and anonymity was preserved. The study followed a cross-sectional design in which researchers tried to collect participants from all Spanish regions. The data of the sample collection was from January 2018 to June 2018. In line with this, the Spanish table tennis federation was contacted by researchers to request an announcement be placed on their website calling for participation in the study. Once participants accessed the announcement, players interested in participating completed the online survey. First, they signed an informed consent form and then they could begin to answer the survey questions. The full survey took thirty minutes and during the form-filling process, they had to respond to the acquiescence questions of the Oviedo scale of infrequency response (Fonseca-Pedrero, Lemos-Giráldez, Paino, Villazón-García, & Muñiz, 2009). This requirement was only to ensure that participants were focused on the task and responded honestly. Finally, in data collection around 527 players signed the informed consent, but only 244 players finished the whole questionnaire, which provided the final sample.

The sample was made up of 244 table tennis players ($M_{age} = 31.29$; $SD = 9.72$; 181 men and 63 women). Regarding participants, 24 were professionals (9.8%) and 220 were amateurs (90.2%). In terms of sport success, 62 reached national successes (25.4%) and 21 reached international successes (8.6%). Concerning the time of sport practice per week, 50 players practised 0-5 hours (20.5%), 89 practised 5-10 hours (36.5%), 63 practised 10-15 hours (25.8%), 31 practised 15-20 hours (12.7%) and 11 practised more than 20 hours (4.5%).
Selected inclusion criteria were: table tennis players, aged over 18 years and members of the Spanish federation.

Measures

Anger was assessed through the Spanish version (Miguel-Tobal, Cano-Vindel, Casado & Spielberger, 2001) of State-Trait Anger Expression Inventory (STAXI-2) (Spielberger et al., 2001). The STAXI-2 is a 49-item survey that measures the intensity of anger as an emotional state (state anger; 15 items) and the tendency to experience angry feelings as a personality trait (trait anger; 34 items). In the present work, we only used the trait anger scale which comprised external anger expression (6 items), internal anger expression (6 items), temperament (5 items), anger reaction (5 items), internal anger control (6 items) and external anger control (6 items) using a 4-point Likert scale ranging from 1 (almost never) to 4 (almost always). To cite examples of some items: “I feel annoyed when I do not get recognition in sport”; “I control my temper when I am competing or training”. The instructions of STAXI-2 were slightly modified to focus on the sporting context (González-García et al., 2019). Previous studies provided evidence for the validity and reliability of the trait anger scale scores (González-García et al., 2019; Miguel-Toba et al., 2001; Spielberger et al., 2001). In the present study, Cronbach alphas provided evidence for acceptable reliability of scores for temperament (α = .83), reaction (α = .81), internal anger control (α = .83), external anger control (α = .75), internal anger expression (α = .67) and external anger expression (α = .75).

The Spanish version (Molinero, Salguero, & Márquez, 2010) of the Coping Inventory for Competitive Sport (CICS; Gaudreau & Blondin, 2002) was used to measure coping skills in table tennis players. This scale contains 31 items using a 5-point Likert-type scale ranging from 1 (not at all) to 5 (very much) (e.g. I tried to relax my body). Previous research provided evidence for the reliability and validity of Spanish CICS scores (González-García et al., 2019; Molinero et al., 2010). The scale is divided in 8 factors: resignation (4 items; α = .73), relaxation
(4 items; $\alpha = .74$), distancing (3 items; $\alpha = .43$), logical analysis (7 items; $\alpha = .61$), seeking support (2 items; $\alpha = .83$), imagery/thought control (5 items; $\alpha = .64$), venting emotions (3 items; $\alpha = .78$) and mental distraction (3 items; $\alpha = .73$).

The Spanish version (Arce, De Francisco, Andrade, Seoane, & Raedeke, 2012) of the Athlete Burnout Questionnaire (ABQ; Raedeke & Smith, 2001) was used to evaluate athlete burnout symptoms. It is made up of three subscales that measure emotional/physical exhaustion (5 items), sport devaluation (5 items), and reduced accomplishment (5 items). Participants responded using a 5-point Likert-type scale ranging from 1 (almost never) to 5 (almost always) (e.g. “I believe I am not as interested in sport as I was”). Previous research provided evidence for the validity and reliability of the scores derived from the ABQ (Arce et al., 2012; González-García, Martinent, & Trinidad, 2019; Isoard-Gautheur, Oger, Guillet, & Martin-Krumm, 2010). The Cronbach alphas were of 0.84 for emotional/physical exhaustion, 0.63 for reduced accomplishment and 0.78 for sport devaluation and provided evidence for acceptable reliability of ABQ factor scores.

The INF-OV was used (Fonseca-Pedrero et al., 2009) to identify acquiescence and dishonest participants. This is a 12-item self-report measure with a 5-point Likert-type rating scale format ranging from 1 (totally disagree) to 5 (totally agree). Its goal is to detect participants who responded randomly, pseudo-randomly or dishonestly on self-reports (e.g. “The distance between Madrid and Barcelona is greater than between Madrid and New York”) (González-García, Pelegrín, & Carballo, 2018). The participants with more than 4 incorrect answers were deleted from the sample. In this study, 10 participants were taken out of the sample. In addition, previous studies presented the accuracy of this scale in the detection of dishonest participants (González-García et al., 2019).

Data Analyses
Statistical analyses were conducted using M plus version 7.3 (Muthén & Muthén, 2012).

To test the hypotheses, we used a Latent Profile Analysis (LPA) approach. LPA is a multivariate statistical model which posits that an underlying grouping variable (e.g. anger profile) is not observed but can be inferred from a set of indicators (Martinent & Nicolas, 2017). Firstly, to identify the model that best fits the selection of the different anger profiles, a series of measurement models was performed to determine which model is the best fit (Martinent & Nicolas, 2016). Specifically, LPA models are grounded in a series of modelling steps, starting with the specification of a one-class model. The number of classes is then increased until there is no further improvement of the model, since adding another class would result in meaningless classes (Martinent & Nicolas, 2016). In LPA models, several statistical indicators are used to assess the model fit to the data. As such, a combination of statistical indicators was used to decide which model fit the best: log likelihood value, Akaike information criterion (AIC; Akaike, 1987), Bayesian information criterion (BIC; Schwartz, 1978); Adjusted BIC (ABIC; Sclove, 1987), entropy, and Lo, Mendell, and Rubin likelihood ratio test (LRT; Lo, Mendell, & Rubin, 2001). The model that contains the smallest values on the AIC, BIC, and ABIC, as well as the highest values on the log likelihood value and the entropy, indicates the best-fitting model (Martinent & Nicolas, 2017). In addition, the LRT was used for model comparison (chi-square difference test). Although there are no firm rules of thumb concerning the required sample size in LPA, Collins and Wugalter (1992) and Park and Yu (2017) suggested a minimum N of almost 250. Moreover, because profiles with few participants (e.g. less than 5% of the total sample) may be difficult to interpret or validate, it is generally advisable to select profiles comprising more than 5% of the total sample (Collins & Lanza, 2010). Another main issue in LPTA relates to the number of indicators (Martinent & Nicolas, 2017). In particular, adding indicators to a LPA model could increase the number of possible response patterns, some of which may be observed infrequently, leading to data sparseness (Collins & Lanza, 2010). Hence, researchers
generally prefer using fewer indicators (from 4 to 10 indicators) with LPA even if there are no firm rules of thumb concerning this point (Collins & Lanza, 2010).

Thirdly, because the use of classify-analyze approaches (e.g., ANOVA) to compare distal outcomes across anger profiles are related to several weaknesses (Nylund-Gibson, Grimm, & Masyn, 2019), we used the Bolck, Croon, and Hagenaars (2004) method (BCH method) to examine anger profile group differences on athlete burnout and coping. The inclusion of some outcomes (athlete burnout and coping) in mixture models introduces some complexity because the LPA measurement model (trait anger profiles) can substantially shift when moving from the unconditional latent profile measurement model to a structural equation mixture model including the anger profiles (Nylund-Gibson et al., 2019). The BCH method allowed to compute athlete burnout and coping dimensions as consequences rather than indicators of anger profiles. To perform the different analyses a confident interval of 95% was taken and to work out the effect size $\eta^2$ was selected (Cohen, 1988). Finally, a series of chi-square tests were conducted in order to identify demographic differences across the three anger profiles such as gender, level of competition (international, national and under national), and the type of practice (professional versus no professional players).

Results

Anger latent profiles analysis

The LPA models were run by first testing a one-class model and then exploring models with more classes. Table 1 includes fit information (log likelihood ratio, AIC, BIC, ABIC, entropy, and LRT) for LPA models with one through five classes. For the AIC, BIC, and ABIC, there were big drops between one and two classes and between two and three classes. The LRTs also found that two classes showed better fit than one, three classes showed better fit than two, four classes showed better fit than three, but five classes did not show better fit than four. Thus, to achieve the balance between theoretical and statistical considerations, we used the model
parameters to make sense of the classes and decide which model fits best. As a result, based on
the interpretability of the anger profiles (i.e. the three-class solutions made more theoretical
sense and added substantive meaning to the understanding of anger profile than the two-class
solution whereas a fourth class did not add anything substantive to the understanding of anger
profiles) and the LPA statistical indicators, a three-class solution was selected.

The STAXI-II estimates were used to differentiate and add substantive meaning to the
anger profiles (Table 2). The anger profiles were labelled as: (a) High anger profile comprising
players with moderate scores of temperament, external expression, external control, reaction
and high scores, internal expression and control ($n = 91$); (b) Overwhelmed anger profile
comprising players with high scores on temperament, reaction, internal and external expression,
and low scores of internal and external control ($n = 13$); and (c) Low anger profile comprising
players with low levels of temperament, reaction, internal and external expression and high
levels of internal and external control ($n = 140$).

Anger profiles differences on athlete burnout symptoms and coping variables

Results of LPA using the BCH method are presented in Table 3 and provided evidence
of the statistically significant differences on athlete burnout and coping among the profiles. In
particular, results showed that: (a) players from the high anger profile reported significantly
higher scores of physical and emotional exhaustion ($\text{Eta}^2 = .06$), reduced sense of
accomplishment ($\text{Eta}^2 = .07$), resignation ($\text{Eta}^2 = .08$) and venting emotions ($\text{Eta}^2 = .12$) than
players belonging to the low anger profile; (b) players from the overwhelmed anger profile
reported significantly higher scores of reduced accomplishment ($\text{Eta}^2 = .07$), sport devaluation
($\text{Eta}^2 = .04$), resignation ($\text{Eta}^2 = .08$), distancing ($\text{Eta}^2 = .03$) and venting emotions ($\text{Eta}^2 = .12$
than players belonging to the low anger profile; and (c) players from the overwhelmed anger
profile reported significantly higher scores of sport devaluation ($\text{Eta}^2 = .04$) and distancing ($\text{Eta}^2$
$= .03$) than players belonging to the higher anger profile.
Anger Profiles Differences on Demographic Variables

Results of chi-square tests showed no significant difference ($p > .05$) across gender ($\chi^2 (2) = 8.35; Eta^2 = .15$), and practice level ($\chi^2 (3) = 1.43; Eta^2 = .09$), but a significant difference across athletes’ status ($\chi^2 (2) = 8.67; p < .05; Eta^2 = .18$). In particular, 62.5%, 8.33% and 29.16% of professional players belonged to high anger profile, overwhelmed anger profile, and low anger profile, respectively whereas 34.54%, 5%, and 60.45% of non-professional players belonged to the aforementioned anger profiles respectively.

Discussion

The aims of the study were to identify dispositional anger profiles in table-tennis players and to examine whether participants from distinct profiles significantly differed on athlete burnout and coping. The results of the present study advanced the knowledge base regarding anger symptoms in sport settings in two ways. Firstly, latent profile analysis provided a parsimonious yet nuanced summary of the heterogeneity of trait anger symptoms among table tennis players involved in competitive sport situations. Rather than individually consider the several trait anger dimensions, latent profile analysis emerged as an effective way to organize information about anger dimensions in a meaningful way (Collins & Lanza, 2010; Martinent & Nicolas, 2017). Indeed, these combinations of trait anger dimensions (anger profiles) informed on the multivariate nature of trait anger symptoms, in contrast to previous literature in sport which has mainly investigated the antecedents and/or consequences of anger dimensions in isolation from other anger dimensions (Davis, 2011; Davis et al., 2010; Martinent & Ferrand, 2009; Martinent et al., 2012). Secondly, the latent profile approach has not only offered a robust heuristic to examine the construct of trait anger within a more holistic approach but has also allowed unpacking their complex associations with key sport outcomes such as coping and athlete burnout. In contrast, previous studies primarily investigated the bivariate relationships
between anger dimensions and some other variables (Davis, 2011; Davis et al., 2010; Martinent & Ferrand, 2009; Martinent et al., 2012).

The results revealed that three dispositional anger profiles emerged from latent profile analysis among table tennis players: (a) a high anger profile with moderate scores of temperament, external expression, and high scores of reaction, external control, internal expression and control; (b) an overwhelmed anger profile with high scores on temperament, reaction, internal and external expression, and low scores of internal and external control; (c) a low anger profile with low levels of temperament, reaction, internal and external expression and high levels of internal and external control. Most of the players pertained to the low anger profiles (57% of the players) whereas the overwhelmed anger profile was the one with least players (5% of the players). Whereas the proportion of men and women or international, national and non-national players did not significantly differ across the three anger profiles, it is noteworthy that the proportion of professional versus amateur players significantly differed across the three anger profiles. In particular, the results showed that the high anger profile was the most represented in terms of professional players whereas the low anger profile was over-represented among amateur players. The significant difference identified in the present study between professional versus amateur players contradicts the results of previous studies in other sports which showed that amateur players reported significantly higher levels of anger (González-García et al., 2019; Menéndez-Santurio & Fernández-Río, 2015). As this is the first study, to our knowledge, to report that amateur players reported lower symptoms of anger in comparison to professional players, future research should test this relationship again to see whether it emerges in other samples, or whether it was a result specific to the current sample.

The results of the present study highlighted the usefulness of adopting a person-centred approach (assessment of ideographic trait anger profiles) rather than a variable-centred approach (Collins & Lanza, 2010; Martinent & Nicolas, 2017). Anger profiles (i.e. meaningful
combinations of trait anger dimensions and their respective magnitudes) revealed important information regarding the functional nature of the anger construct. Whereas players from both the high anger and low anger profiles experienced similar levels of reaction, players from the high anger profile who also reported significantly higher scores of external anger expression and internal anger expression were characterized by poorer psychological adjustment (higher scores of reduced sense of accomplishment, physical and emotional exhaustion, resignation, venting emotions). Thus, the present results suggested that trait anger dimensions likely operate in conjunction with one another, and their effect might vary as a function of alternative anger dimensions that are experienced concurrently. This is why instead of pitting the effect of one anger dimension against another, future research should consider the profiles (the meaningful configurations) of anger dimensions.

Of particular importance in the context of the present study, results revealed significant differences across anger profiles on athlete burnout and coping scores. In particular, table tennis players belonging to the low anger profile reported significantly lower scores of physical and emotional exhaustion, reduced sense of accomplishment, sport devaluation, resignation, distancing and venting emotions in comparison to the players belonging to the high anger profile and/or the overwhelmed anger profile. These higher scores of athlete burnout symptoms, disengagement and distraction-oriented coping reported by players from the high anger or overwhelmed anger profiles suggested that these athletes were characterized by poorer psychological adjustment (Doron & Martinent, 2016; Kurimay et al., 2017; Martinent & Decret, 2015). Furthermore, overwhelmed and high anger profile reported differences between them in distancing and sport devaluation, in favour of overwhelmed anger profile, which signifies that these profiles stands out by extreme scores in the cited variables. Thus, high anger and overwhelmed anger profiles could be conceptualised as dysfunctional profiles that could be
classified as at risk of dropout and could, in turn, deserve the concern of sport practitioners and
sport psychologists.

The findings of the present study could also be used to enhance applied psychology
consultants’ efforts with athletes in sport settings. The person-centred perspective used in this
study may be useful in identifying higher risk profiles for individuals in need of targeted and
adaptive intervention approaches. Indeed, knowing dispositional anger profiles of athletes
could help coaches and sport psychologists to tailor programs to groups of individuals with
particular trait anger characteristics. Furthermore, understanding relationships between
dispositional anger profiles and key sport outcomes (such as coping and athlete burnout) is
paramount for designing prevention and intervention strategies that will be most salient to
particular athletes. For instance, knowing which of the multivariate trait anger profiles are
associated with adaptive or maladaptive psychological adaptation (inferred from coping and
athlete burnout scores) could help practitioners in targeting athletes who could benefit the most
from changing their anger scores. Based on the results of the present study, players from the
high anger profile and from the overwhelmed anger profile should benefit the most from an
intervention on the anger construct. Moreover, the intervention designed on such players could
be adapted to the particular combinations of the trait anger dimensions of such players.

As is always the case with latent profile studies, the trait anger profiles are data-driven
and sample-specific (Collins & Lanza, 2010; Martinent & Nicolas, 2016). Future research is
needed to replicate the present findings with individuals of different ages, cultures and sports.
Another methodological limitation refers to the exclusive use of self-report questionnaires,
which are sensitive to some memory bias, as well as social desirability, exaggeration of results,
lack of motivation in the form-filling procedure, distraction and response in terms of the study
target (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Also, the use of a cross-sectional
design can be a limitation from the perspective that the time of the sample taking could not be
a representative moment (Podsakoff et al., 2003). In addition, despite the proven evidence that LPA analysis can be run in little sample sizes (Collins & Wugalter, 1992; Park and Yu, 2017), it might be considered as a possible limitation and this issue should be addressed in future approaches. Notwithstanding these limitations, the present study proposed an alternative person-centred approach that may provide researchers and practitioners with a useful way to examine combinations of the several trait anger dimensions (Davis, 2011; Davis et al., 2010; Martinent & Ferrand, 2009; Martinent et al., 2012). Because understanding relationships between coping and athlete burnout with anger profiles is paramount for designing prevention and intervention strategies that will be most salient to a particular athlete, knowing that players from the high anger and overwhelmed anger profiles were characterized by poorer psychological adjustment could help practitioners in targeting athletes who might benefit most from changing their chronic anger experience. Hence, these results must be taken into consideration to develop empirically proven interventions designed to help such athletes modify their maladaptive anger profile in order to maximize their psychological adjustment to the inherent demands of table-tennis.
References


Table 1. Fit Indices for Latent Profile Analysis Models.

<table>
<thead>
<tr>
<th>No. of classes</th>
<th>No. of free parameters</th>
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<th>3</th>
<th>4</th>
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<td>7631.26</td>
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<tr>
<td>ABIC</td>
<td></td>
<td>7940.33</td>
<td>7693.90</td>
<td><strong>7680.69</strong></td>
<td>7554.63</td>
<td>7504.46</td>
</tr>
<tr>
<td>LRT</td>
<td></td>
<td>—</td>
<td>262.72*</td>
<td><strong>129.50</strong></td>
<td>52.36*</td>
<td>56.46</td>
</tr>
<tr>
<td>Entropy</td>
<td></td>
<td>—</td>
<td>.80</td>
<td>.90</td>
<td>.84</td>
<td>.83</td>
</tr>
<tr>
<td>BLRT</td>
<td></td>
<td>—</td>
<td>262.72**</td>
<td><strong>129.50</strong></td>
<td>52.36**</td>
<td>56.46**</td>
</tr>
</tbody>
</table>

Note: AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; ABIC = Adjusted BIC; LRT = Lo, Mendell, and Rubin Likelihood Ratio Test; *p < .05; **p < .001; Bold entries reflect selected model.
Table 2. Estimates of Latent STAXI-2 Scores and Prevalence of Anger Profiles for the LPA Model.

<table>
<thead>
<tr>
<th>Estimates of latent STAXI-2 scores and prevalence of anger profiles</th>
<th>High anger profile ((N = 91)) (SD)</th>
<th>Overwhelmed anger profile ((N = 13)) (SD)</th>
<th>Low anger profile ((N = 140)) (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperament</td>
<td>10.05 (1.60)</td>
<td>16.76 (1.81)</td>
<td>6.08 (1.15)</td>
</tr>
<tr>
<td>Reaction</td>
<td>14.12 (3.16)</td>
<td>14.80 (3.74)</td>
<td>10.94 (3.12)</td>
</tr>
<tr>
<td>External Anger Expression</td>
<td>12.53 (2.59)</td>
<td>17.13 (2.07)</td>
<td>9.20 (2.21)</td>
</tr>
<tr>
<td>Internal Anger Expression</td>
<td>14.68 (3.21)</td>
<td>16.28 (2.36)</td>
<td>11.51 (3.13)</td>
</tr>
<tr>
<td>External Anger Control</td>
<td>16.47 (3.41)</td>
<td>12.86 (3.92)</td>
<td>19.88 (3.32)</td>
</tr>
<tr>
<td>Internal Anger Control</td>
<td>14.31 (3.79)</td>
<td>11.81 (4.64)</td>
<td>15.70 (4.45)</td>
</tr>
</tbody>
</table>
Table 3. Profile Differences in Burnout and Coping using the Bolck, Croon, and Hagenaars Method.

<table>
<thead>
<tr>
<th></th>
<th>(a) High anger profile (n=91)</th>
<th>(b) Overwhelmed anger profile (n=13)</th>
<th>(c) Low anger profile (n=140)</th>
<th>Chi-Square tests</th>
<th>Eta²</th>
<th>α</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>overall test</td>
<td>(a) vs. (b)</td>
<td>(a) vs. (c)</td>
</tr>
<tr>
<td>Physical and Emotional Exhaustion</td>
<td>12.13 (.45)</td>
<td>12.62 (1.34)</td>
<td>10.11 (.28)</td>
<td>15.61***</td>
<td>.12</td>
<td>13.45***</td>
</tr>
<tr>
<td>Reduce Sense of Accomplishment</td>
<td>13.05 (.39)</td>
<td>13.78 (1.26)</td>
<td>11.05 (.30)</td>
<td>18.09***</td>
<td>.30</td>
<td>15.49***</td>
</tr>
<tr>
<td>Sport Devaluation</td>
<td>10.00 (.48)</td>
<td>13.27 (1.48)</td>
<td>9.34 (.33)</td>
<td>7.37*</td>
<td>4.40*</td>
<td>1.17</td>
</tr>
<tr>
<td>Resignation</td>
<td>9.00 (.38)</td>
<td>9.16 (1.01)</td>
<td>7.00 (.23)</td>
<td>21.55***</td>
<td>.02</td>
<td>18.95***</td>
</tr>
<tr>
<td>Relaxation</td>
<td>13.00 (.35)</td>
<td>13.70 (.72)</td>
<td>13.44 (.27)</td>
<td>1.22</td>
<td>.76</td>
<td>.91</td>
</tr>
<tr>
<td>Distancing</td>
<td>7.06 (.25)</td>
<td>8.32 (.49)</td>
<td>6.55 (.19)</td>
<td>12.19**</td>
<td>5.32*</td>
<td>2.38</td>
</tr>
<tr>
<td>Logical Analysis</td>
<td>24.77 (.49)</td>
<td>24.77 (.96)</td>
<td>24.52 (.36)</td>
<td>.19</td>
<td>.00</td>
<td>.16</td>
</tr>
<tr>
<td>Seeking for support</td>
<td>6.82 (.25)</td>
<td>6.92 (.72)</td>
<td>6.93 (.20)</td>
<td>.11</td>
<td>.02</td>
<td>.11</td>
</tr>
<tr>
<td>Imagery/Thought Control</td>
<td>18.18 (.37)</td>
<td>19.17 (.61)</td>
<td>18.88 (.29)</td>
<td>2.69</td>
<td>1.85</td>
<td>1.99</td>
</tr>
<tr>
<td>Venting Emotions</td>
<td>8.81 (.35)</td>
<td>9.00 (.80)</td>
<td>6.56 (.23)</td>
<td>31.35***</td>
<td>.05</td>
<td>26.73***</td>
</tr>
<tr>
<td>Mental Distraction</td>
<td>6.41 (.29)</td>
<td>8.10 (.96)</td>
<td>6.50 (.24)</td>
<td>2.80</td>
<td>2.77</td>
<td>.05</td>
</tr>
</tbody>
</table>

Note. ¥ p ≤ .07 * p < .05 ** p < .01 *** p < .001.